

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Electrical and Electronics Engineering) (Sem.-6)
LINE COMMUTATED AND ACTIVE PWM RECTIFIERS

Subject Code : BTEE-604C-18

M.Code : 79952

Date of Examination : 09-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Discuss the types of rectifiers.
- b) What do you understand by continuous current operation of thyristor converter?
- c) Define the term voltage ripple factor and current ripple factor.
- d) What is the function of free-wheeling diode in controlled rectifier?
- e) Define pulse number of converter response.
- f) Define the term delay angle and margin angle.
- g) What is the condition for rectification in single-phase fully controlled converter.
- h) What do you understand by line-commutated converters?
- i) A power supply A delivers 20 V dc with a ripple of 0.5 V r.m.s. while the power supply B delivers 25 V dc with a ripple of 1 mV r.m.s. Which is better power supply?
- j) What is the ripple factor for half-wave rectifier?

SECTION-B

2. Draw the phasor diagram and explain the operation of single-phase AC-DC active PWM rectifier under lagging, leading and unity power factor conditions.
3. Explain the continuous and discontinuous conduction modes of thyristor rectifiers.
4. Draw the circuit diagram of twelve pulse rectifier and explain its operation with the help of suitable waveforms.
5. What are the advantages of active PWM rectifiers over diode bridge rectifiers?
6. A single-phase thyristor converter is shown in figure below with source inductance L_s then

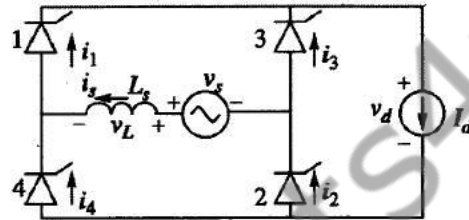


Fig.1

- a) Derive the expression for the commutation angle μ , and
- b) Calculate it if V_s (rms) = 150 V, $L_s = 3$ mH, $I_d = 8.5$ A, and $\alpha = 35^\circ$ Frequency $f = 50$ Hz.

SECTION-C

7. Derive the expression for average(dc) output voltage of three-phase line-commutated rectifier with L and LC filter and draw the waveforms.
8. Explain the operation of three-phase full-bridge thyristor converter with suitable diagram and waveforms.
9. Describe the effect of source inductance on the performance of a single-phase full converter indicating clearly the conduction of various thyristors during one cycle. Derive the expression for its output voltage.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.