



MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

DEPARTMENT: ELECTRICAL ENGINEERING

LEVEL:	DIPLOMA
CLASS:	MRUC EE/P/14DM
TERM/SEMESTER:	YEAR II SEM I
ACADEMIC YEAR:	2014/2015
YEAR OF STUDY:	2015
UNIT:	ANALOGUE ELECTRONICS 2
UNIT CODE:	SEE1202
TIME:	2 HOURS
DATE:	18TH AUGUST 2015

Instructions to candidates

This paper contains Four (4) questions

Questions 1 is Compulsory and Attempt any TWO Questions from Section B

You should have the following for this examination;

- Drawing instruments
- Scientific calculator

Mobile Phones are NOT ALLOWED in Examination Room.

SECTION A

QUESTION ONE

1. a) with the aid of a diagram, explain the principle of Operation of an SCR thyristor highlighting its characteristics (6marks)
- b) I. Explain TWO Methods of turning ON an SCR (4marks)

II Define the following terms with respect to the UJT Characteristic.

- i. Cut-off region
- ii. Negative resistance region
- iii. Saturation region (4marks)

III. The C35 Series SCR have a circuit fusing rating of $75A^2 S$. Determine the maximum allowable duration of 100A surge that passes through one of these devices.

- c) With the aid of a diagram derive the formula for obtaining the Voltage gain for a positive feedback (5marks)
- d) A unijunction Transistor used for triggering the silicon controlled rectifier has $r_{B1} = 4K\Omega$ and $r_{B2} = 2.5K\Omega$. Find (a) the value of intrinsic stand-off ratio, and (b) the peak point voltage, if $V_{BB} = 15V$. Take the barrier potential as 0.7 V (3marks)
- e) I Explain the Frequency Response of RC Coupled Amplifier highlighting its TWO Advantages over other Coupling Methods.

ii With the aid of a well labeled V-I Characteristics curve explain the Zener diode.

Explaining the difference between Zener effect and avalanche breakdown. (8marks)

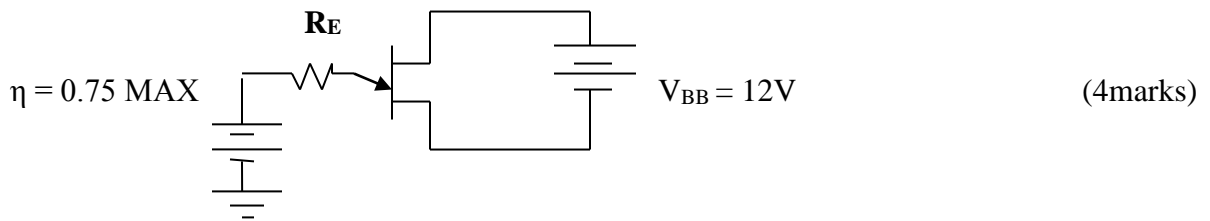
SECTION B

QUESTION TWO

2. a) I with the aid of a diagram explain the principle of Operation of a Triac explaining its V-I Characteristic

II List three applications of a Triac. (7marks)

b) Determine the peak point voltage (V_P) value for the 2N 4870 UJT shown below (Take $V_D = 0.7V$)



QUESTION THREE

3. a) Explain the following as it relates to Op- Amps
- i. Gain
 - ii. Input resistance
 - iii. Output resistance
 - iv. Slew rate (5marks)
 - v. Input offset current.
- b) An Op Amp has a CMRR of 90 decibells. If its differential voltage gain is 30000, calculate its common mode gain (5marks)
- c) List three characteristics of Op Amps (5marks)
- d) With the aid of a diagram explain the V-I Characteristics of a Diac. (5marks)

QUESTION FOUR

4. a) List FOUR advantages and ONE disadvantages of Negative feedback. (5marks)
- ii The Voltage gain of certain Amplifier without feedback is 400. If the feedback ratio (β) is equal to 0.1, find the voltage gain of the Amplifier with negative feedback. (4marks)
- iii An Amplifier has a voltage gain of 1000. With negative feedback, the Voltage gain reduces to 10. Calculate the fraction of the output that is feedback to the input. (6marks)
- b) Explain the following special semiconductor diodes highlighting their characteristics and areas of application
- I Tunnel diode
 - ii Varactor diode
 - III Schottky diode (5marks)