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Code No. : 31223

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**

**B.E. (EEE) III Year I-Semester Main & Backlog Examinations, December-2017**

**Power Electronics**

Time: 3 hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

1. What is secondary breakdown in BJT?
2. Why it is necessary to use fast recovery diodes for high speed applications?
3. Distinguish between voltage and current commutation.
4. Mention the significance of high frequency pulse triggering of SCR.
5. Explain the principle of phase control in rectifiers.
6. A 230V, 50 Hz, single pulse SCR is triggered at a firing angle of  $60^\circ$  and the load current extinguishes at an angle of  $220^\circ$ . Find the circuit turn off time.
7. What do you mean by switching mode regulators?
8. List out the applications of cycloconverter.
9. What is the purpose of diodes in inverter circuits?
10. Define modulation index.

**Part-B (5 × 10=50 Marks)**

*(All bits carry equal marks)*

11. a) What is schottky diode? How it is different from general purpose diode?  
b) Discuss about the advantages and disadvantages of MOSFET over IGBT.
12. a) With the help of a circuit diagram explain how SCR can be triggered using UJT.  
b) Explain the driver circuits used to turn-ON IGBT.
13. a) With relevant waveforms, explain the operation of three phase half wave controlled rectifier feeding a resistive load.  
b) A single phase fully controlled bridge rectifier is feeding power to an R - L - E load of  $R = 2\Omega$  and  $E = 80V$ . The value of load inductance is large enough to keep load current virtually constant. Input voltage to the rectifier is 230V at 50Hz. Firing angle is  $30^\circ$ . Calculate average output voltage, average output current and input power factor.
14. a) Explain the operation of a boost converter with appropriate waveforms. Also derive the expression for output voltage.  
b) A 230V, 1kW electric heater is fed through an AC voltage controller from 230V, 50Hz source. Find the load power for a firing angle delay of  $70^\circ$ .
15. a) Discuss different PWM techniques used in inverters.  
b) Compare  $120^\circ$  and  $180^\circ$  modes of operation of three phase inverter.
16. a) Draw and explain the switching characteristics of MOSFET.  
b) With necessary circuit diagram, explain the triggering circuit used for single phase bridge rectifier.
17. Answer any *two* of the following:
  - a) Explain the operation of Dual converter.
  - b) Voltage control methods in choppers
  - c) Current source inverters.