

GANPAT UNIVERSITY
B. TECH SEM- V (ELECTRICAL)
REGULAR EXAMINATION NOV-DEC 2016
2EE504: POWER ELECTRONICS

TIME: 3 HRS

TOTAL MARKS: 60

- Instructions:** (1) This Question paper has two sections. Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.

SECTION: I

- Que.-1** (A) Draw and explain turn on and turn off characteristics of IGBT. [04]
(B) Discuss the construction and working of MOSFET. [04]
(C) Sketch V-I characteristic of MOSFET. [02]

OR

- Que.-1** (A) Explain the working of SCR with help of two transistor analogy. [04]
(B) Enlist different triggering methods for SCR and explain gate triggering method. [04]
(C) Draw the V-I characteristic of SCR. [02]

- Que.-2** (A) Illustrate the single phase mid-point cycloconverter. [05]
(B) Draw waveforms for an AC voltage regulator with phase angle control at $\alpha = 90^\circ$. Also find its RMS voltage and power delivered if, 50 ohm load is connected. [05]

OR

- Que.-2** (A) Which are the types of AC voltage regulators? Discuss any one type with its principle. [05]
(B) Draw circuit diagram and waveform for step down cycloconverter with the output frequency is 1.5 times of input frequency and phase control $\alpha = 45^\circ$. [05]

Que.-3 Attempt any Two:

- (A) Explain single phase half wave controlled rectifier with R-L load. [05]
(B) A single-phase transformer, with secondary voltage of 230 V, 50 Hz, delivers power to load $R = 20 \Omega$ through a half-wave controlled rectifier circuit. For a firing-angle delay of 30° , determine (a) the rectification efficiency (b) form factor (c) voltage ripple factor (d) transformer utilization factor and (e) PIV of thyristor. [05]
(C) Write short note on : a) GTO b) BJT [05]

SECTION-II

- Que.-4** (A) Explain three phase inverter with 180 degree conduction mode. [05]
(B) A single phase bridge inverter has a resistive load of 10Ω and the center-tap dc input voltage is 96 V. Compute: [05]
a) RMS value of output voltage,
b) Fundamental component of the output voltage waveform,
c) First five harmonic of the output-voltage waveform,
d) RMS value of the power consumed.

OR

- Que.-4** (A) Discuss the external control of DC input voltage in single phase inverter. [05]
(B) Give the classification of PWM inverters. [05]

- Que.-5 (A) Explain the working of step down dc dc converter with necessary diagrams. [05]
(B) For type-A chopper, dc source voltage = 230 V, load resistance = $10\ \Omega$. Take a voltage drop of 2 V across chopper when it is on. For a duty cycle of 0.4, calculate: [05]
(a) average and rms values of output voltage and (b) chopper efficiency.

OR

- Que.-5 (A) Write a short note on a Type-B chopper. [05]
(B) Compare different control strategies for chopper. [05]

Que.-6 Attempt any Two:

- (A) Explain single phase full-bridge inverter with R load. [05]
(B) Explain three phase fully controlled rectifier with R load for $\alpha = 0$. [05]
(C) A single-phase 230 V, 1 kW heater is connected across 1-phase, 230 V, 50 Hz supply through an SCR. For firing angle delays of 45° and 90° , calculate the power absorbed in the heater element. [05]

END OF PAPER