Sem-VII Electronics. (CBGS) 8/12/16

Power Electronics-II

QP Code : 728502

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

N.B.: (1) Question No. **1** is **compulsory**.
(2) Answer any **three** questions from remaining five questions.
(3) Assume suitable **data** where ever **necessary**.

1. Solve any **four** questions :— **20**
   (a) Differentiate between Plugging and generating mode in AC Motor.
   (b) With the heip of diagram explain principle of working of induction heating.
   (c) For a single phase full converter with inductive load, if the source inductance Ls is considered find the average output voltage and reduction in the average output voltage due to overlap if $\alpha = 30$ deg. and $\mu=2$ deg. with supply voltage of 230 volts.
   (d) The speed of 10 HP separately excited DC motor is controlled by single phase full converter. The rated armature current is 30 A. Ra = 0.5 ohm. The ac supply voltage is 260 volts. The motor voltage constant is 0.182V/rpm. While in motoring action with back emf of 192 volts the polarity of it is reversed for regenerative action. Calculate firing angle to keep the motor current at its rated value.
   (e) Explain battery charging circuit in detail.

2. (a) Explain stator voltage control technique for three phase induction motor. Draw torque-slip characteristics. **10**
   (b) Explain three phase fully controlled bridge converter with source inductance. Draw waveforms. **10**

3. (a) Draw and explain average model and state space model for buck DC-DC converter in detail. **10**
   (b) What is the need of SVM. Explain SV sequence and SV switching in detail in space vector modulation. **10**

4. (a) Explain continuous mode fly-back converter in continuous mode. Derive the relation for load voltage **10**
   (b) A 3 phase 4 pole induction motor is operated from 415V / 50 Hz supply. Stator voltage control technique is to be applied to vary the speed. The motor is driving a load torque of 100 N-m. Find out the following if motor speed is 100 rad/sec. i)Slip ii)P_{ag} iii) P_{slip} iv) P_{mech} v) The efficiency of rotor circuit. **10**

5. (a) Draw and explain semi converter drive for separately excited DC motor. Draw torque-speed characteristics. **10**

(b) State and explain different characteristics of battery. **5**

(c) A UPS driving 600 W load which has a power factor of 0.8. The efficiency of the inverter is 80 percent. The battery voltage is 24 volts dc. Assume that there is a separate charger for the battery. Determine the followings. i) KVA rating of the inverter ii) Wattage of the rectifier. **5**

6. Write short notes on the following :— **20**

(a) On line and off-line UPS

(b) Controllers in DC-DC converters

(c) Torque-slip/speed characteristics of induction motor with operating regions with different value of slip.
