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

Total Number of Pages : 02 **B.Tech**
PEE6I101

6th Semester Regular / Back Examination 2018-19
ELECTRICAL DRIVES
BRANCH : ELECTRICAL
Max Marks : 100
Time : 3 Hours
Q.CODE : F991

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)**

a) Draw the complete block diagram of electrical drive?
b) What are the main factors for choice of electric drives?
c) Write the expression for torque equation for mechanical load?
d) Write the mathematical expression for overloading factor in short time periodic duty?
e) Draw the torque speed characteristics of IM and show the different regions?
f) How the selection of motor can be done?
g) Write the advantage and disadvantage of rotor resistance control method?
h) Define dead weight and adhesive weight?
i) Define static stability limit?
j) 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)**

a) Derive the expression for Moment of inertia of the flywheel when used in load equalization?
b) A 3-phase IM ,50Hz,8 pole ,400V synchronous motor and a driven machine act total inertia 300kg-m2.Determine time taken and number of revolution made by it to come to stand still if (i) rheostatic breaking is used which is gives an initial breaking torque 450kg ,(ii) Break by plugging which produce a constant breaking torque 120Kg. Assume a frictional torque of 1kg.
c) Describe with complete diagram and explain static Kramer's drive?
d) A motor has continuous rating of 100kW.The heating and cooling time constants are 50and 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.
e) Describe details with diagram of plugging in series motor and Induction motor?
f) A drive has following parameters: J=10kg-m^2,T=100-0.1N-m,Passive load torque T_l=0.05N N-m, where N is the speed in RPM. Initially drive operating in steady state. Now it is to be reversed. For this motor characteristics is changed to T=-100-0.1N, N-m. Calculate the time of reversal.
g) Derive the expression for maximum speed in km/hr using simplified trapezoidal speed time curve?
h) Write a short note on Slip power recovery control?
i) A 220V, 970rpm, 100A dc separately excited motor has an armature resistance of 0.05 ohm. It is braked by plugging from an initial speed of 1000rpm. Calculate (i) resistance to be placed armature to limit the breaking current twice the full load (ii) torque when speed is fallen to zero.
j) 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.

k) Write the short note of mechanics of train movement? Also write the complete expression for tractive effort of the train?

l) Write a short note on variable frequency control using voltage source converter 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 A 3 phase 440V, 50Hz, 6 pole, Y connected induction motor has following parameters referred to stator: Rs=0.5 ohm, Rr=0.6ohm,Xs=Xr=1 ohm. Stator to rotor turns ratio is 2. If the motor is used for regenerative breaking determines maximum overhauling torque it can hold and the range of speed in which it can safely operate? **(16)**

Q5 Write the short note on

a) microprocessor based drive **(8)**

b) Steel mill **(8)**

Q6 A motor having a suitable control circuit develops a torque by the relationship $T_M = a\omega + b$, where a and b are positive constants. This motor is used to drive a load whose torque is expressed as $T_L = c\omega^2 + d$, where c and d are positive constants. The total inertia of the rotating masses is J. **(16)**

a) Determine the relations amongst the constants a, b, c and d in order that the motor can start together with the load and have an equilibrium operating speed?
b) Calculate the equilibrium operating speed?
c) Will the drive be stable at this speed?
d) Determine the initial acceleration of the drive?
e) Determine the maximum acceleration of the drive?