EEE-702

RollNo. | | | | | | | | | | |

B.Tech

(SEM VII) ODD SEMESTER THEORY EXAMINATION, 2015-16

ELECTRIC DRIVE(EEE-702)

Time: 3 Hours *Maximum Marks:100*

Note: *Attempt all questions.*

Q.1. *Attempt any **FOUR** parts of the following.* **5x4=20**

a) What is an electric drive? What are its advantages?
b) State essential parts of electric drive and draw its block diagram and briefly indicate the role of each part.
c) Enlist the classification of electric drive. Explain in details.
d) How do you define the passive load torques and active load torques? What are the differences between them?
e) Explain the Four Quadrant operation of a motor with illustrative figures for each.
f) Explain the various types of loads? What are the components of the load torques?

Q.2. *Attempt any **FOUR**parts of the following.* **5x4=20**

a) What is load equalization? Derive the moment of inertia of the flywheel.
b) A motor equipped with a flywheel has to supply a load torque of 1000N-m for 10sec followed by a light load period of 200 N-m long enough for the flywheel to regain its steady state speed. It is desired to limit the motor torque to 700 N-m. What should be the moment of inertia of the flywheel? The no load speed of the motor is 500 rpm and it has a slip of 5% at torque of 500N-m. Assume the motor speed –torque characteristics to be a straight line in the range of operation. Motor has inertia of 10kg- m^2.
c) Derive conditions for stability of an electric drive.
d) Draw typical variation of output power and temperature with time in following cases.
   i. Short time duty
   ii. Continuous duty
   iii. Intermittent periodic duty with starting and breaking.
e) From basic principles of heat transfer, develop an expression for temperature rise of an electric motor delivering fixed rated power at a fixed rated speed?
f) The temperature rise of a motor after operating for 30 minutes on full load is 20˚C. after another 30 minutes on the same load the temperature rise becomes 30˚C. Assuming that the temperature increases according to an exponential law, determine the final temperature rise and the time constant.

Q.3. *Attempt any **TWO**parts of the following.* **10x2=20**

a) Explain the type of braking's of induction motors. Which one is usually employed and why?
b) Explain how the acceleration time and energy losses are calculated during starting of a dc motor.
c) A 220-V, dc shunt motor having an efficiency of 85% drives a hoist having an efficiency of 80%. Calculate the current drawn from the supply to raise a load of 400 kg at 2.5 m/s. what resistance must be added in the armature circuit in order to lower the load at 2.5 m/s, using rheostatic braking. Assuming that the efficiency of motor and load will remain the same.

Q.4. *Attempt any **TWO** parts of the following.* **10x2=20**

a) Discuss the principle of working of a single phase fully-converter fed separately excited dc motor drive for continuous conduction mode. Explain the advantages and disadvantages of fully-converter fed dc motor drive.
b) Explain the multi quadrant operation of dc separately excited motor fed from fully controlled rectifier (Dual converter).
c) Write the drawbacks of rectifier-fed dc drives. Explain the chopper controlled dc drives.

Q.5. *Attempt any **TWO** parts of the following.* **10x2=20**

a) Explain the operation VSI controlled scheme for the induction motor drive.
b) Explain the self-controlled scheme for the synchronous motor control.
c) Write short notes on the following:
    i. Brushless dc motor drive
    ii. Switched reluctance motor drive.

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