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Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | |

B. Tech. EEE

UTU (SEM.-VI) Examination-2015

POWER ELECTRONICS

Time : 3 Hrs. ***Max. Marks :100***

Instructions:

All questions are Compulsory. (5×4=20 Marks)

1. Attempt any four :

a) What is a Thyristor. Sketch and explain I-V characteristics of a Thyristor.

b) Define string efficiency? Discuss series and parallel operation of a Thyristor.

c) Explain principle of operation of Step up and Step-down chopper.

d) Discuss dual converters.

e) Analyze single phase ac voltage controller with resistive load. Obtain expression for mean and rms value of output voltage waveform.

f.) Explain harmonic reduction techniques for inverter output voltage.

2. Attempt any **Four** : (5×4=20 Marks)

a) Discuss two-transistor model of Thyristor.

b) Explain design consideration of snubber circuits for Thyristor protection.

c) A single phase half wave converter is operated from 230V,50Hz source and the load resistance is 12 Ω. For a firing angle delay of 30°, determine (i) rectification efficiency.(ii) form factor,(iii)voltage ripple factor

d) Explain principle of operation of single phase to single phase step up cycloconverter.

e) List out methods of voltage control in single phase inverters.

f) Compare characteristics of IGBT and Power MOSFET.

3. Attempt any **TWO**. (10×2=20 Marks)

a) Discuss 120° mode of operation of three phase voltage source inverter. A three phase bridge inverter delivers power to a resistive load from a 415V dc source. For a

star connected load of 15 Ω per phase. For 120° mode of operation determine,

i) RMS value of load current

ii) RMS value of Thyristor current

iii) Load power

b) Explain integral cycle control of AC voltage controllers. A single phase voltage controller has input voltage of 220V, 50Hz and a load of 10 Ω. For 8 Cycles on and 4 Cycles off, determine

(i) RMS output voltage

ii) Average and RMS Thyristor currents.

(c) List out commutation techniques of Thyristor.

4. Attempt any **Two**. (10×2=20 Marks)

(a) Discuss classification of choppers.

(b) Discuss 180° mode of operation of three phase voltage source inverter. A star connected load of 20 Ω per phase id fed from 420 V dc source through a 3-phase bridge inverter. For 180° mode of operation determine,

(i) RMS value of load current

(ii) RMS value of Thyristor current

(iii) Load power

(c) Analyze three phase to three phase cycloconverter and hence obtain output voltage equation for a cycloconverter.

5. Attempt any **Two.** (10×2=20 Marks)

(a) A Single phase full wave SCR circuit feeds power to a resistive load. Draw waveforms for source voltage, load voltage, load current and voltage across SCR for a given firing angle α. Hence obtain expression for average and rms load voltages in terms of source voltage and firing angle.

(b) Discuss single phase capacitor-commutated Current Source Inverter with R load. Analyze the output voltage waveform to determine expression for Input power.

(C) List out methods to turn-on a Thyristor.

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