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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (EEE) III Year II Semester Old Examinations, May-2019

Electric Drives and Static Control

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. List out any two limitations of Electric Drives?
2. Classify various types of electric drives with applications.
3. What is meant by plugging?
4. What are the limitations of reverse voltage braking?
5. List out any two differences between circulating and noncirculating dual converters?
6. Draw the speed torque characteristics of 1-phase fully controlled rectifier fed separately excited DC motor drive?
7. List out the limitations of stator voltage control of induction motor drives?
8. How are output voltage and frequency of voltage source inverter controlled?
9. Write few applications of brushless dc motor drives?
10. What are the ways of receiving firing pulses in self control mode?

Part-B (5 × 10 = 50 Marks)

- 11.a) Draw the block diagram of electric drive? Explain the functions of Power modulator? [5]
- b) A 500V dc series motor has an armature resistance of 0.4Ω and series field resistance of 0.3Ω . It takes a current of 100A at a speed of 600 rpm. Find the speed of the motor if a diverter of resistance 0.6Ω is connected across the field, load torque being kept constant. Neglect armature reaction and assume that flux is proportional to the current. [5]
- 12.a) Explain how regenerative braking is achieved in DC shunt motor? [5]
- b) A 220V, 20kW Dc shunt motor running at its rated speed of 1200 rpm is to be braked by reverse current braking. Armature resistance is 0.1Ω and rated efficiency of the motor is 88%. Calculate: [5]
 - i) The resistance to be connected in series with armature to limit the initial braking current to twice the rated current
 - i) The initial braking torque?
- 13.a) List out the advantages of chopper fed DC motor drives over rectifier fed DC motor drives? [5]
- b) Draw the block diagram of closed loop speed control of rectifier fed below base speed and explain briefly? [5]
- 14.a) What are the advantages and disadvantages of slip power recovery scheme? [5]
- b) At 50Hz, the synchronous speed and full load speed are 1500 rpm and 1370 rpm respectively. Calculate the approximate value of speed for a frequency of 40Hz and 80% of the full load torque of the inverter fed induction motor drive? [5]

- 15.a) With a neat schematic block diagram, explain the principle and operation of a 4-phase 4/2 pole switched reluctance motor? [6]
- b) Explain about separately controlled mode of synchronous motor drive [4]
- 16.a) Explain about steady state stability of electrical drive with necessary diagrams and equations. [5]
- b) Describe various methods to reduce the energy loss during starting of electric motors [5]
17. Answer any *two* of the following:
- a) Explain the operation of chopper fed separately excited DC motor for motoring operation [5]
- b) Illustrate the voltage source inverter fed induction motor drive with neat sketch [5]
- c) Explain the operation of unipolar BLDC motor with neat circuit diagram? [5]

