



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY (ELECTRICAL POWER ENGINEERING)(DEPE5)

EEP 2303 : POWER ELECTRONICS 11

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) Explain the operation of the induction-motor speed control of figure 1 below.

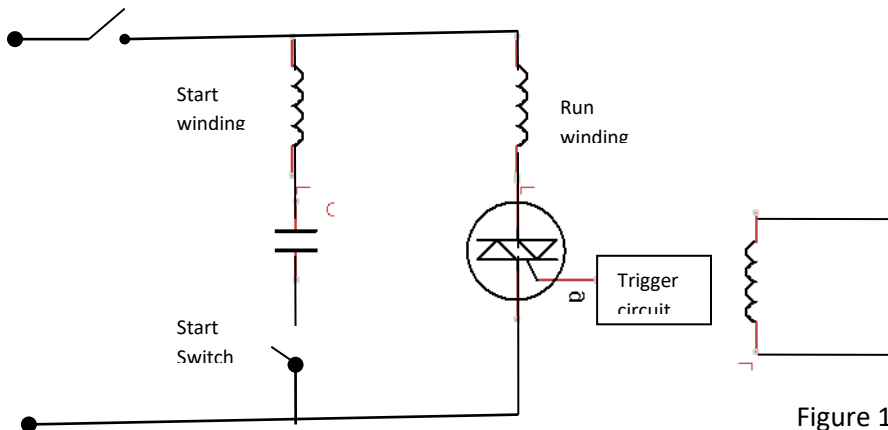


Figure 1

(ii) With the aid of a block diagram explain the operation of a variable d.c speed drive
(10marks)

(b) (i) Explain the principles of operation of an inverter by use of basic circuit.

- (ii) Draw the circuit of a Mc Murray Bedford inverter and describe its operation.
(10marks)

Question TWO

- (a)(i) Explain the following terms applied in filters:-

- I Image impedance
- II Insertion loss

- (ii) Draw a correctly terminated T-section network and show that its propagation coefficient is given by:-

$$\text{Cosh } P = 1 + \frac{Z_1}{2Z_2}$$

(10marks)

- (b)(i) Explain any THREE most covered types of axial movements available in CNC machines

- (ii) Define the FOUR basic limb configurations incorporated in robots.

(10marks)

Question THREE

- (a) (i) With the aid of a basic circuit diagram and waveforms explain the operation of a cycloconverter

- (ii) Explain the major limitation of using a cycloconverter in speed control of motors

(9marks)

- (b)(i) Explain the importance of commutating diode in controlled rectification and how it helps in power control.

- (ii) Draw a three phase controlled converter circuit diagram and explain the process of regenerative braking of a d.c motor.

(11marks)

Question FOUR

- (a)(i) With the aid of a low pass π -filter section derive its characteristic impedance expression

(5marks)

- (ii) Design a constant K low pass T-section filter having a cut-off frequency of 2kHz and an impedance of 500 Ω .

(6marks)

- (b)(i) Show how a bridged T-section network can be reduced to a lattice section

- (ii) A constant K T-section filter consists of two series elements each of 60mH and a shunt capacitor of 0.1 μ F, Determine:-

- I Its cut-off frequency
- II Iterative impedance at 2kHz

(9marks)

Question FIVE

- (a)(i) With the aid of a block diagram explain the structure of computer Aided Part Programming(CAPP) software in a manufacturing industry.

- (ii) Explain the following types of robots

- I Manufacturing robots
- II Handling

(10marks)

(b) Explain the following CNC program features

(i) canned cycles

(ii) CNC program macro

c) With the aid of a labelled block diagram explain the operation of a numerically controlled machine.

(10marks)