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**B.TECH**  
**(SEM VII) THEORY EXAMINATION 2021-22**  
**ELECTRIC DRIVES**

**Time: 3 Hours****Total Marks: 70****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

- 1. Attempt *all* questions in brief. **2 x 7 = 14****
- a. What are the disadvantages of dc drives?
  - b. What are the components of the load torque in a drive?
  - c. Why the cooling time constant of rotating machine is usually larger than its heating time constant?
  - d. What are the problems faced in case a motor of wrong rating is chosen?
  - e. What are the advantages of electrical braking?
  - f. Explain why the characteristics of a dc series motor are suitable for traction applications?
  - g. Suggest suitable motors for textile and paper mill drive applications.

**SECTION B**

- 2. Attempt any *three* of the following: **7 x 3 = 21****
- a. Draw the block diagram of an electric drive. Explain the function of Power modulator in detail.
  - b. Explain classes of duty in detail with examples.
  - c. Illustrate the Dynamics of motor load system. Also give comparison between DC and AC Drive.
  - d. Explain chopper controlled DC motor drive.
  - e. Compare the operation of VSI and CSI based Drives. Which will be preferred for control of speed of induction motor driving load having constant load torque?

**SECTION C**

- 3. Attempt any *one* part of the following: **7 x 1 = 7****
- (a) Define Electric Drives and explain classification of Electric drives in detail.
  - (b) In which type of applications four quadrant operation is employed in industries? Explain in detail the working of such an electric drive.
- 4. Attempt any *one* part of the following: **7 x 1 = 7****
- (a) Discuss 'rms current', 'rms torque' and 'rms power' methods for evaluation and rating of motor for continuous duty variable load conditions. Give their merits and limitations.
  - (b) Explain the loading of an electric motor and its duty cycle with a simple diagram.
- 5. Attempt any *one* part of the following: **7 x 1 = 7****
- (a) Explain the various types of braking as used in a dc motor. What necessary modifications are required while braking a dc series motor?



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- (b) Explain the dynamics during starting of a three phase induction motor. What are the methods of reducing energy loss during starting? Explain.

**6. Attempt any *one* part of the following:**

**7 x 1 = 7**

- (a) A 400kw, 3-phase, 3.4kV, 50Hz, 0.8 (lagging) power factor, 4 pole, star connected synchronous motor has following parameters:  $X_s=10\Omega$ ,  $R_s=0$ . Rated field current is 5A. 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.
- (b) Explain the operation of Brushless dc motor drive in detail.

**7. Attempt any *one* part of the following:**

**7 x 1 = 7**

- (a) What is slip-power recovery system? What are the advantages of slip-power recovery system?
- (b) Why a self controlled synchronous motor is free from hunting oscillations? Explain how the speed of a synchronous motor can be controlled using VSI fed inverter with requisite waveforms.