



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN TECHNOLOGY (ELECTRICAL & ELECTRONICS ENGINEERING) (CEEE3)

EEE 1202: INDUSTRIAL ELECTRONICS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: SEPTEMBER 2018

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 THREE general requirements for alarm circuits

(ii) Explain the operation of the alarm circuit of figure 1 below

(9marks)

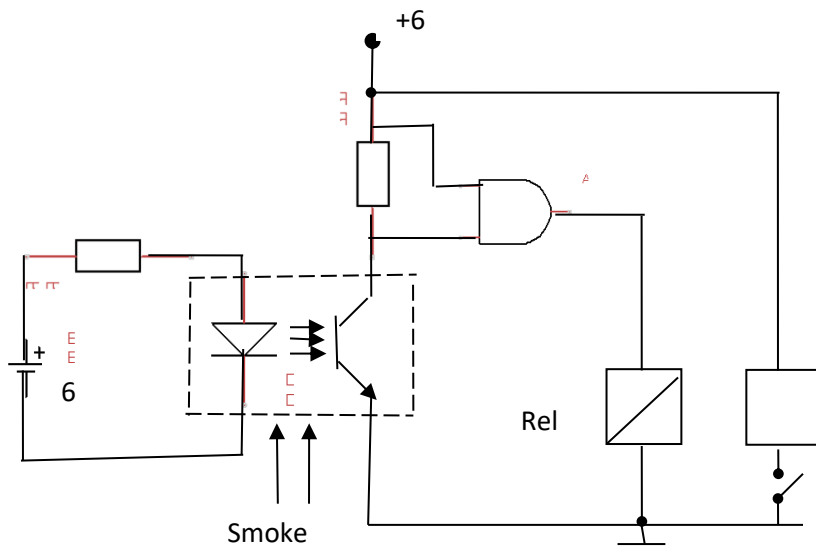


Figure 1:

(b)(i) Describe any THREE features of a good alarm system

(ii) Explain the following types of closed circuit television camera CCTV

I. Remote operation type

II. Self contained (Monoblock)

(11marks)

Question TWO

(a)(i) With the aid of a diagram explain the construction of a light emitting diode

(ii) State the elements and voltages applied to give the following light colours in LEDs

I. Green

II. Yellow

(8marks)

(b) Explain the following sensors used in industrial circuits

i. Infra-Red

ii. Thermocouple

(6marks)

(c)(i) State any TWO applications of a strain gauge

(ii) Show that for a strain gauge:-

$$\Delta R = 2R_0 \frac{\Delta l}{l_0}$$

Where R_0 = sample resistance

l_0 = length in meters

(6marks)

Question THREE

(a)(i) Describe THREE modes of heat transfer

(ii) With the aid of a sketch explain the operation of eddy currents heating

(10marks)

(b) (i) State any TWO transducers used in each of the following physical variables

I. Load

II. Position

III. Velocity

IV. Temperature

(ii) State the limitations of remote transducers and how these limitations are overcome. **(10marks)**

Question FOUR

(a)(i) State any TWO applications of a thyristor

(ii) With the aid of a diagram and waveforms describe how power control is achieved using an SCR

(8marks)

(b)(i) Describe the operation of the thyristor using the two transistor analog

(ii) Sketch the thyristor characteristics and explain the shape

(12marks)

Question FIVE

(a) State with reasons the most appropriate type of electric heating to be applied for each of the following:

- I. Tip hardening of chisel
- II. Cooking pot
- III. Curing of sand cores in foundries

(6marks)

(b) (i) Explain any THREE temperature control techniques for resistance ovens

(ii) List any TWO desirable properties of resistance heating.

(8marks)

(c) Explain any FOUR advantages and any TWO disadvantages of electric heating in comparison with fossil fuels.

(6marks)