



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

## UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING

EEE4231: ANALOGUE ELECTRONICS 1.

## END OF SEMESTER EXAMINATION

**SERIES:** DECEMBER 2016

**TIME:** 2 HOURS

**DATE:** DECEMBER 2016

### Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. ANSWER ANY THREE QUESTIONS.

**Do not write on the question paper.**

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### Question ONE

(a) (i).Define the following terms as used with power supplies.

(I).Average Value (II).Ripples.

(ii).State any two applications of DC power supplies.

**(5 Marks).**

(b) (i).Explain the need for a filter circuit in a power supply unit and hence draw an LC filter and explain how it operates.

(ii).Identify the circuit of fig Q1.State the advantages and dis-advantages of the circuit compared to a center tapped transformer type.

**(10 Marks).**

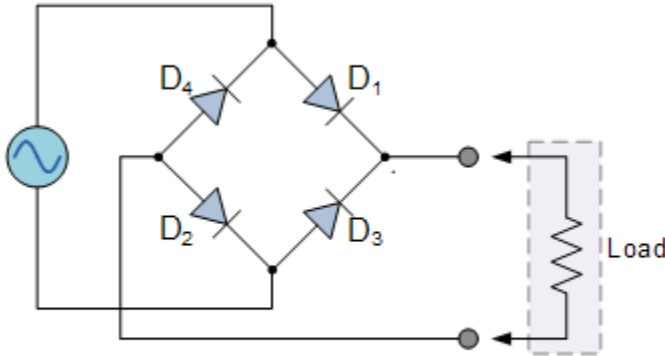
(c).A power rectification circuit uses a transformer with a turn ratio 1:20.The primary side of the transformer is connected to a supply of 240V (rms) at 50Hz.The secondary side is connected to a bridge rectifier in series with a filter circuit. Determine,

(i).Transformer secondary voltage.

(ii).Average and rms output voltage.

(iii).The rms out power if the load is a  $10\Omega$  resistor.

**(5 Marks).**



**Fig Q1**

### Question TWO

(a) (i).Differentiate between an acceptor and a donor atom.

(ii).Explain why devices made of silicon are preferable to those of germanium in circuit construction.

**(6 Marks)**

(b) (i).State the draw-backs of operating semiconductor devices above their rated temperature values.

(ii).With the aid of a diagram, explain the formation of PNP transistor from a pure silicon material.

**(11 Marks).**

(c).A rectifier circuit uses four diodes for rectification purposes. The input voltage to the circuit is 12volts and delivers a current of 6A.Each diode has an internal resistance of  $0.1\Omega$  when forward biased, determine, the load resistance.

**(3 Marks)**

### Question THREE

(a) (i).Differentiate between positive and negative feedback in amplifiers.

(ii)State advantages and disadvantages of employing negative feedback in amplifiers.

**(6 Marks).**

(b) (i).Identify the circuit of fig Q3.

(ii).Explain the significance of this circuit in amplifiers.

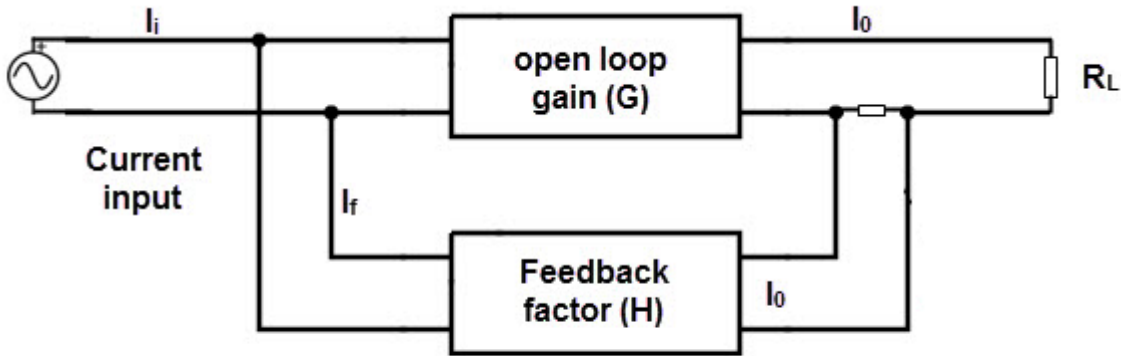
(iii).Derive the relationship between input and output current of the circuit.

**(10 Marks).**

(c).A transistor amplifier has a current gain of 100 and a collector resistance of  $2000\Omega$ . If the input resistance is  $1000\Omega$  and uses current shunt with feedback factor of 0.1, determine the following.

- (i). Voltage gain without feedback.
- (ii). Current gain.
- (iii). Input Resistance.
- (ii). Voltage gain with feedback

**(4 Marks)**



**Fig Q3**

**Question FOUR**

- (a) (i). Differentiate between a uni-junction and a bipolar transistor. State two applications for each type of transistor.
- (ii). Explain the meaning of the following terms for UJTs.

(I) Inter-base resistance. (II). Depletion Layers.

**(8 Marks).**

- (b) (i). Draw and explain the operation of UJT relaxation oscillator.

(ii). A UJT is connected to 12V power supply and passes a DC current of 1.2mA between base 1 and base 2 resistances of the UJT. If the base 1 resistance is 6.5kΩ, Determine,

- (I). Inter-base Resistance (II). Intrinsic standoff ratio of the UJT.

**(12 Marks).**

**Question FIVE**

- (a) (i). Define an amplifier and state any two of its applications.
- (ii). Explain the meaning of the following terms as used in transistor amplifiers.

(I). Coupling Capacitor. (II). Stability Factor.

**(6 Marks)**

(b) (i). Explain why common emitter transistor amplifiers are more common than the other two types of configuration.

(ii). Explain how class A and class B transistor amplifiers differ.

**(4 Marks)**

(c) (i). Draw a common emitter transistor amplifier using a potential divider type of bias and explain its operation.

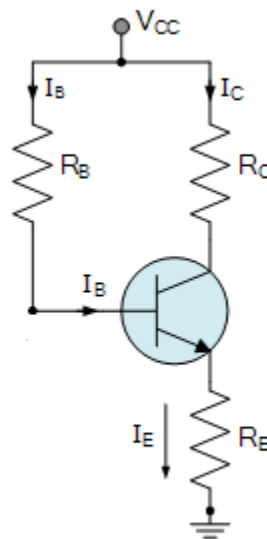
(ii). Given  $R_B = 300\text{k}\Omega$ ,  $R_C = 2000\ \Omega$ , and  $R_E = 1000\ \Omega$  for fig Q5, Determine,

(I). Saturated collector current.

(II). Normal collector current.

(III). Collector voltage.

**(10 Marks)**



**Fig Q5**