TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY (ELECTRICAL POWER ENGINEERING)(DEPE2)

EEE 2101 : 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)Explain the following terms as used in diodes

  i.   Avalanche breakdown
  ii.   Zener effect

(b) With the aid of a construction diagram explain the NPN transistor action   (10 marks)

c) Distinguish between the following classes of amplifiers illustrating with waveforms:-

  i.   class A
  ii.   class B
  iii. class C   (6 marks)

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

  (ii) Explain the following terms as applied to cathode ray oscilloscope:-

  I.   Time base
  II.   Synchronization

                                                                                   (4marks)

Question TWO

a)(i) Explain any TWO factors that affect the Q-point of an amplifier

(ii) State how the factors in a(i) can be minimized   (6marks)

(b)(i) Explain the term " Thermal runaway"

(ii)State any TWO effects of thermal runaway

(4marks)

c)(i) For figure 1 circuit determine the values of:-

I.   Collector current I_C
II. V_{CE}

Take V_{BE} =0.6V and h_{fe}=100

(ii) Determine the new values of c(i) if a resistor of 1kΩ is connected between emitter and ground

(6marks)

(d)(i) Explain how d.c stabilization is achieved in an emitter feedback biasing circuit.

(ii) State the effect of removing the emitter decoupling capacitor in the biasing circuit of d(i)
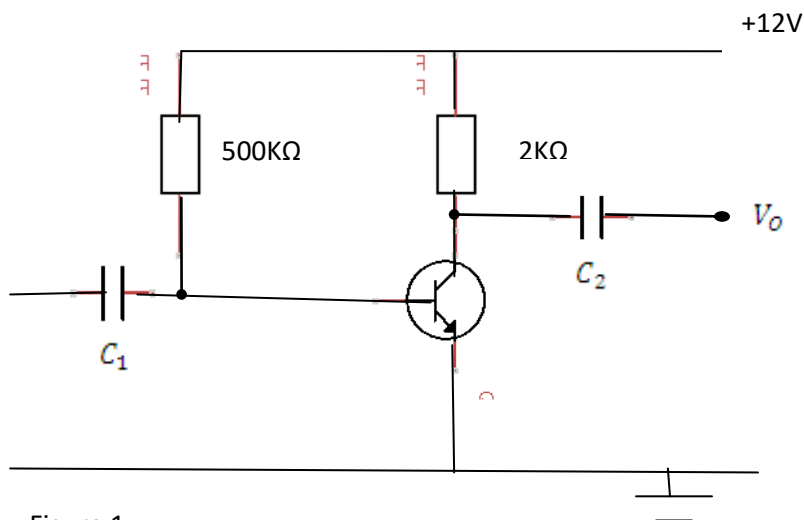
(6marks)

Figure 1

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

(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

V_{CE}	Collector Current I_C (mA)		
	$I_b=0$	$I_b=40$μA	$I_b=80$ μA
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)Define the following terms as applied to power supplies:-

   i.   Ripple
   ii.   Peak Inverse voltage

(b)(i) Draw a circuit diagram of a full wave bridge rectifier and explain its operation with the aid of waveforms.

(ii) State any TWO advantages of full wave bridge rectifier over the centre-tapped.

(iii) With the aid of a circuit diagram explain the operation of a zener diode regulator when:-

   I.   The load varies
   II.   The input voltage varies

                                        (14marks)

c) A 5.6V,1W zener diode regulator having a minimum current of 5mA is used in a shunt regulator to supply a constant load current of 20m from a supply voltage which varies between 15V and 24V. Calculate:-

   i.   the suitable value of series resistor Rs
   ii.   the power rating of Rs in C(i) above
   iii. the power dissipated by the zener diode when the supply is at its maximum

Question FIVE

(a)(i) With the aid of a construction diagram describe the operation of an n-channel JFET

(ii) State any TWO differences between FET_s and BJT_s

(10 marks)

(b) For the JFET amplifier of figure 2 g_m=2000µs, Determine:-

i. Its input impedance
ii. a.c output resistance
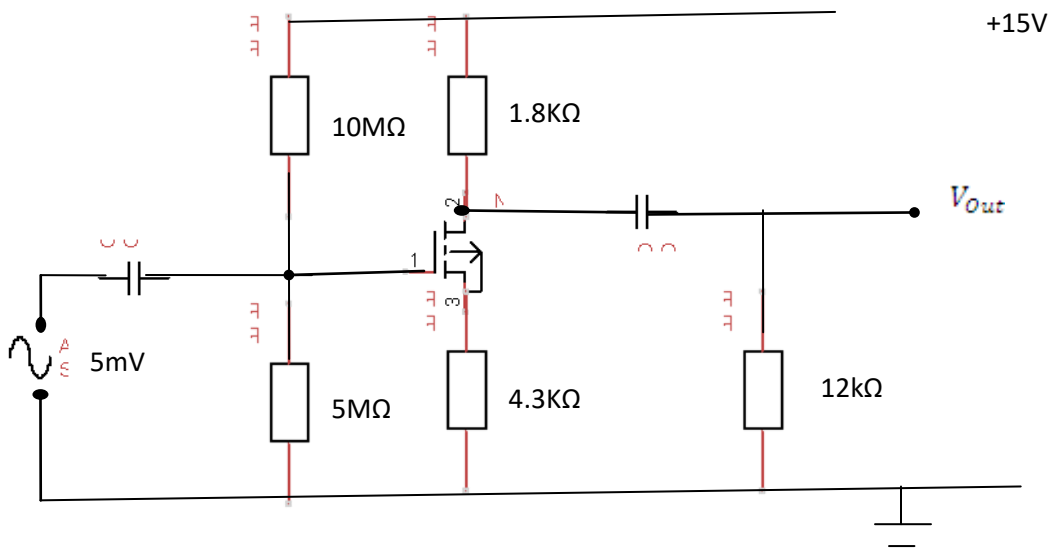iii. output voltage

(6marks)

Figure 2:

c) Explain the following terms as applied in FETs

i. pinch-off voltage
ii. Transconductance

(4marks)