B.E. Electrical (Electronics & Power) Engineering Eighth Semester

EP803 - Advanced Electrical Drives

P. Pages : 2 **GUG/W/18/2011**

Time : Three Hours * 1 5 4 1 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Students have to solve questions as per internal choice.

1. a) For the equivalent motor – load system, derive the condition for its stable operation. **8**

b) A drive has a following equations for motor & load torques. $T = 1 + 2w_m$ and $T_L = 3\sqrt{w_m}$ obtain the equilibrium points & determine the steady state stability. **8**

OR

2. a) Explain the four quadrant operation of an electrical drives, Illustrate with suitable example. **8**

b) Derive the fundamental torque equation for an equivalent motor – load system taking into account various components of load torques for its dynamic analysis. **8**

3. a) Explain the working of single phase, fully controlled rectifier fed DC drives with relevant wave forms. Assuming continuous conduction mode of operation. Derive the necessary equations. **8**

b) A 220 V, 1500 rpm, 10A separately excited DC motor is fed from a single phase fully controlled rectifier with an a.c. source voltage of 230V, 50Hz with an armature resistance of 2Ω. Conduction can be assumed to be continuous. Calculate firing angles for **8**

i) Half the rated motor torque & 500 rpm.
ii) Rated motor torque and (-1000) rpm.

OR

4. a) Draw the drive circuit & explain the working of two – quadrant chopper for both motoring and breaking modes of operation in DC separately excited motor. Draw the necessary wave forms. **8**

b) Describe relative merits & demerits of four quadrant dc drives employing circulating and non – circulating current dual converters. **8**

5. a) Explain the working principle of v/f control method for induction motor drive. With the help of speed – torque characteristics, give the main features of constant torque & constant power modes of operation. **8**

b) What do you mean by 'Slip power'? Explain any one method in detail of utilizing this power for control drive. **8**

OR

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6.	a)	With suitable drive circuit explain the working of static rotor resistance control for induction motor drives. How can you determine effective rotor resistance.	**8**
	b)	How can you obtain Variable Frequency, Variable Voltage Source (VFVS) from the available fixed source? What are their different types? Explain cycloconverter circuit to be fed to the induction motor?	**8**
7.	a)	Draw the single line layout to explain the various process involved in cement industry. Suggest the motors suitable to carry out above process in brief.	**8**
	b)	With the help of neat diagram explain the working of reversing cold rolling mills.	**8**

OR

8.	a)	What are the main requirements of textile industries? Suggest the drives suitable for this process.	**8**
	b)	Write brief note on 'automatic slip regulators'.	**8**
9.	a)	What are the different modes of operation in variable frequency synchronous motor drives? Explain any one mode of operation in detail.	**8**
	b)	Compare inverter fed & cycloconverter fed synchronous motor drives. Comment on its suitability and area of application.	**8**

OR

10.	a)	Compare unipolar and bipolar brushless DC motors.	**6**
	b)	Give the important features & applications of brushless dc motors.	**6**
	c)	Explain why PM DC motor is preferred for low power applications.	**6**

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