B.E. (Electrical Engineering (Electronics & Power)) Sixth Semester (C.B.S.)

Electrical Drives & Their Control AHK/KW/19/2239 P. Pages : 2 *1061* Time : Three Hours Max. Marks: 80 Notes : 1. All questions carry marks as indicated. Solve Ouestion 1 OR Ouestions No. 2. 2. 3. Solve Question 3 OR Questions No. 4. Solve Question 5 OR Questions No. 6. 4. 5. Solve Question 7 OR Questions No. 8. Solve Question 9 OR Questions No. 10. 6. 7. Solve Question 11 OR Questions No. 12. Assume suitable data whenever necessary. 8. 9. Illustrate your answers whenever necessary with the help of neat sketches. 7 How are electrical drives classified? Explain their classification in brief with their a) advantages and disadvantages. A 25 hp, 500V, 4 pole, 50 Hz cage Induction motor with mesh connected stator takes a 7 b) full load current of 30A and has a slip of 4%. The impedance per phase is 3.5Ω . Calculate starting torque and starting current taken from the supply if motor is started by-Direct switching i) ii) A star delta starting Auto transformer starting with 70% tapping. iii) OR a) Explain briefly the field control in dc series motor. A dc series motor runs at 1000 rpm 8 taking 100A at 400V. A diverter having double the resistance of field winding is then connected in parallel with it. Estimate the change in speed if torque varies as the square of the speed. Assume unsaturated field and neglect losses. A 500V, 45kW, 600 rpm dc shunt motor has full load efficiency of 90%. The field 6 b) resistance is 2000 and the armature resistance is 0.20. The field current is maintained constant. Armature reaction and brush drop may be neglected. Calculate the rated armature current & hence find the speed under each of following conditions at which machines develops an electromagnetic torque equal to rated value. i) Regenerative braking – no external resistance. Plugging – external resistance of 5.5Ω inserted. ii) Dynamic braking – external resistance of 2.6Ω inserted. iii) 7 a) Explain RMS horse power rating of motor. A motor has to perform the following duty

cycle.

1.

2.

3.

100 Hp for 10 mins No load for 5 mins 60 Hp for 8 mins No load for 4 mins

which is repeated indefinitely. Determine suitable size of continuously rated motor.

A motor fitted with a flywheel supplies a load torque of 150 kg-m in 15 sec. During the b) no load period the flywheel regains its original speed. The motor torque is required to be limited to 85 kg-m. Determine moment of inertia of the flywheel. The speed of motor is 500 rpm and it has slip of 10% on full load.

OR

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6

4.	a)	What do you mean by load equalization? And explain the effect of flywheel. Derive its expression for motor torque.	8
	b)	A motor of 25 Hp with heating time constant of 100 min. has a temperature rise of 40°C on continuous rating. Find the half hour rating of motor for this temperature rise assuming that it cools down completely between each load period. The motor has maximum efficiency at 85% of its full load.	5
5.	a)	Explain the working of programmable logic controller with block diagram.	7
	b)	Explain with suitable example the programming of PLC using ladder diagrams.	6
6.	a)	What are various methods of programming of PLC?	7
	b)	What are the advantages of PLC in speed control of electric motors as compared to other methods?	6
7.	a)	Explain the construction and working of dc contactor.	7
	b)	What are different methods of control of acceleration of dc shunt motor? Explain any one method with heat power & control circuits.	7
8.	a)	Differentiate between : i) Contactor and Circuit breaker ii) AC and DC contactor	8
	b)	With neat power and control circuit, explain plugging as applied to ac motor.	6
9.	a)	Explain speed time curve in detail with relevant diagram.	7
	b)	An electric train is to have acceleration and braking retardation of 0.8 km/hr/sec and 3.2 km/hr/sec respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26 secs, find schedule speed for a run of 1.5 km. Assume simplified trapezoidal speed time curves.	6
10.	a)	OR Explain series – parallel control used in traction motors.	7
	b)	List the advantages of electric traction over other methods of traction.	
11.	a)	With neat block diagram explain digital control of electric motors.	7
	b)	State the requirement & mention the drives commonly used in following applications. i) Lifts ii) Pumps iii) Mines	6
12.	a)	OR Compare analog and digital control of electric drives	5
	u) h)	Which maters are required for following applications	0
	0)	i) Conveyorsii) Lathesiii) Home appliancesiv) Punching machines.	ð

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