Total No. of printed pages = 6

END SEMESTER EXAMINATION – 2019

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) The operation of SCR can be explained by _____ .

   (b) A DIAC is used to trigger _____ .

[Turn over

(c) A thyristor can be turned on by _____ gate signal.

(d) The _____ diode is connected across the load.

(e) An IGBT has _____ losses as well as low switching time.

(f) Rectifier circuits using thyristors are known as _____ rectifiers.

(g) An inverter is a _____ converter.

(h) A SMPS is a multistage _____ power supply.

(i) A _____ regulator gives an output voltage which is less than input voltage.

(j) UPS stands for _____.

2. Write true or false : 1×10=10

(a) SCR is a unidirectional device.

(b) A TRIAC has two terminals.

(c) A parallel inverter uses a transformer.

(d) A Single phase half-bridge inverter uses two thyristors

(e) A switching regulator uses PWM.

(f) An UPS is invariably needed for critical loads.

(g) A switching regulator can be buck, boost and buck-boost.

(h) In a series inverter the circuit is under damped.

(i) A SMPS is a multistage power supply.

(j) SMPS stands for Single Mode Power Supply.

3. Choose the correct answer : 1×5=5

(a) IGBT is a

(i) voltage controlled device

(ii) current controlled device

(iii) power controlled device

(iv) All of the above

(b) The number of thyristors in a single phase fully controlled bridge rectifier is

(i) 16 (ii) 8

(iii) 4 (iv) 2

(c) An RC snubber circuit is used to protect a thyristor against

(i) false triggering

(ii) failure to turn on

(iii) switching transients

(iv) failure to commutate

(d) UPS is never used in

(i) street lighting

(ii) computers

(iii) Communication link

(iv) instrumentation

(e) Triac is a

(i) Bi-directional switch

(ii) Uni-directional switch

(iii) Mechanical switch

(iv) None of the above

PART – B

Marks – 45

4. (a) What is a power diode ? 2

(b) How is power diode classified ? Give the main features of each type. 5

(c) Name some applications of power diode. 2

5. (a) Name any four members of a thyristor family. 4

(b) Draw the symbols of SCR, Diac, Triac and IGBT. 2

(c) Explain the two transistor analogy of a thyristor. 3

6. (a) What is a controlled rectifier. 2

(b) Explain the working of a single phase full wave controlled rectifier feeding purely resistive load. 5

(c) Draw the waveform diagram of input voltage, output voltage, output current and gate current. 2

7. (a) What is an inverter ? 2

(b) Give a brief classification of inverter. 3

(c) Explain three phase bridge inverter with a proper circuit diagram. 4

8. (a) Explain the working of a shunt regulator with a proper circuit diagram. 5

(b) What is SMPS ? Name some commonly used configurations of SMPS. 4

9. (a) What is UPS ? How is it classified ? 5

(b) Explain the working of OFF-LINE UPS with a proper diagram. 4

10. What is an AC regulator. Give some of its applications. 9

11. What is a stepper motor ? Explain the principle of operation of a stepper motor. 9

12. Write a note on switching regulator and servo regulators. 9