GARISSA UNIVERSITY

UNIVERSITY EXAMINATION 2017/2018 ACADEMIC YEAR ONE SECOND SEMESTER EXAMINATION

SCHOOL OF EDUCATION, ARTS AND SOCIAL SCIENCES

FOR THE DEGREE OF BACHELOR OF EDUCATION (ARTS)

COURSE CODE: COM212

COURSE TITLE:

EXAMINATION DURATION: 3 HOURS

DATE: /12/17 **TIME: .00-.00 PM**

INSTRUCTION TO CANDIDATES

- **The examination has SIX (6) questions**
- **Question ONE (1) is COMPULSORY**
- **Choose any other THREE (3) questions from the remaining FIVE (5) questions**
- **Use sketch diagrams to illustrate your answer whenever necessary**
- **Do not carry mobile phones or any other written materials in examination room**
- **Do not write on this paper**

This paper consists of TWO (2) printed pages ***please turn over***

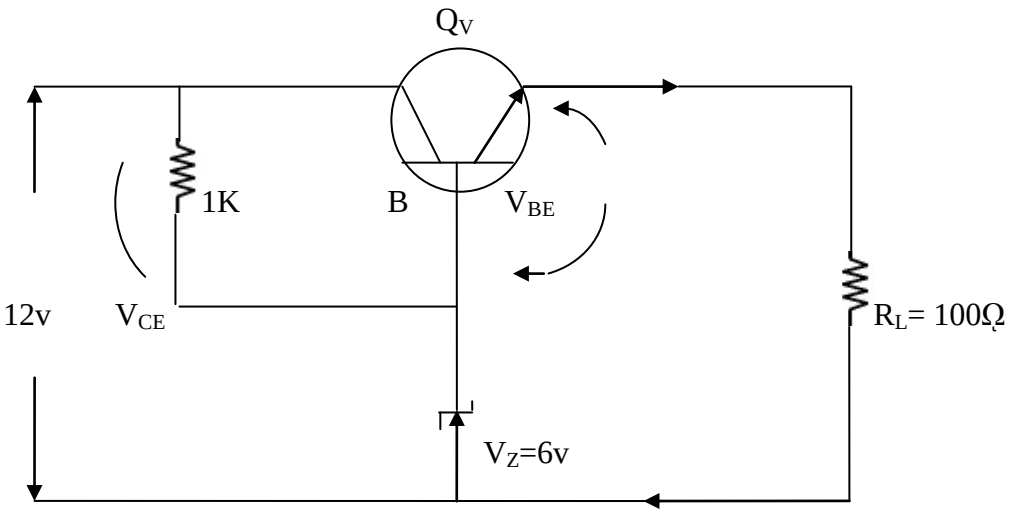
QUESTION ONE (COMPULSORY)

(a). i. Determine the valency electrons of Gallium with an atomic number of 31. [2 marks]

ii. Atomic nuclei are made of protons and neutrons. This fact by itself shows that there must be another kind of interaction in addition to the electrical forces. Explain [2 marks]

iii. With reference to energy bands explain electrical conduction and atomic structure of Conductors, Insulators and Semiconductors. [6 marks]

(b). Using the emitter follower regulation circuit below compute the values of



i. V_L [2 marks]

ii. I_E [2 marks]

iii. Power dissipated by Q_V [3 marks]

(d). i. Identify advantages of digital signals over analog signals. [3 marks]

ii. Comment on the electrical conductivity of metals and semiconductors. [2 marks]

iii. Explain the purpose of electronic voltage regulators in computers, automobile alternators and central power station. [3 marks]

QUESTION TWO (15 MARKS)

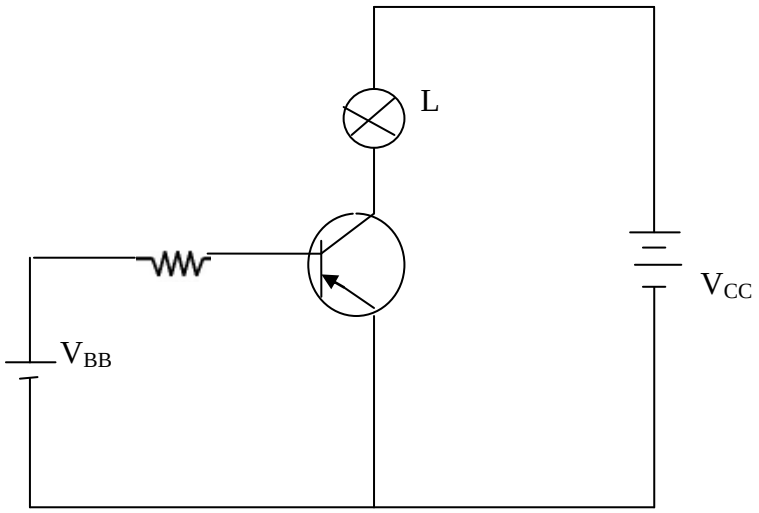
(a). State three regions in which a BJT transistor operates. [3 marks]

(b). i. Explain why the collector region of most transistors are larger than Emitter and Base regions. [2 marks]

ii. With the aid of illustrations discuss pnp transistor biasing of emitter-base junction.

[4 marks]

iii. The figure below shows a lamp in a transistor circuit configuration. State and explain if the lamp is ON or OFF. [4 marks]



iv. Define common emitter forward amplification factor β dc. [2 marks]

QUESTION THREE (15 MARKS)

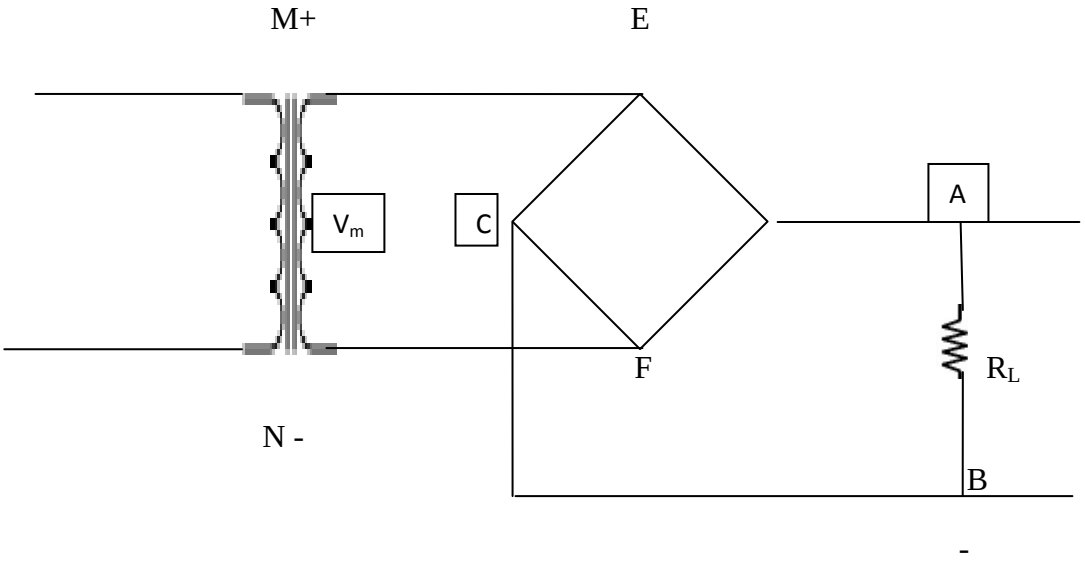
(a). i. State function of a voltage regulator . [2 marks]

ii. Regulated power supply systems include transformers, rectifiers and regulators. Outline the functions of the above named power blocks showing input/output relation.

[5 marks]

(b). Define rectification. [1 mark]

(c). The circuit below shows full wave bridge rectifier circuit.



i. Complete the circuit and show current direction through the load resistor R_L [2 marks]

ii. Explain using illustrations full wave rectification in c(i) above [5 marks]

QUESTION FOUR (15 MARKS)

(a). Define logic gate. [1 mark]

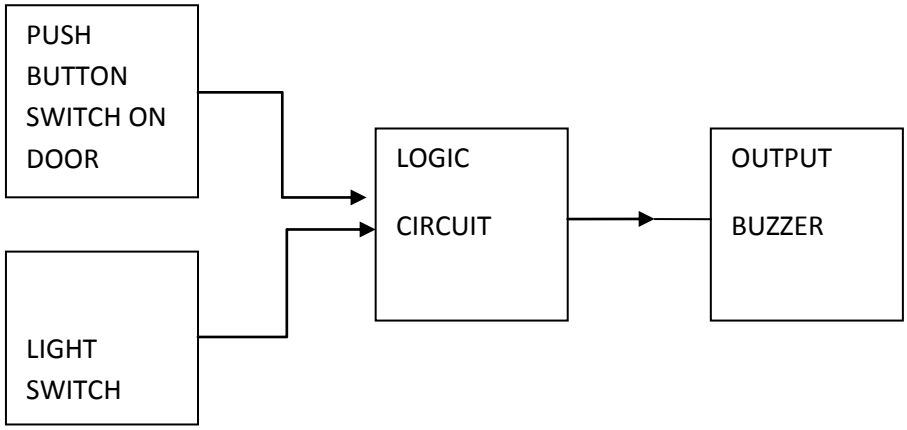
(b). i. The following operations represent common gates. Identify their symbols

AND: [3 marks]

OR:

NOT:

ii. Most new cars have audible alarm systems. The block diagram of lights –on alarm system is as shown below



The table below shows combinations of switches for the lights-on-alarm.

Light switch	Door switch	Audible warning
OFF	OPEN	OFF
OFF	CLOSED	OFF
ON	OPEN	OFF
ON	CLOSED	ON

By choosing the correct logic gate design a system using a truth table which could be used to make the decisions necessary in the lights-on warning system in a car. [5 marks]

(c). i. State two advantages of a bridge rectifier. [2 marks]

ii. Discuss biasing of a p-n junction diode. [4 marks]

QUESTION FIVE (15 MARKS)

(a). i. Define an integrated circuit (IC). [1 mark]

ii. Outline three applications of IC's in modern electronic market. [3 marks]

iii. Distinguish between monolithic and multichip IC's. [2 marks]

(b). i. What do you understand by the terms computer hardware and software. [2 marks]

ii. Can a computer run without a software or hardware?Discuss [2 marks]

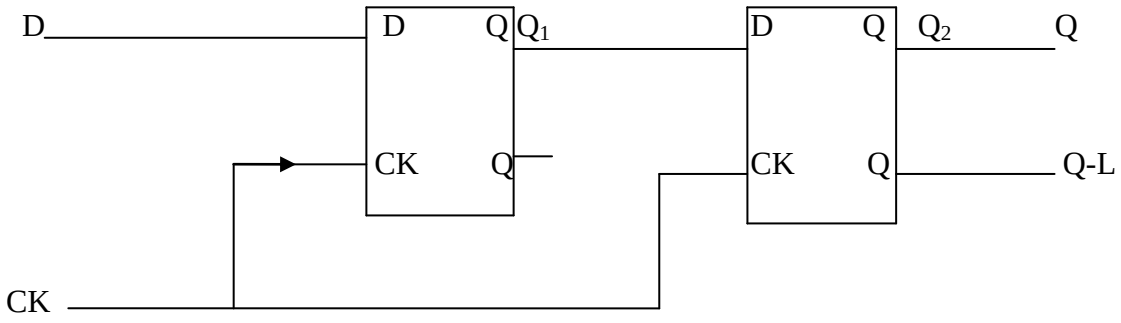
iii. Illustrate ways of installing a computerhardware with reference to computer processor and hard drive. [5 marks]

QUESTION SIX (15 MARKS)

(a). i. State the functions of a flip flop. [2 mark]

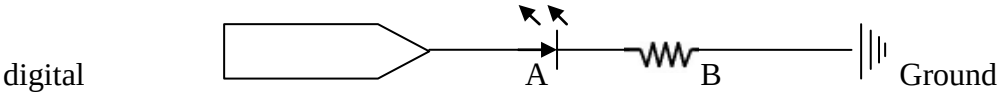
ii. The figure below shows a positive-edge triggered flip flop. Discuss its function.

[2 marks]



Logic diagram

iii. The electronic diagram below shows a circuit of a microcontroller. Name the parts labeled A and B [2 marks]



output pin

iv. Discuss how the parts in a(iii) above are connected to a breadboard and wiring board using jumper cables. [3 marks]

(b). Surveying the rules for Boolean addition, the 0 and 1 values seem to resemble the truth table of a very common logic gate. Which type of gate is this, and what does this suggest about the relationship between Boolean addition and logic circuits? [6 marks]

Rules for Boolean addition:

$0 + 0 = 0$

$0 + 1 = 1$

$1 + 0 = 1$

$1 + 1 = 1$