TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY (ELECTRICAL POWER ENGINEERING)(DEPE5)

EEP2306 : POWER ELECTRONICS 11.

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

DATE: MAY 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

(i)Define the term "Insertion loss" for a filter transmission network

(ii) Deduce the relationship between the impedances of a symmetrical π network and that of an equivalent T-network

(7marks)

b(i)With the aid of a low pass T filter section show that its characteristic impedance is given by:

$$Z_{OT} = \sqrt{\{Z_1 Z_2 (1+\frac{Z1}{4Z2})\}}$$

(ii) Design a constant K low pass T-section filter having a cut-off frequency of 2kHz and an impedance of 800Ω.

(13marks)

Question TWO

(a)State:

(i) Any TWO advantages of computer Aided design CAD

(ii) the main roles of the following in CAD

I Computer

II Designer

(6marks)

b)(i) Describe the following robot elements

I Controller

II Manipulator

III Tooling

(6marks)

(ii) With the aid of a labelled block diagram explain the operation of a numerically controlled machine

(8marks)

Question THREE

a)(i) State any THREE advantages of using thyristor motor control

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

(8marks)

b)(i) Explain the word "overlap" as used in 3phase rectifier circuits

(ii) Derive the expression of overlap angle in 3phase diode rectifier circuit in terms of load current I_L,circuit inductance X_L,and maximum phase voltage $V_{MAX(phase)}$.

(9marks)

c) Explain why the rectifier circuit does not open during the period of overlap in rectification

(3marks)

Question FOUR

(a)(i) Explain the principles of operation of an invertor by use of basic circuit.

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

(9marks)

(b)(i) With the aid of a block diagram explain the speed control of an induction motor or synchronous motor by use a cycloconvertor.

(ii) Draw the circuit of a Mc Murray Bedford invertor and describe its operation.

(11marks)

Question FIVE

(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:-

$$\text{Cosh } P=1+\frac{Z1}{2Z2}$$

(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)