

Total No. of printed pages = 7

END SEMESTER EXAMINATION – 2021

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

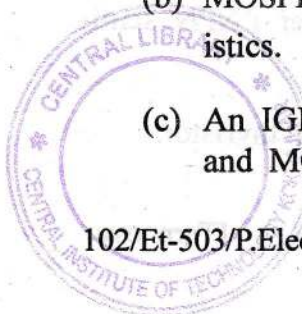
1. Fill in the blanks : 1×10=10
 - (a) A thyristor is a _____ layer PNPN semiconductor device.
 - (b) A _____ is a bi-directional thyristor.

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- (c) A DIAC is a _____ electrode PNP device.
- (d) An IGBT is a _____ controlled device.
- (e) An IGBT has lower switching time than _____.
- (f) The use of _____ diodes improves the wave shapes of the load current.
- (g) An inverter is a _____ converter.
- (h) An AC regulator converts a constant AC voltage into a _____ AC voltage.
- (i) UPS stands for _____.
- (j) A _____ motor is also known as step motor or stepping motor.

2. Write true or false : 1×10=10

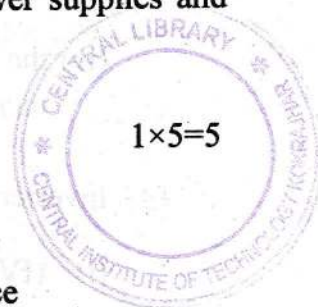
- (a) An SCR is a two transistor analogue.
- (b) MOSFETS have very fast switching characteristics.
- (c) An IGBT combines the advantages of BJT and MOSFET.



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- (d) Rectifier circuits using thyristors are known as uncontrolled rectifier.
 - (e) A three phase bridge inverter can be operated in 120 degree or 180 degree both.
 - (f) In a switching regulator the output voltage is always lower than input voltage.
 - (g) The principle of SMPS is similar to that of chopper.
 - (h) IC regulators are all series regulators.
 - (i) An UPS is invariably needed for critical loads.
 - (j) Power BJTs are used in power supplies and inverter circuits.

3. Choose the correct answer :

- (a) Thyristor is a
 - (i) voltage controlled device
 - (ii) current controlled device
 - (iii) both voltage and current controlled device



(b) Freewheeling is useful when the load is

- (i) Inductive
- (ii) Capacitive
- (iii) Resistive
- (iv) None of the above



(c) In a buck regulator as the duty cycle increases

- (i) the output voltage increases
- (ii) the output voltage decreases
- (iii) the output voltage increases at no load and decreases at full load
- (iv) the output voltage decreases at load and increases at full load

(d) Inverter finds applications in

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

(e) To protect an SCR against high di/dt we connect

(i) a capacitance in series with SCR

(ii) a capacitance in parallel with SCR

(iii) an inductance in series with SCR

(iv) an inductance in parallel with SCR

PART - B


Marks - 45

4. (a) What is a thyristor ? 2
(b) Discuss its operation and characteristics. 5
(c) Draw the two transistor analogies of a thyristor. 2
5. (a) What is a power diode ? 2
(b) Name some applications of power diode. 4
(c) Give a comparison between power MOSFET and IGBT. 3

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6. (a) What is a controlled rectifier ? 2
- (b) Explain the working of a single-phase half wave controlled rectifier feeding a purely resistive load. 5
- (c) Draw the waveform of input voltage, firing pulses, output voltage and output current. 2
7. (a) What is an inverter ? 2
- (b) What are the advantages of a current source inverter ? 3
- (c) Explain voltage driven inverter with the help of a neat circuit diagram. 4
8. (a) What is a DC regulated power supply ? 4
- (b) Draw the circuit diagram of a shunt regulator and explain the functions of different components. 5
9. (a) What is UPS ? Classify UPS. 5
- (b) Explain the working of ON-LINE UPS with a proper diagram. 4

