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06EE74

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Industrial Drives and Applications

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. What are the advantages of an Electric drive system? (06 Marks)
 b. Define Active load torque and Passive load torque. (04 Marks)
 c. With the help of the quadrantal diagram, explain the four – quadrant operation of a motor driving a hoist load. (10 Marks)
- 2 a. Obtain the thermal model of motor for heating and cooling. Briefly explain heating and cooling curves. (10 Marks)
 b. Explain the classification of duty for motors with load diagrams. (10 Marks)
- 3 a. With a neat circuit, explain dynamic and plugging type of braking system for separately excited DC motor. (10 Marks)
 b. A 220V, 1500 rpm , 10A separately excited DC motor is fed from a single – phase fully controlled rectifier with an AC source voltage of 230 Volt , 50Hz , $R_a = 2\Omega$ conduction can be assumed to be continuous. Calculate firing angles for :
 i) Half the rated motor torque and 500 rpm.
 ii) Rated motor torque and – 1000 rpm. (10 Marks)
- 4 a. Explain the Multi – quadrant operation of a separately excited DC motor fed from fully controlled rectifier for the following schemes : i) Single fully controlled rectifier with a reversing switch ii) Dual converter. (12 Marks)
 b. A 230V, 960 rpm and 200A separately excited DC motor has an armature resistance of 0.02Ω . The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 volt. Assume continuous conduction mode.
 i) Calculate duty ratio of chopper for motoring operation at rated torque and 350 rpm.
 ii) Calculate duty ratio of chopper for braking operation at rated torque and 350 rpm. (08 Marks)

PART - B

- 5 a. What is Single – Phasing? Explain the operation of a 3 – phase induction motor with unbalanced voltages. (10 Marks)
 b. A 440V, 50Hz , 6 – pole ,950 rpm, Y – connected induction motor has following parameters referred to the stator $R_S = 0.5\Omega$, $R_r^1 = 0.4\Omega$, $X_S = 1.2\Omega$, $X_M = 50\Omega$. Motor is driving a fan load, the torque of which is given by $T_L = 0.0123W_m^2$. Now one – phase of the motor fails. Calculate motor speed and current. (10 Marks)
- 6 a. Explain the Static rotor resistance control system of an induction motor. (10 Marks)
 b. A Y – connected squirrel cage induction motor has the following ratings and parameters : 400V, 50Hz , 4 – pole , 1370 rpm , $R_S = 2\Omega$, $R_r^1 = 3\Omega$, $X_S = X_r^1 = 3.5\Omega$, $X_M = 55\Omega$. It is controlled by a current source inverter at a constant flux. Calculate the motor torque, speed and stator current when operation at 30Hz and rated slip speed. (10 Marks)

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- 7 a. Explain Pull – in process in synchronous motor operation from fixed frequency supply. (08 Marks)
b. Explain the operation of self controlled synchronous motor drive employing load commutated thyristor inverter. (12 Marks)
- 8 a. Explain the Operation of drives in paper mill. (10 Marks)
b. Explain the operation of drives in cement mill. (10 Marks)
