



MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING

EED 216: POWER ELECTRONICS

DATE: 10/5/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS:

- i. Question ONE is COMPULSORY
- ii. Do any other TWO Questions
- iii. Neat work required

QUESTION ONE (30 MARKS)

- a) Differentiate a power Diode and a silicon controlled rectifier (SCR) (4 marks)
- b) What is a thyristor? (2 marks)
- c) Explain briefly the operation of a converter? (4 marks)
- d) With an aid of labeled diagrams , explain how a sensor works (8 marks)
- e) Explain briefly the conversion of both Digital & Analogue signals in an Electronic Transducer (10 marks)
- f) Mention any TWO applications of Digital signals. (2 marks)

QUESTION TWO (20 MARKS)

- a) Identify THREE methods used in industrial heating process (3 marks)
- b) With an aid of labeled diagrams explain
 - i. Basic set up for induction Heating (10 marks)
 - ii. Application of Eddy Currents in an cylindrical metal piece (5 marks)

- iii. Give an Expression for density of current induced in a thick smooth metal piece (2 marks)

QUESTION THREE (20 MARKS)

- a) List any FOUR advantages and TWO disadvantages of induction Heating (12 marks)
b) With an aid of a table tabulate binary to voltage representation of quantities (8 marks)

QUESTION FOUR (20 MARKS)

- a) Define dielectric Heating (3 marks)
b) Describe the process of Dielectric operation in industrial plants (12 marks)
c) A slab of insulating material 150 cm^2 in area and 1 cm thick is to be heated by dielectric heating. The power required is 400W at 30 MHZ. The material has relative permittivity of 5 and p.f of 0.5 Determine the necessary voltage required (Absolute permittivity = $8.85 \times 10^{-12} \text{ F/M}$ (5 marks)

QUESTION FIVE (20 MARKS)

Describe a cyclo converter circuit