

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2150903

Date:09/05/2018

Subject Name:Power Electronics – I

Time:02:30 PM to 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define the following terms : (03)
(a) Firing angle (b) Extinction angle (c) Conduction angle
(b) State two advantages and two disadvantages of Power Electronics. (04)
(c) Draw its static V-I characteristics and explain its behavior in forward conduction, forward blocking and reverse blocking modes. (07)
- Q.2** (a) Define the following terms: (1) latching current (2) holding current (03)
(3) Circuit turn-off time.
(b) Draw the symbol and characteristics of UJT. (04)
(c) What is Snubber circuit? How elements of Snubber circuits are calculated? (07)
- OR**
- (c) Explain 1-phase dual converter drive for dc motor. (07)
- Q.3** (a) Why pulse triggering is preferred over continuous triggering? (03)
(b) Draw the circuit diagram of single-phase half wave controlled rectifier. (04)
Also draw the waveform of output voltage with R-load with $\alpha = 60^\circ$.
(c) Write a short note on the current ratings and voltage ratings of thyristor. (07)
- OR**
- Q.3** (a) Explain construction of Power MOSFET. (03)
(b) Give comparison of RC firing circuit and R firing circuit. (04)
(c) Draw the waveform of output voltage, load current of single phase semi-converter consisting of RL load with continuous conduction. Derive the equation of average output voltage. (07)
- Q.4** (a) What is the function of freewheeling diode in Phase controlled rectifier? (03)
(b) Explain the two transistor analogy of the thyristor. (04)
(c) Draw the circuit diagram of three-phase full converter connected to RL load with continuous conduction. Draw the waveforms of output voltage, output current for firing angle equal to 30° . (07)
- OR**
- Q.4** (a) What is the function of pulse transformer in triggering circuit? (03)
(b) Write a short note on buck-boost converter. (04)
(c) Explain in brief various control strategies of a chopper. (07)
- Q.5** (a) Enlist any three methods to turn-on the SCR. (03)
(b) Draw the output voltage waveform of three-phase half-wave controlled rectifier with the R-load. (04)
(c) Explain the parallel operation of thyristor. (07)
- OR**
- Q.5** (a) Using relevant circuit diagram and waveforms, explain regenerative braking control in DC machines using chopper circuit. (03)
(b) Which are the different methods of braking DC motor? (04)
(c) Discuss constant H.P and constant Torque operation of speed control of motors. Specify their field of applications. (07)
