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BTECH
(SEM VII) THEORY EXAMINATION 2018-19
ELECTRIC DRIVES

Time: 3 Hours *Total Marks: 100*
Notes: *Assume any Missing Data.*

SECTION – A

1. Attempt all parts of the following. (10*2=20)

(a) What is meant by the nature of load torque?
(b) What are the disadvantages of dc drives?
(c) Classify various mechanical loads on the basis of their torque-speed characteristics.
(d) Explain why the characteristics of a dc series motor are suitable for traction applications?
(e) What are the advantages and disadvantages of electrical braking?
(f) What are the problems faced in case a motor of wrong rating is chosen?
(g) On what factors does the rate of rise of temperature depend?
(h) Why the thyristor control is preferred over Ward Leonard system of speed control?
(i) Suggest suitable motors for textile and paper mill drive applications.
(j) Why the cooling time constant of a rotating machine is usually larger than its heating time constant?

SECTION – B

2. Attempt any three parts of the following: (3*10=30)

(a) Draw the block diagram of an electric drive. Explain the function of Power modulator in detail.
(b) State the advantages of drive system. Give some applications with suitable drive system.
(c) Explain the Load equalization in drive.
(d) Illustrate the Dynamics of motor load system. Also give comparison between DC and AC Drive.
(e) Elucidate the multi-quadrant operation of Electric drive system.

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SECTION - C

Note: - All questions are compulsory. **(5*10=50)**

3. Attempt any one parts of the following:

(a) Describe in detail the various components of load torque.

(b) A 6-pole, 50Hz, 3-phase wound rotor induction motor has flywheel coupled to its shaft. The total moment of inertia of motor –load –flywheel is 1000kg-m^2 of 10sec duration followed by a no load period which is long enough for the drive to reach its no load speed. Motor has a slip of 3% at a torque of 500N-m. Calculate (i) Maximum torque developed by the motor (ii) speed at the end of declaration period. Assume motor speed- torque curve to be straight line in the operating range

4. Attempt any one parts of the following:

(a) Explain chopper controlled DC motor drive.

(b) A 500kw, 3-phase, 3.3kV, 50Hz, 0.8(lagging) power factor ,4 pole, star connected synchronous motor has following parameters: X_s=15Ω, R_a=0. Rated field current is 10A. Calculate (i) Armature current and power factor at half the rated torque and rated field current (ii) Field current to get unity power factor at the rated torque.

5. Attempt any one parts of the following:

(a) A 220 volts, 1500 rpm, 10 Amps separately excited dc motor has an armature resistance of 10 Ω. It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of 230 volts, at 50 Hz. Assuming continuous load current, compute

i. The motor speed at firing angle of 30 degrees and torque of 5 NM

ii. Developed torque at the firing angle of 45 degrees and speed of 1000 RPM

(b) Explain the various methods of braking can be applied to induction motor. And also state what kind of braking is more effective, justify, it.

6. Attempt any one parts of the following:

(c) Explain how the Static Scherbius drive is used in slip power recovery scheme.

(d) Describe in detail about speed control of self controlled synchronous motor drives.

7. Attempt any one parts of the following:

(a) Elucidate the operation of Brushless dc motor drive in detail.

(b) A 200 volts, 875 rpm, 150 A separately excited DC motor has an armature resistance of 0.06 Ω. It is fed from a single phase fully controlled rectifier with an ac source of 220 Volts, 50Hz. Assuming continuous conduction calculate

i. Firing angle for rated motor torque and 750 rpm

ii. Motor speed for α =160 degrees and rated torque

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