14633

B. Tech 4th Semester Examination

Power Electronics (N.S.)

EE-222

Time : 3 Hours   **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note :   Attempt any five questions in all selecting one question from each of sections A, B, C and D. Section E is compulsory.

SECTION - A

1. (a)   Enumerate briefly the growth of power electronics as an emerging field in electrical engineering.   (10)

    (b)   Differentiate Power MOSFET, Power BJT and Power diode as switching elements.   (10)

2. (a)   What are desirable characteristics (V_g - I_g) of an ideal driver circuit for SCR applications.   (10)

    (b)   Explain voltage commutation, current commutation and load commutation for thyristor applications.   (10)

SECTION - B

3. (a)   What do you mean by extinction angle? State its practical significance in AC regulators?   (10)

    (b)   Explain operation of a 3-phase AC regulator.   (10)

4. (a) What do you mean by phase controlled converters? Explain with neat circuit, output wave froms and deriving expressions of load voltage, current and converter efficiency of single phase full wave phase controlled converter feeding Resistive load. (18)

   (b) Why Power factor improvement is needed in converter fed loads? (2)

SECTION - C

5. (a) Explain briefly operation and working of a parallel and a series inverter. How their performance is assessed? (12)

   (b) Why pulse width modulation techniques are adopted in VSI and CSI applications? (8)

6. (a) Explain 180 degree and 120 degree conduction scheme for a 3-phase inverter. (16)

   (b) State four applications of Inverters. (4)

SECTION - D

7. (a) Draw basic scheme of choppers. How their output voltage can be controlled? (10)

   (b) A DC battery is charged from a constant DC source of 220V through a chopper. The DC battery is to be charged from its internal emf of 90V to 122 volts. The battery has internal resistance of 1 ohm. For constant charging current of 10 Amperes, Compute range of duty cycle of chopper. (10)

8. (a) Explain principle of working of a 3-phase half wave cycle converter. (10)

   (b) State three advantages and three disadvantages of 3-phase cyclo converters when used in electric drive control applications. (10)

SECTION - E

9. (a) Who invented an SCR?

(b) Why UJT is used as relaxation oscillator?

(c) How output voltage of poly phase converters is controlled?

(d) Name different power factor improvement techniques as used in AC-DC converter circuits.

(e) What are resonant converters?

(f) What is role of freewheeling diode?

(g) Why chopper circuits find applications in electric traction drives?

(h) Draw one protection scheme for single phase controlled circuit having R-L load.

(i) Why cyclo converter circuits are called frequency converters?

(j) Draw circuit schematic of a four quadrant chopper.

(2×10=20)