Printed Pages: 02 **Subject Code: NEE502**

Paper Id: 120516 **Roll No:** | | | | | | | | | | |

B TECH
(SEM V) THEORY EXAMINATION 2018-19
POWER ELECTRONICS

Time: 3 Hours **Total Marks: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. **2 x 10 = 20**

a. What is the function of power modulator?
b. Give the comparison between transistor and thyristor.
c. What are the problems associated with firing of parallel connected SCRs?
d. What are the merits and demerits of load commutated chopper?
e. Explain freewheeling diode and its effect.
f. What are the points should be considered while selecting converter?
g. Explain why the single phase a.c. regulator using two SCRs must have its trigger source isolated from each other.
h. Discuss the important factors to be considered while feeding transformers through a.c. regulators.
i. What do you mean by total harmonic distortion of an inverter?
j. Explain the function of feedback diodes used in antiparallel with transistors in inverters.

SECTION B

2. Attempt any three of the following: **10 x 3 = 30**

a. Draw and explain the turn off characteristic of the SCR. Explain method of turning off an SCR.
b. Draw and explain the simultaneous triggering circuit of series connected SCRs.
c. A three phase, half wave converter is supplying a load with a continuous current of 40A over a firing angle from 0 to 75°. What will be the power dissipated by the load at these limiting values of firing angle? The supply voltage is 415V(line).
d. Derive an expression for the output current in terms of source voltage, load impedance and firing angle for a single phase a.c. voltage controller with RL load.
e. Briefly explain bipolar and unipolar PWM full bridge inverters.

SECTION C

3. Attempt any one part of the following: **10 x 1 = 10**

(a) Explain the various types of triggering methods of SCR briefly. Which is the universal method and why?
(b) Describe the turn off process in a GTO with the help of appropriate voltage and current waveforms.

4. Attempt any one part of the following: **10 x 1 = 10**

(a) Explain the continuous conduction mode and non-continuous conduction mode of class A chopper and derive the relation for average load current.
(b) A d.c. on-off chopper operating at 1kHz and duty cycle of 10% is supplied from a 200 V source. If the load inductance is 10mH and resistance 10Ω. Compute the maximum and minimum current in the load.

5. Attempt any one part of the following: 10 x 1 = 10

(a) Explain the operation of three phase half wave controlled converter with resistive load, and inductive load. Sketch the associated waveforms also.

(b) Derive an expression for the output voltage of a three phase fully controlled bridge converter by conducting the following factors: (i) overlap – angle
(ii) source - inductance

6. Attempt any one part of the following: 10 x 1 = 10

(a) A single phase load of resistance 12 Ω in series with an inductance of 24 mH is fed from a 240 V , 50 Hz supply by a pair of inverse parallel thyristors. Find the mean power in the load at firing angle of (a) 0^o (b) 90^o and (c) 120^o .Ignore source inductance and device voltage drop

(b) Describe the basic principle of working of a single phase to single phase cycloconverter for both continuous and discontinuous conductions for a bridge type cycloconverter.

7. Attempt any one part of the following: 10 x 1 = 10

(a) A single phase bridge inverter delivers power to a series connected RLC load with R= 2 Ω and ωL= 10 Ω. The period time T is 0.1ms. What value of capacitor C should be load have in order to obtain load commutation for the SCRs. The thyristor turn off time is 10μs. Assume circuit turnoff time T_{off}= 1.5 t_q. Also assume that the load current contains only fundamental components.

(b) Explain three phase inverter in 180^o conduction mode with resistive load, also draw its voltage waveform.