



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) (FT/WP/S4PT) Examinations April 2026 (2019 Scheme)

Course Code: EET306

Course Name: POWER ELECTRONICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|---|-----|
| 1 | Explain the working of snubber circuit with the help of neat diagram. | (3) |
| 2 | Define latching and holding current in SCR. | (3) |
| 3 | Draw the circuit diagram and input - output voltage waveforms of a single phase fully controlled rectifier for $\alpha > 90$ in discontinuous conduction mode feeding R-L-E Load. | (3) |
| 4 | List any 3 advantages of three phase rectifiers over single phase rectifiers. | (3) |
| 5 | A single-phase full bridge converter, connected to 230 V, 50Hz source is feeding a load having resistance $R=10\Omega$ with a large inductance that makes the load current ripple free and continuous. Calculate the average value of load current for a firing angle of 60° . | (3) |
| 6 | Show that input power factor of AC voltage controller feeding R load vary depending upon firing angle. | (3) |
| 7 | Explain how a 10V DC can be stepped down to 6V DC. | (3) |
| 8 | Explain the advantages of current limit control over pulse width modulation techniques. | (3) |
| 9 | Explain with necessary equations how speed of DC motor can be controlled by using Class A chopper. | (3) |
| 10 | List the advantages and disadvantages of AC drives. | (3) |

PART B

Answer one full question from each module, each carries 14 marks.

Module I

- 11 a) Explain the turn ON and turn OFF mechanism of SCR with necessary waveforms (10)
b) Explain different types of power diodes. (4)

OR

- 12 a) Illustrate the working principal of Si IGBT. (9)
b) Explain the need for synchronization of gate driver circuit. (5)

Module II

- 13 a) Explain how a single-phase full-wave controlled converter operates with R-L-E load when the current becomes discontinuous, with the help of neat circuit and waveform diagrams. (9)
b) A single-phase full-wave controlled rectifier is operated from a 120V, 60Hz for a resistive load of 10 ohm. If the average output voltage is 25% of maximum possible average output voltage, Calculate the delay angle. (5)

OR

- 14 a) With a circuit diagram, explain the operation of three-phase fully controlled rectifier feeding R-Load. Draw the output voltage waveforms for $\alpha = 90^\circ$. (14)

Module III

- 15 a) Explain the 120° conduction mode working of three phase bridge inverter feeding R load. (12)
b) Define amplitude modulation index and frequency modulation index. (2)

OR

- 16 a) Explain the significance of THD. (6)
b) Obtain the THD value of single-phase half bridge inverter feeding R load. (8)

Module IV

- 17 Explain the working of type E chopper with the help of necessary diagrams and showing current flow path. (14)

OR

- 18 a) Illustrate the working of type C chopper. (8)

- b) A buck converter has following parameters $V_s = 50V$, $D = 0.4$, $L = 400\mu H$, $C = 100\mu F$. Switching frequency is 20kHz and load resistance is 20Ω . Assuming ideal components, Calculate (a) Output voltage (b) Maximum and Minimum inductor current (c) Output voltage ripple. (6)

Module V

- 19 a) Illustrate and explain the various components of an electric drive using a neat block diagram. (7)
- b) With the help of necessary diagram explain the working of three phase dual converter fed DC motor. (7)

OR

- 20 a) With the help of necessary diagrams and equations explain the speed control of induction motor by varying stator frequency. (10)
- b) Compare stator voltage control and V/f control of induction motor. (4)
