Hall Ticket Number:

Code No. : 32215

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (E.E.E.) III Year II-Semester Main Examinations, May-2017

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. Draw the block diagram of Electric Drive.
2. What are the factors influencing the choice of electric drives?
3. Differentiate Mechanical and Electrical Braking.
4. What are the factors influencing the selection of starters?
5. Name the solid state controllers used for the speed control of D.C Shunt motor and Series Motor.
6. What are the advantages and disadvantage of solid state drive methods?
7. What are the advantages of Slip-power recovery system?
8. Write down the limitation of cyclo converter method of speed control.
9. Why a cyclo converter is preferred over inverter for synchronous motor control?
10. Derive torque equation of switched reluctance motor.

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) Describe the different types of Electrical drives.
    b) Modify the speed torque characteristics of DC shunt motor by the introduction of different values of armature series resistance.

12. a) A 220V shunt Motor has an armature resistance of 0.062 Ω and with full field has an emf of 215V at a speed of 960 rpm, the motor is driving an overhauling load with a torque of 172 Nm. Calculate the minimum speed at which the motor can hold the load by means of regenerative braking.
    b) Evaluate optimum value of slip at which maximum torque occurs for minimum accelerating time.

13. a) Draw and explain closed loop control of separately excited DC motor.
    b) Explain the speed control of a separately excited DC motor with fully controlled converter in continuous conduction mode.

14. a) Draw the power circuit arrangement of three phase variable frequency inverter for the speed control of three phase induction motor and explain its working.
    b) Explain static krammer drive to control the speed of three phase induction motor.

15. a) Demonstrate the load commutated inverter fed synchronous motor drive with a neat schematic.

Contd...2

b) A 3-phase, 5 kW, 400 V, 0.8 PF (lag), 50 Hz, 6 pole, star connected synchronous motor has negligible stator winding resistance and has synchronous reactance of 6 Ω. It is operated under regenerative braking connecting to bus with rated motor voltage. Calculate braking torque, torque angle and field current when field current is adjusted to operate motor at rated current at unity power factor.

16. a) Explain the dynamics of electric drives.

b) A 10kW, 3-phase, 400V, 20A, 50Hz, 960 rpm, 0.88 p.f squirrel cage induction motor drives a certain load. The total moment of inertia of the drive is 0.5 kg-m^2. Determine the number of starts per minute that this drive can make under no load conditions without exceeding the total power dissipated in the motor under rated conditions. Assume a ratio of stator to rotor resistance of unity and neglect magnetizing current and rotational losses.

17. Answer any ***two*** of the following:

a) Draw and explain the control of a separately excited DC motor with dual converter with non-circulating current mode.

b) Explain slip power recovery concept for three phase induction motor.

c) Draw and explain three phase brushless DC motor drive.

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