SCHOOL OF ENGINEERING AND TECHNOLOGY

D.C. COURT JUNCTION, DIMAPUR

End Term Examination June 2017

Course Code:	EC6T04	**Semester:**	VI	**TotalMarks**	60
Course Name:	**Power Electronics**			**Time:**	3hrs.

Answer the following questions:

A. Multiple choose question. (10X1=10)

i. A chopper in which current remains positive but voltage may be positive or negative is known as
   a) type A b) type B c) type C d) type D

ii. In the SPWM, the modulating signal is
   a) Square
   b) Sinusoidal
   c) Triangular
   d) Saw – tooth

iii. In a thyristor, anode current is made up of
   a) electrons only b) electrons or holes
   c) electrons and holes d) holes only

iv. A PWM switching scheme is used with a three phase inverter to
   a) Reduce the total harmonic distortion with modes filter
   b) Minimize the load on the dc side
   c) Increase the life of the batteries
   d) Reduce low order harmonics and increase high order harmonics

v. In dc hoppers, per unit ripple is max. When duty cycle α is
   a) 0.2 b) 0.7 c)0.5 d) 0.9

vi. SMPS are superior to linear power supplies in respect of
   a) size and efficiency
   b) efficiency and regulation
   c) regulation and noise
   d) noise and cost

vii. Integral cycle control
   a) is very fast in action
   b) does not introduce sub-harmonics in the supply lines which are difficult to filter
   c) cannot be used on inductive loads
   d) can be advised only for loads with high time constant and limited range control

viii. A chopper can be used on
   a) PWM only b) FM only
   c) both PWM and FM d) AM only

ix. The number of p-n junction in a thyristor is
   a) 1 b) 2 c) 3 d) 4

x. In a 3-phase full converter, the six SCRs are fired at an interval of
   a) 30° b) 60° c)90° d)120°

B. Answer any five of the following question. (5X4=20)

1. What is cycloconverter? Explain the basic principle of single-phase to single-phase step-down cycloconverter with the help of mid-point configuration.
2. Explain in brief any two methods employed for the reduction of harmonics in the inverter output voltage.
3. For type-A chopper with dc source voltage =230 V, load resistance =10Ω. Take a voltage drop of 2V across chopper when it is on. For a duty cycle of 0.4, calculate
   (a) Average and RMS output voltage and
   (b) Chopper efficiency
4. Explain in brief buck-boost regulator.
5. What is the effect of source impedance on the performance of phase controlled converters? Explain.
6. In brief explain the forward blocking and forward conducting mode of thyristors.
7. Explain the principle of phase control of ac voltage controller.

C. Answer any four of the following question (4X7.5=30)

[*Illustrate your answer with appropriate circuits and waveforms*]

8. Discuss the different modes of voltage-commutated chopper.
9. Discuss the operation of single-phase voltage controller with RL load for the conditions when $\alpha>\phi$ and $\alpha=\phi$.
10. Elaborate the principle operation of thee-phase star connected ac voltage controller with balanced resistive load.
11. Discuss the principle operation of working of a three-phase bridge inverter when each thyristors conducts for 180° and the resistive load is star connected.
12. Discuss the two-transistor model of a thyristor and derive an expression for the anode current.
13. A single-phase full bridge inverter is connected to an RL load. For a dc source voltage of V_s and output frequency $f = \frac{1}{T}$. Obtain expression for load current as a function of time for the 1st half cycle of the output voltages.

****