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Total Number of Pages : 02

B.Tech
PEL6J003

6th Semester Regular / Back Examination 2018-19

ELECTRICAL DRIVES

BRANCH : EEE

Max Marks : 100

Time : 3 Hours

Q.CODE : F755

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- Draw the complete block diagram of electrical drive?
- What are components of load torque?
- What do you mean load equalization? How it overcome?
- Write the mathematical expression for overloading factor in intermittent periodic duty?
- What are the drawbacks of stepped wave inverter?
- How the selection of motor can be done?
- What are the factors affecting specific energy consumption?
- Define dead weight and adhesive weight?
- What are the factors affecting schedule speed?
- Why 3 phase Induction motors are not used in electric traction?

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Derive the expression for Moment of inertia of the flywheel when used in load equalization?
- A 250V dc shunt motor taking an armature current of 150A and running 550rpm is beaked by reversing the connection of armature and inserting additional resistance in series with it. Calculate the value of series resistance required to limit the initial current of 240A and initial value of braking torque? The armature resistance is 0.09Ω.
- Describe with complete diagram and explain static Scherbius drive?
- A motor has continuous rating of 100kW. The heating and cooling time constants are 50 and 70 min respectively. The motor has maximum efficiency at 80% full load and is employed in an intermittent load periodic cycle consisting of a load of 10 minute followed by a no load period of 10 min . Calculate the value of load in kW during load period.
- Describe details with diagram of plugging in series motor and also deduce the torque expression for that?
- A 3 phase, 440V, 50Hz, 6 pole, Y connected induction motor has following parameters referred to stator: $R_s=0.5$ ohm, $R_r=0.6$ ohm, $X_s=X_r=1$ ohm. Stator to rotor turns ratio is 2. If the motor is used for regenerative braking determines maximum overhauling torque it can hold and the range of speed in which it can safely operate?
- Derive the expression for maximum speed in km/hr using simplified trapezoidal speed time curve?
- Write a short note on Slip speed control of induction motor?
- Discuss the transient stability in electric drives?
- A 400V, 4 poles, 50Hz induction motor develops 25 hp at 4% slip on full load. If the ratio of rotor resistance to standstill reactance is 1:4, estimate in kg-m the initial plugging torque and the torque at standstill.
- Define coefficient of adhesion? Derive the expression for energy output from the driving Axle?
- Write a short note on current regulated voltage source inverter control using complete diagram?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A 500 tonne goods train is to be hauled by a locomotive up a gradient of 1 in 40 with an acceleration of 1.5kmphps. Determine the weight of the locomotive and number of axels, if the axial load is not exceed 24 tones. Coefficient of adhesion is 0.3, track resistance 45N/tone and effective rotating masses 10% of dead weight? **(16)**

Q4 At a full load of 10Hp motor temperature rise of the motor is 25⁰ C at one hour and 40⁰C at 2 hour. Find out the final temperature rise in full load, heating time constant of motor and half hour rating if iron loss remains constant at 80% of the copper loss at full load? **(16)**

Q5 Write the short note on :

- a) Microprocessor based drive **(8)**
- b) Paper mill **(8)**

Q6 A 3 phase ,400V, 6 pole , 50Hz delta connected , slip ring IM has rotor resistance of 0.2 ohm and leakage reactance of 1 ohm per phase refereed to stator. When driving a fan load it runs at full load at 0.4% slip. What resistance must be inserted in the rotor circuit to obtain a speed of 850rpm.Stator to rotor turns ratio is 2.2. **(16)**