Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
PEEL5303

6th Semester Back Examination 2017-18
ELECTRIC DRIVES
BRANCH : EEE
Time : 3 Hours
Max Marks : 70
Q.CODE : C151

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1. **Answer the following questions :** **(2 x 10)**

a) What are the functions of power modulator?

b) Differentiate between active load torque and passive load torque.

c) What are the different components of load torque?

d) What is the need for load equalisation and how it is done?

e) What is the difference between dynamic braking and plugging?

f) Why a DC series motor is more suited to deal with torque overloads than other DC motors?

g) Which method of speed control of DC shunt motor is constant power drive method? Justify.

h) What is slip power recovery scheme for an induction motor?

i) What is self-control mode of a synchronous motor drive?

j) What are the advantages of AC traction using semiconverter fed DC motor over Load transformer tap changer fed DC motor?

Q2. **a)** Derive the expression for Equivalent moment of inertia and Equivalent torque for a motor load system with loads having rotational and linear motion. **(5)**

b) A drive has following parameters J=1 kg-m^2, T=15 - 0.01N (N-m) and passive load torque T_L=0.005N (N-m): where N is the speed in rpm. Initially the drive is operating in steady state. Now it is to be reversed. For this the motor characteristic is altered such that T= -15 - 0.01N (N-m) for positive as well as negative values of N. Calculate the reversal time. **(5)**

Q3. **a)** A 3-phase ,100 kW, 6-pole, 960 rpm induction motor drives a load whose torque varies such that a torque of 3000 N-m for 10 sec followed by a torque of 500 N-m of sufficient long time to reach steady state. Find the moment of inertia of the flywheel if the motor torque should not exceed twice of the rated torque. The MI of the motor is 10 Kg-m^2. **(5)**

b) Derive the expression of rise in temperature from the thermal model of motor during heating and cooling. **(5)**

Q4. **a)** A drive consisting of converter fed dc motor running with the following periodic duty cycle. **(5)**

(i) Acceleration from starting to 1000 rpm in 10 second at uniform acceleration

(ii) Running at 1000 rpm & 800 N-m for 8 second

(iii) Braking from 1000 rpm to stand still in 10 second at uniform deceleration

(iv) Remains ideal for 20 second

Determine the torque & power rating of the motor, Moment of inertia of the motor is 100 kg-m2.

b) Explain the closed loop speed control of electrical drive with suitable block diagram. **(5)**

Q5. **a)** A 220V, 1500 rpm, 10 A separately excited DC motor is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz, Ra=2 Ω. 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. **(5)**

b) Explain the chopper controlled separately excited dc motor drive for motoring and braking with suitable circuit diagram and waveforms. **(5)**

Q6. **a)** A 440 V,50 Hz, 6 Pole, Y-connected squirrel cage induction motor has following parameters Rs=0.6 Ω, R_r'= 0.3 Ω Xs= X_r'=1 Ω. The normal full load slip is 0.05. The motor is fed from a voltage source inverter, which maintains a constant V/f ratio. For an operating frequency of 10 Hz, calculate the breakdown torque as a ratio of its value at the rated frequency. **(5)**

b) Draw and Explain Static Rotor Resistance control of Induction motor and mention its advantages & disadvantages. **(5)**

Q7. A train service consists of the following: **(10)**

Uniform acceleration of 1kmphps for 2min

Free running for 30 min

Coasting for 2 min at a deceleration of 0.1 kmphps

Uniform braking at 1.2 kmphps to stop

A stop of 5 min

Calculate (i) Distance between the stations and (b) Scheduled speed

Q8. **Write short answer on any TWO :** **(5 x 2)**

a) Static Kramer Drive

b) Paper Mills

c) Steel rolling Mills

d) 25 kV, 50 hz ac Traction employing two stage half controlled converter.