(3 Hours) **Total Marks: 80**

N. B. 1**)** Question No. 1 is compulsory.
2) Attempt any three questions out of the remaining five questions.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever required but justify the same.

Q 1. Attempt any **Four**: - **20**

a) Explain the effect of source inductance on Single phase full controlled bridge rectifier.

b) State advantages of PWM Method for voltage source inverters.

c) Explain significance of slip in ac motors with suitable example.

d) Explain regenerative braking of DC motor

e) State different factors for selection of battery in UPS systems.

Q 2. a) Explain the speed control of separately excited dc motor by single phase full converter for continuous motor current. Also draw associated voltage and current waveforms. **10**

b) Explain the principle of Induction heating. State advantages, disadvantages and applications. **10**

Q 3. a) Derive and explain the average state space model of boost converter. **10**

b) Explain variable frequency control method of induction motor for two different working modes. **10**

Q 4 a) Explain state vector sequence and switching used in SVM. State advantages of SVM **10**

b) Derive an expression for average output voltage of a three phase full converter with R load by considering the effect of source inductance. **10**

Q 5 a) Explain the isolated fly back converter in continuous mode. State advantages and disadvantages. **10**

b) Explain rotor resistance control Scheme using chopper in detail. **10**

Q 6. Write Short Notes on-[Any Four] **20**

i) PID control in dc to dc converter

ii) Torque speed characteristic of IM

iii) Soft start soft stop operation of dc motor

iv) SMPS and UPS

v) Harmonic reduction techniques.
