Libi @

**Q. P. Code: 22912**

(3Hours) [ Total Marks:80]

N.B.: (1) Question No. 1 is compulsory.
(2) Solve any three questions out of remaining five questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data if required.

1. Attempt the following :- 20
   (a) Explain in brief the principle of operation of switched mode rectifier.
   (b) Discuss the principle of phase control in single phase full wave a.c. voltage controller.
   (c) Give the comparison of Power MOSFET and IGBT.
   (d) Draw and explain the torque- speed characteristics of three phase induction motor.

2. (a) Explain with neat diagram and waveform the operation of single phase full bridge voltage source inverter. 10
   (b) Explain the various triggering modes of Triac with neat diagram. Also draw it's V-I characteristics. 10

3. (a) A 220 V, 1500 rpm, 10 A separately excited dc motor has an armature resistance of 1ohm. It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of 230 V, 50 Hz. Assuming continuous load current, compute 10
   (i) motor speed at the firing angle of 30° and torque of 5 Nm.
   (ii) developed torque at the firing angle of 45° and speed of 1000 rpm.
   (b) Describe the principle of operation of single phase to single phase step down bridge type cycloconverter for discontinuous conduction current mode. 10

4. (a) With the help of neat diagram and associated waveforms discuss the operation of Cuk converter. 10
   (b) Describe static rotor resistance control method for the speed control of three phase induction motor. 10

5. (a) Describe with neat diagram and relevant waveforms, the operation of two quadrant chopper fed d.c. separately excited motor. 10
   (b) Explain the need of commutation in thyristor circuits. Enumerate the various commutation techniques used for thyristors. Describe class 'D' commutation with relevant waveforms. 10

6. (a) Explain the speed control of three phase induction motor by current source inverter with neat diagram. Explain the operation for two cases: 10
   (i) At and below rated frequency
   (ii) Above rated frequency
   (b) Explain the operation of single phase, half controlled bridge converter with RL load. Derive the expression for average load voltage and load current. 10

------------------------------------------