TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING) (DMAE3)

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)Define the following terms:

(i) intrinsic semiconductor

(ii) extrinsic semiconductor **(4marks)**

(b) With the aid of a diagram, explain the formation of a P-type extrinsic material **(5marks)**

(c))(i) State any TWO advantages of ICs over discrete circuits

(ii) Define the following terms as used in the manufacture of monolithic integrated circuits:

(I) metallization

(II) wafer

(III) encapsulation

(IV) Diffusion mask **(11marks)**

Question TWO

(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.

(8marks)

(b)(i)Explain the formation of a P-N junction
(ii) Sketch the silicon diode forward and reverse characteristics and explain its shape **(8marks)**

(c) Explain any TWO applications of LED_S **(4marks)**

Question THREE

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

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

i. class A
ii. class B
iii. class C **(12marks)**

(c) (i) Give any THREE reasons why the Common Emitter (C-E) connection is preferred over the other configurations
(ii) With the aid of a construction diagram explain the NPN transistor action **(8marks)**

Question FOUR

(a)(i) State any THREE advantages of a Transistor as an electronic switch over mechanical switches

(ii) Draw the common emitter output characteristics and explain under which conditions a transistor may be used as a switch rather than an amplifier. **(8marks)**

(b)With the aid of a two-diode representation of both an NPN and PNP transistor explain how you can determine the serviceability of these transistors by use of an ohmmeter. **(8marks)**

(c) Calculate the value R_B of figure 1 below (Take I_B = 7.5µA and V_{BE} = 0.6V) **(4marks)**

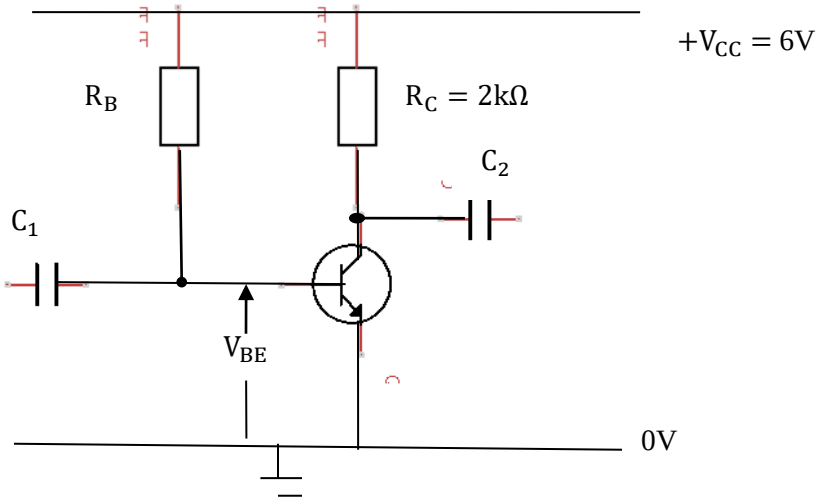

Figure 1

Question FIVE

(a)(i) Derive the expression of the voltage gain when an OPAMP is connected as a non-inverting amplifier

(ii) For the circuit of the summing amplifier of figure 3 determine the value of the output voltage

(11marks)

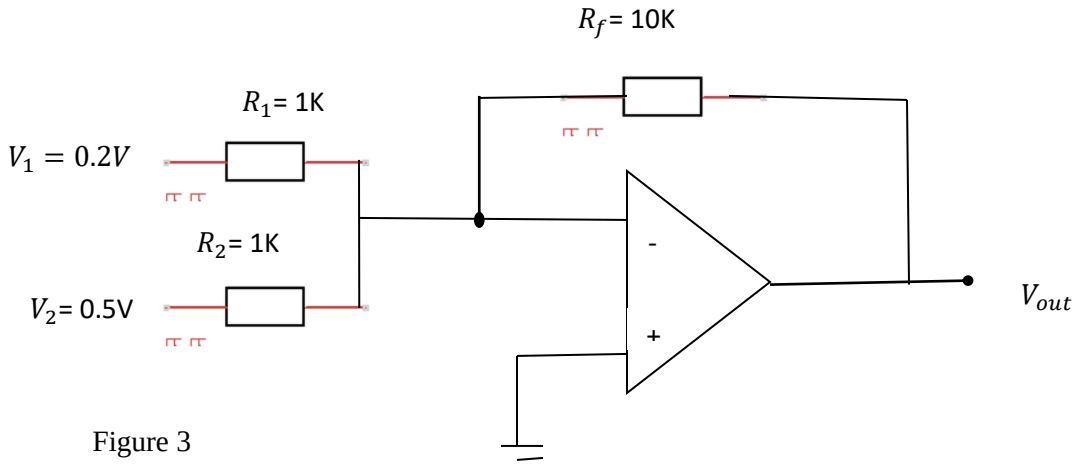

Figure 3

(b)(i) With the aid of a diagram explain the operation of an OPAMP as an integrator

(ii)Explain the following parameters as applied to OPAMPS

I Slew rate

II Input offset voltage

III Common mode rejection ratio **(9marks)**