

Total No. of printed pages = 6

END SEMESTER EXAMINATION – 2022

Semester : 5th

Subject Code : ET-503

POWER ELECTRONICS

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Instructions :

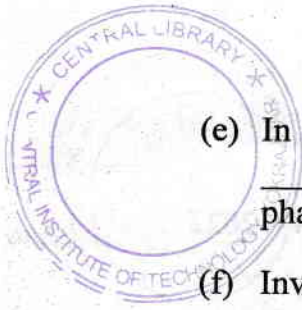
1. *All* questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×10=10
 - (a) An IGBT is a _____ controlled device.
 - (b) A SCR is two _____ analogy.
 - (c) _____ is used to trigger TRIAC.
 - (d) GTO stands for _____.

[Turn over



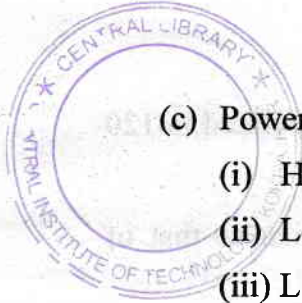
- (e) In a controlled rectifier when the load is _____ the output current and voltage are in phase.
- (f) Inverter is a _____ to _____ converter.
- (g) AC regulator is a circuit which converts _____ voltage to _____ voltage.
- (h) A switching regulator uses _____.
- (i) A _____ regulator is a circuit which increases the output voltage than the input voltage.
- (j) SMPS have _____ number of configurations.
2. State whether the following statements are true or false : 1×10=10
- (a) A TRIAC has three modes of operation.
- (b) In a thyristor holding current is less than latching current.
- (c) A snubber circuit uses a capacitor in series with thyristor.
- (d) The use of freewheeling diode improves the wave shape of load current and input power factor.

- (e) A three phase inverter can be operated in 120 degree or 180 degree mode.
- (f) The principle of SMPS is similar to that of chopper.
- (g) IGBT combines the advantages of BJT and MOSFET.
- (h) An AC regulator is an AC-DC converter.
- (i) An UPS (Uninterrupted Power Supply) is invariably needed for critical loads.
- (j) A stepper motor is also known as step motor or stepping motor.

3. Choose the correct answers :

- (a) A TRIAC is equivalent to
 - (i) Two thyristor in series
 - (ii) Two thyristor in parallel
 - (iii) One thyristor and one diode
 - (iv) One thyristor and one transistor
- (b) In a controlled rectifier a freewheeling diode is necessary when the load is
 - (i) Inductive (ii) Resistive
 - (iii) Capacitive (iv) All of these





(c) Power MOSFET finds the application in

- (i) High power high frequency
- (ii) Low power high frequency
- (iii) Low power low frequency
- (iv) High power low frequency

(d) The main elements of UPS are

- (i) Rectifier
- (ii) AVR
- (iii) Inverter
- (iv) All of the above

(e) Inverter finds applications in

- (i) HVDC transmission
- (ii) UPS
- (iii) Variable speed AC drives
- (iv) All of the above.

PART – B

Marks – 45

4. (a) What is a power diode? 2
- (b) Name some applications of power diode. 4
- (c) Compare BJT and POWER MOSFET. 3

5. (a) What is a thyristor ? What is the function of gate in a thyristor ? 2
- (b) Explain the construction and working of a thyristor. 4
- (c) Draw the VI characteristics curve of thyristor and explain. 3
6. (a) What is a controlled rectifier ? 2
- (b) Explain the working of a single phase fully controlled bridge rectifier feeding a purely resistive load. 5
- (c) Draw the waveform of input voltage, firing pulses, output voltage and load current. 2
7. (a) What is an inverter ? 2
- (b) Discuss the classification of inverter. 3
- (c) Explain the working of a voltage driven inverter with circuit diagram. 4
8. (a) Draw the circuit of a series regulator and explain the functions of different components. 4
- (b) Draw the circuit and explain the working of flyback converter. 5

9. (a) What is UPS ? How is it classified ? 5
(b) Explain the working of offline UPS with proper diagram. 4
10. What is a buck-boost regulator ? Draw its circuit and explain its working. 9
11. Name some applications of AC regulators. Draw the circuit diagram and explain the working of a solid state tap changing transformer. 9
12. What is a stepper motor ? Explain the different types of stepper motor. 9

