EX - 702 B.E. VII Semester
Examination, December 2014
Electrical Drives
Time: Three Hours
Maximum Marks: 70

Note: Attempt one question from each unit. All questions carry equal marks.

Unit-I

1. Draw the complete drive circuit of fully controlled rectifier controlling a separately excited dc motor. The circuit should include the 1-(|> supply, controlled rectifier and the motor. Draw typical wave forms of supply voltage, armature voltage and current at a fixed speed under continuous conduction. Derive an expression for motor speed in terms of supply voltage, firing angle and motor constants. Also state specific industrial application of this drive.

OR

2.a) A 220V, 1500 rpm, 1 OA separately excited dc motor with an armature resistance of 3Q is fed from a single phase fully controlled rectifier connected to an ac source voltage of230 V, 50 Hz. Assuming conduction, calculate the firing angle for half the motor torque at 600 rpm. b) What are the differences between the rectifier control of a dc shunt and dc series motors? Explain.

Unit - II

3. Explain the four quadrant operation of an electric driven der) Explain the types of braking of dc motors. Which one is usually employed and why?

OR

4.a) Explain the two modes in which a dual converter is used to control the dc motor speed. Which of the two methods is better and why? Explain.

b) A 230 V separately excited dc motor takes 50A at a speed of 800 rpm, Ra = 0.4Q. This motor is controlled by a chopper with an input voltage of230 V and frequency of 50 Hz. Assuming continuous conduction throughout, calculate and plot speed torque characteristics for

i) Motoring operation at duty ratio of 0.6.

ii) Regenerative braking operation at duty ratio of 0.7.

Unit-III

5. a) Draw the circuit diagram of a VSI fed induction motor drive using IGBTs. Draw typical waveforms of inverter output line voltages under

i) Stepped wave and ii) PWM inverters

I b) What are the effects of harmonics in line voltage due to inverters on the performance of induction motors?

OR

6. a) Calculate the value of dc voltage of a stepped wave inverter type VSI to feed a 3-Θ , 415 V, 50 Hz, delta connected squirrel cage induction motor,

b) What is the significance of maintaining the ratio of supply voltage to frequency constant in variable frequency drives of induction motors?

7. Explain the slip power recovery scheme of a three phase induction motor control. Whaf are its advantages and disadvantages?

8. Explain static rotor resistance control method for controlling the speed of induction motor and compare it with conventional control methods.

UNIT-V

9. Describe self controlled synchronous motor drives in detail and compare with load commutated inverter controlled drives.

10. a) List the similarities and differences between a Brushless dc motor and a conventional dc motor.

b) Explain the operation of cycloconverter fed self controlled synchronous motor drive.

c) Write typical motor and controllers for i) Pump drive ii) Kiln drive