

Roll No.

OLE-24229

B. Tech. 5th Semester (EE)

Examination – April, 2021

POWER ELECTRONICS

Paper : EE-317-F

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. Question 1 is *compulsory*. Attempt four more question from the sections A, B, C & D by selecting at least *one* question from each section.

1. (i) Name and symbol of any four power semiconductor devices.
- (ii) Define electric drive. Mention advantages and disadvantages of AC Drive.
- (iii) Define cycloconverter . Enumerate some of its industrial applications.
- (iv) Describe the principle of de chopper operation. Derive an expression for its average de output voltage.

- (v) What is freewheeling diode ? What are the advantages using it ? $5 \times 4 = 20$

SECTION – A

2. Define commutation techniques and Explain any two of them. 20

OR

3. (i) Describe the switching characteristics of Power MOSFET. 10
(ii) Explain working of UJT with high and low value of R. Also describe its V-I characteristics. 10

SECTION – B

4. (i) For a single-phase voltage controller, Discuss how pulse gating is suitable for R load and not for RL load.
(ii) Describe the two types of AC voltage controller. Which one of these is preferred and why ? 10

OR

5.

A single-phase semiconverter feeds power to RLE load. For discontinuous load current, draw the source voltage, output voltage, load current, source current, freewheeling diode current waveforms as a function of time when 20

- (i) Extinction angle $\beta > \pi$.
(ii) Extinction angle $\beta < \pi$ with $V_m \sin \beta < E$.

SECTION – C

6. Describe in detail modified McMurray half bridge inverter with appropriate voltage and current 20 waveforms. Explain its operation by dividing the total commutation interval into certain well defined modes. 20

OR

7. (i) Describe the working of four quadrant chopper with relevant circuit diagrams and its operation in all the four quadrants. 10
- (ii) Describe a voltage-commutated chopper with relevant current and voltage waveform function of time. 10

SECTION – D

8. (i) What is slip power recovery scheme ? Explain working of static Kramer drive. 10
- (ii) Explain V/F method of speed control of 3-phase induction motor. 10

OR

9. Describe the basic principle of working of single-phase to single phase step-down cycloconverter for both continuous and discontinuous conduction for bridge-type cycloconverter. 20