



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING (DMAE)

EMR 2204 : MARINE 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. Attempt **ANY THREE Questions**

Do not write on the question paper.

Question ONE

a)(i) State any TWO advantages of the full wave rectifier over half-wave

(ii) With the aid of a circuit diagram and waveforms explain the operation of a bridge rectifier

(9marks)

(b)(i) Explain the formation of a PN junction

(ii) The current-voltage characteristics of a semiconductor diode is given in the Table below

| | | | | | | |
|---------------------|------|-----|------|------|------|-----|
| Forward Voltage (V) | 0.05 | 0.1 | 0.15 | 0.20 | 0.25 | 0.3 |
| Current (mA) | 0.2 | 0.4 | 0.6 | 4.0 | 30 | 200 |

Plot the characteristics and hence explain the shape

(11marks)

Question TWO

- (a)(i) State any THREE methods of biasing a transistor
(ii) Explain why common emitter (C-E) configuration is preferred than the common Base or common Collector. (7marks)
- (b) (i) With the aid of a construction diagram explain the NPN transistor action
(ii) With the aid of waveforms distinguish between the following classes of amplifiers
I. Class A
II. Class B
III. Class C (13 marks)

Question THREE

- a) Explain the meaning of the following terms:
(i) Doping
(ii) Peak Inverse Voltage (3marks)
- (b)(i) State any TWO advantages of ICs over discrete circuits
(ii) Explain the etching sequence for the monolithic ICs (10marks)
- (c) Define the following terms as used in the manufacture of monolithic integrated circuits:
(i) metallization
(ii) wafer
(iii) encapsulation
(iii) Diffusion mask (7marks)

Question FOUR

- (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 $1k\Omega$ is connected between emitter and ground (6marks)

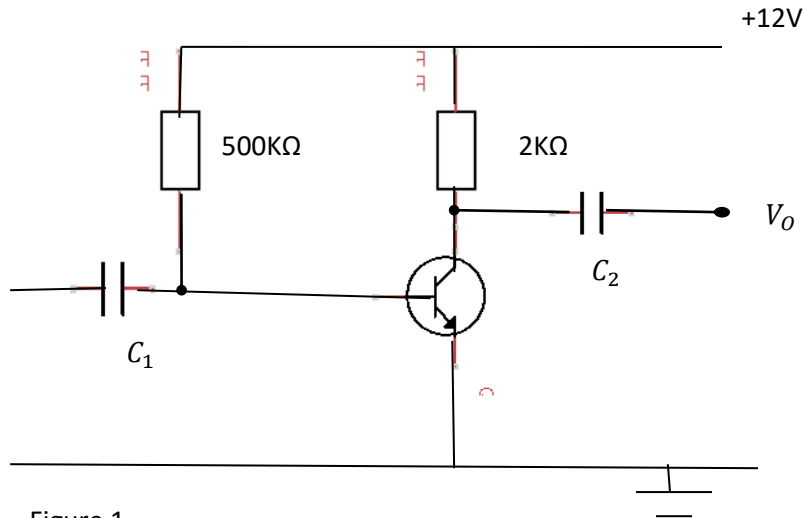


Figure 1

(d) Explain how d.c stabilization is achieved in an emitter feedback biasing circuit. **(4marks)**

Question FIVE

(a) Define the following terms as applied to OPAMPS

- (i) Slew rate
- (ii) Common mode rejection ratio

(3marks)

(b) (i) With the aid of a diagram derive the expression for gain of a non-inverting OPAMP circuit.

(ii) For the differential amplifier of figure 2 determine its output voltage

(12marks)

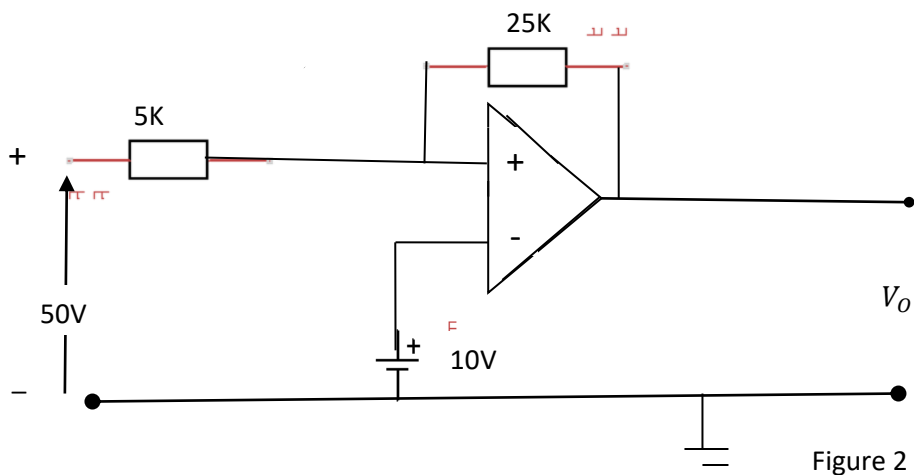


Figure 2

c) With the aid of a circuit diagram explain the operation of an OPAMP as an integrator

(5marks)