

8/12/2011

BE ETRX VII (REV)
Power Electronic & Drives

211 : 2ndHF11C.mk

Con. 6298-11.

(REVISED COURSE)

MP-5572

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is compulsory.**(2) Attempt any four questions out of the remaining six questions.****(3) Figures to the right indicate full marks.****(4) Assume suitable additional data if necessary.**

1. (a) Explain how semiconverter provides better power factor compared to full converter when both are working as rectifiers with R-L load. 5
- (b) Explain why separately excited d.c. motor is used in most of the applications where variable speed is required compared to ordinary shunt d.c. motor. 5
- (c) Draw torque-speed characteristics for the following control circuits for squirrel cage a.c. induction motor. 5
 - (i) Variable stator voltage control
 - (ii) V/f control.

Why the second control circuit is used in most of the industrial applications?
- (d) Give advantages of flyback converter compared to forward converter. 5
2. (a) Explain how full converter can be operated as — (i) rectifier (ii) inverter using appropriate waveforms. What are conditions for successful inverter operation? 10
- (b) Draw circuit diagram of dual converter and explain its working. Give relation between firing delay angles of two converters when the circuit is operating in circulating current mode. Give advantage of this mode of operation in d.c. motor control. 10
3. (a) Explain working of any voltage commutated chopper circuit using SCR's. Draw relevant voltage/current waveforms. 10
- (b) A d.c. separately excited motor is driven by class A chopper circuit fed from 220 V d.c. supply. If motor rating is 110 V, 75 A, 750 RPM with $R_a = 0.1$ Ohm and motor speed required is 500 RPM at half the full load torque determine duty cycle of chopper. 10
If on time of chopper is 1 millisecond determine frequency of the chopper circuit. Assume that field winding is fed from fixed 110 V d.c. supply.
4. (a) Explain working of McMurray bridge inverter using circuit diagram and appropriate waveforms. 10
- (b) Explain working of multiple pulse PWM with sinewave reference signal. Discuss the application of the circuit in a.c. motor control. 10
5. (a) Explain constant torque and constant power operation of separately excited d.c. motor. Give schematic diagram of control circuit. 10
- (b) A separately excited d.c. motor is driven by full converter bridge operating on 250 V single phase 50 Hz supply. The motor ratings are 110 V, 950 RPM, 25 Amps with $R_a = 0.1$ Ohm. Find the firing delay angle α in the following two cases :— 10
 - (i) Motoring mode, 700 RPM, half the full load torque
 - (ii) Braking mode, 650 RPM, half the full load torque.

6. (a) Explain using schematic diagram how slip power recovery technique can be used to control a.c. motor speed above and below synchronous speed. What is the advantage of this technique ? 10
- (b) Using block diagrams discuss different configurations of UPS. 10
7. Write short notes on any two of the following :— 20
- (a) Converter types used in SMPS
 - (b) Selection of battery in UPS
 - (c) Effect of source inductance in converter.
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