

Code: EE5T4

**III B.Tech - I Semester – Regular/Supplementary Examinations
October 2019**

**POWER ELECTRONICS
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1.

- a) What's the SCR ratings, di/dt in A/ μ sec and dv/dt in V/ μ sec, may vary between?
- b) SCR half cycle surge current is 3000A for 50Hz, then calculate one cycle surge current?
- c) Define Resonant Pulse commutation. What is the circuit turn-off time for main thyristor?
- d) Draw the circuit diagram a 3- ϕ full converter with RL load and write the expression for average load voltage.
- e) Write the formula for RMS value and Peak value of Thyristor current for 3- ϕ Dual converter in circulating current operation.
- f) Formulate for Full bridge inverter L and C commutating elements.
- g) A single phase bridge inverter is feeding from a Input =Vs, R=10ohms, C=0.001F, L=10mH what will be the voltage across the capacitor?
- h) what happens in step-up chopper when T1 is turned on. What is the minimum duty cycle.
- i) Purpose of inductor in Boost regulator, express its peak to peak ripple voltage of capacitor.

- j) Draw the diagram of single phase mid point cyclo converter and draw the load voltage wave form for $f_o = 1/3f_s$.
- k) RMS value of load voltage for 1- ϕ AC voltage controller for R load when $\alpha=45^\circ$.

PART – B

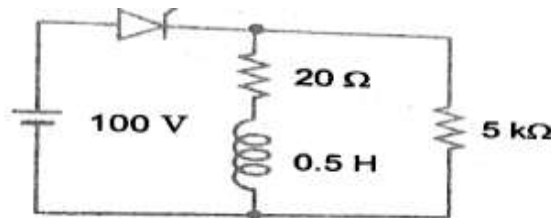
Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Explain the principle of operation of TRIAC. 6 M

b) An SCR turn ON time of 5 μ sec, latching current 50mA holding current of 40mA, the minimum pulse width required to turn on the SCR will be.

6 M



c) Any four Comparisons between GTO and SCR. 4 M

3. a) For a 3- phase full converter, sketch the time variations of input voltage, load voltage and the Voltage across one thyristor for one complete cycle for a firing angle delay of 0° and 25° for both firing angles. Find average load voltage for a three phase supply voltage of 240V,60Hz. 8 M

b) Derive the expression for circulating current for 3-phase dual converter under on load conditions. 8 M

4. a) A single phase Full bridge inverter is connected to an RL load. For a dc source voltage of V_s and output frequency, derive load current as a function of time for first two half cycles of output voltage. 8 M
- b) Discuss different PWM techniques for inverters. 8 M
5. a) Describe the principle of step-up chopper. Derive an expression for the average output voltage in choppers. And determine the range of off-periods for the gate signal if step-up chopper has output voltage of two to four times the input voltage, for chopping frequency of 2 KHz. 8 M
- b) Sketch output voltage, output current, source current, thyristor current waveforms for Buck-Boost chopper for its operation. Indicate the conditions of various devices, for ripple free current and explain. 8 M
6. a) For a single phase voltage controller feeding a RL load draw the wave forms of gating signals, output voltage, output current and voltage across each SCR. Find expression for RMS load Voltage. 8 M
- b) Explain the operation of a single phase to single phase bridge type cyclo converter to step-up the output frequency. 8 M