TECHNICAL UNIVERSITY OF MOMBASA

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY (ELECTRICAL POWER ENGINEERING)(DEPE2)

EEE2101 : ANALOGUE ELECTRONICS 1.

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

DATE: MAY 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. Attempt **ANY THREE Questions**
Do not write on the question paper.

Question ONE

(a)(i) State any TWO factors that distinguish a zener diode from a rectifier diode

   (ii) Using a schematic diagram and waveforms explain the operation of a full wave bridge rectifier incorporating a capacitive filter.

(9marks)

(b) For the circuit of figure 1 calculate:

 (i) the value of resistor R

(ii) the diode current when the load is 2kΩ

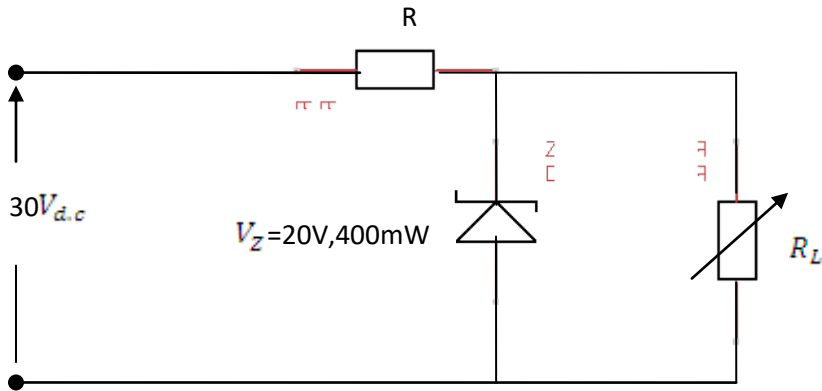**(6marks)**

R

$30V_{d.c}$

V_Z=20V,400mW

R_L

Figure: 1

c) With the aid of diagram explain pentavalent doping process   **(5marks)**

Question TWO

(a)(i) Explain why common emitter (C-E) configuration is preferred than the common Base or common Collector.

(5marks)

(ii)Describe thermal runaway in discrete amplifiers and it effects.   (6marks)

(b) With the aid of waveforms distinguish between the following classes of amplifiers

   i.   Class A
   ii.   Class B
   iii. Class C   (9marks)

Question THREE

(a)(i) State any THREE methods of biasing a transistor

  (ii) Explain TWO purposes for each of the following

   I.   d.c loadline
   II.   a.c loadline

(7marks)

(b) The characteristics of a BJT are given in table 1 below

   The transistor has a collector load of 1500Ω, a supply voltage of 6V and a bias current of 40μA

   i.   Plot the characteristics
   ii.   Draw the d.c and a.c loadlines on the characteristics
   iii. Calculate the power dissipated in the transistor

iv.   Calculate the total voltage swing at the collector for an a.c input signal current of 40μA peak in the base

(13marks)

V_{CE}	Collector Current I_C (mA)		
	$I_b=0$	$I_b=40\mu A$	$I_b=80\ \mu A$
1	0.2	1.90	3.7
4	0.3	2.05	4.0
7	0.4	2.20	4.3

Table 1

Question FOUR

(a)(i) Define the following terms as used in FETs

  I.   Mutual conductance
  II.   Drain source resistance   (2marks)

(ii)State any TWO advantages and TWO disadvantages of FETs over the Bipolar Junction Transistor

(4marks)

(b)(i) With the aid of a diagram explain the construction and operation of an N-channel JFET

  (ii) Draw the characteristics of b(i) and explain the shape.

(14marks)

Question FIVE

(a)(i) State the functions of the following in the cathode ray oscilloscope

  I.   Graphite coating
  II.   Electron gun

(ii) A C.R.O is used to display a waveform having peak to peak amplitude of 10cm with two cycles occupying 4cm horizontally. The vertical sensitivity is 0.1V/cm and the horizontal time base is set at 5ms/cm. Determine:-

  I.   The r.m.s voltage
  II.   The frequency

(8marks)

(b)(i) With the aid of a circuit diagram explain the operation of a voltage doubler

(ii) Explain the operation of a zener diode regulator when the :-

I.   Load varies
II.   Input voltage varies

(c) A 9-1V, 1.3W zener diode is used as a stabilizer. If the supply voltage ranges between 18V-22V and the load current is constant at 25mA. Determine:-

I.   The value of series resistor R_S
II.   The power dissipated by the zener diode when supply voltage is maximum
III.   The current in the diode when the supply voltage is at 21V

(12marks)