



SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : ELECTRIC DRIVE SYSTEMS (18EE2101) Course & Branch: M.Tech -EEE
Year & Sem: I-M.Tech & I-Sem **Regulation: R18**

UNIT –I

DYNAMICS OF ELECTRIC DRIVES

1. Explain briefly about Fundamentals of torque equation? [10M]
2. What are the different types of torque that involved in drive system? [10M]
3. Derive the expression for torque equation in electrical drives. [10M]
4. Describe briefly about multi quadrant operation of drives. [10M]
5. Derive the expression for torque in multi-quadrant drive system. [10M]
6. Explain four quadrant operation of motor drive system with hoist load. [10M]
7. What are the components of load torques? [10M]
8. What are the equivalent values of drive parameters and explain any one of them? [10M]
9. Explain speed torque convention with multi quadrant operation. [10M]
10. What are the modes of operation in electric drive system? [10M]

UNIT –II

CLASSIFICATION OF LOAD TORQUES

1. What are the classifications of load torques? [10M]
2. Explain briefly about steady state stability of motor load systems. [10M]
3. (a) Explain the operation of closed loop speed control with inner current control loop. [5M]
(b) What are the methods used in current sensing. [5M]
4. Derive the load equation of motor in electric drive system. [10M]
5. What is steady state stability of electric drives and explain it briefly. [10M]
6. How does a phase locked loop speed control schemes operate? Where do you use it? [10M]
7. State and explain different methods of speed sensing. [10M]
8. Explain feed-back loop control of drives. [10M]
9. What are the types of closed loop speed control schemes are used in multi motor drives. [10M]
10. Explain Four –quadrant operation of DC motor drive? [10M]

UNIT –III
DC MOTOR DRIVES

- 1) Explain four quadrant DC Motor drive? [10M]
- 2) Explain the principle and operation of the four quadrant chopper circuit? [10M]
- 3) Design a current controller of DC Motor Drive? [10M]
- 4) Explain the Dynamic simulation of speed controlled DC motor Drive? [10M]
5. (a) Explain briefly about state space modeling of DC motor drives. [5M]
(b) A separately –excited dc motor is delivering rated torque at rated speed. Find the efficiency of the motor at this operating point .The details of the machine are as follows:
1500kw.600V, rated current =2650A, 600rpm, Brush voltage drop=2V, Field power input=50KW, $R_a=0.003645$ ohms, $L_a=0.1$ mH, Machine frictional torque coefficient=15Nm/(rad/sec).Field current is constant and the armature voltage is variable. [5M]
6. How does a phase locked loop speed control schemes operate? Where do you use it. [10M]
7. State and explain different methods of speed sensing. [10M]
8. Explain the Principles of DC motor speed control. [10M]
9. What do you understand by constant torque drive and constant power drive? [10M]
10. Explain three phase controlled converters with neat sketch? [10M]

UNIT –IV
POLY-PHASE INDUCTION MACHINES

- 1) Find the relationship between the dc link voltage and the stator frequency for the closed –loop implementation of a volts/hz inverter fed induction motor drive .The motor parameters are as follows 5hp,60Hz,star connected,4-pole,0.86pf and 0.86 efficiency's=0.277 Ω , $R_r=0.183$ Ω , $X_m=20.30\Omega$, $X_{1r}=0.841$ [10M]
- 2 .What is the principle of vector control and explain the direct vector control scheme . [10M]
- 3 .Explain briefly about flux weakening operation of induction motor drives? [10M]

4. Write the classification of frequency changers and explain? [10M]
5. Define voltage source inverter and explain the operation of McMurray in industrial motor Drives? [10M]
6. Describe the speed control of Inverter-Driven induction motor? [10M]
7. Explain the principle if operation of slip-energy recovery scheme? [10M]
8. Evaluate the control characteristics of induction machine? [10M]
9. Explain about three phase to two phase transformation in IM ? [10M]
10. An induction motor has the following parameters 5 hp=3-phase ,60hz,4-pole,star connected $R_s=0.277\Omega$ $R_r=0.183\Omega$ $L_m=0.0538H$ $L_r=0.056H$ Effective stator to rotor turns ratio, $a=3$ The motor is supplied with its rated and balanced voltages. Find the q and d axes steady state voltages and currents and phase currents I_{qr} , I_{dr} , I_α and I_β when the rotor is locked .Use the stator –reference frames model of the induction machine. [10M]

UNIT –V

TRACTION MOTOR

1. Explain briefly about the construction of stepper motor? [10M]
2. Describe the principle of operation of a switched reluctance motor? [10M]
3. Explain briefly about the construction of servo motor? [10M]
4. Explain briefly about nature of load in electric traction? [10M]
5. An electric train weighing 500 tonnes climbs up-gradient with $G=8$ and following speed-time curve:
- (i) Uniform acceleration of 2.5 Km/hr/sec for 60 sec
 - (ii) Constant speed for 5 min
 - (iii)Coasting for 3 min
 - (iv) Dynamic braking at 3 kmphs to reset

The resistance is 25N/tonne, rotational inertia effect 10% and combined efficiency of transmission and motor is 80%. Calculate the specific energy consumption. [10M]

6. What are the types of electric traction services, Explain briefly? [10M]

7. What are the applications for the following? [10M]

a) Stepper motor

b) Servomotor

8. a) explain about specific energy consumption? [10M]

b) A 100 tonne motor coach is driven by 4 motors, each developing a torque of 5000 N-m during acceleration. If up-gradient is 50 in 1000, gear ratio $a=0.25$, gear transmission efficiency 98%, Wheel radius 0.54m, train resistance 25 N/tonne, effective mass on account of rotational inertia is 100% higher, calculate the time taken to attain a speed of 100kmph. [10M]

9. Discuss 25kv ac traction drive employing transformer with tap-changer. [10M]

10. Discuss the operation of dc traction drive employing PWM and Load commutated inverter. [10M]

Prepared by **T.J.DEEPTHI**