ELEX 7 SEM POWER ELECTRONICS-2 JUN 2016

Q.P.Code **31331** (3 Hours) [Total Marks : 80

N.B. : 1. Question No.1 is compulsory.
2. Solve any three questions out of remaining five questions .
3. Assume suitable data if necessary .

Q1 Attempt any four from the following : 20

a) Why separately excited DC motor is widely used as compared to DC shunt motor ? Explain

b) Give advantages of regenerative braking of DC motor compared to other methods of braking ?

c) Explain why V/F control is popular in AC induction motor control.

d) Give advantages of high frequency induction heating as compared to convertional methods of heating.

e) Compare SMPS with linear regulated power supply.

Q2 a) Explain the effect of soruce inductacne in single-phase full converter working in rectifier mode. Draw relevant output voltage waveforms Give equations which can be used to determine overlap angle μ and output DC voltage. 10

b) In a 3-phase full converter working in rectifier mode, input supply is 440V (L-L), 50Hz. If firing angle $\alpha = \pi/4$ and load current is 20 A constant with load voltage = 370 V, determine source inductance Ls and overlap angle μ. 10

Q3 a) Explain the steps involved in space vector modulation (SVM) technique used in three-phase voltage source inverter. 10

b) Explain using block diagram and transfer funtion, working of PI controller for DC-DC converter . 10

Q4 a) Give details of the state-space averaged model of DC-DC buck converter operating in continous conduction mode. 10

b) A separately excited DC motor armature winding is supplied power using single-phase full bridge converter working on 250V, 50Hz mains supply. If Ra = 0.1 Ω and armature urrent is 50 A, find the firing angle of the converter at 700RPM. Assume that field winding is supplied with rated DC voltage and motor ratings are 110V DC,1000 RPM and 75A. 10

Q5 a) Explain rotor resistance method of speed control of three-phase wound rotor induction motor. Draw speed-torque characteristics and give disadvantages of this technique. 10

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b) Explain the following regions as related to V/F control of AC induction motor. 10

i) Contant torque

ii) Contant power

Draw variations in applied voltage and motor current over entire operation from low speed to double the rated speed of the motor.

Q6 Write short notes on :

a) Battery charging circuit and its working 7

b) Selection of battery capacity in UPS. 7

c) Constant torque and constant power regions in control of separately excited DC motor. 6
