(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2011 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VII) EXAMINATION, 2007-08

ELECTRIC DRIVES

Time : 3 Hours] *[Total Marks : 100*

Note : *(1) Answer **all five** questions.*
*(2) Any **two** from each question.*
*(3) All questions carry **equal** marks.*
(4) Graph paper will be supplied.

1 Answer any **two** of the following : **10×2**

(a) A drive has following parameters : **10**
$J = 10$ kgm^2, T=100 0.1 Nm, Passive Load Torque = 0.05 Nm, N = speed in rpm. Initially the drive is operating in steady state. Now it is to be reversed. For this motor characteristic is changed to T = -100-0.1 Nm. Calculate the time of reversal.

(b) Draw Torque-speed characteristics of DC Drives. **10**
Justify them using mathematical relations.

(c) Explain the operation of Motors subjected **10**
to Intermittent Loads. Deduce the frequency of operation.

(c) Calculate and explain energy losses in DC machine during transients. 10

4 Solve any **two** of the following : 20

(a) A closed loop dc drive system has 50 kW 240 V, 1100 rpm separately excited dc motor. $R_a = 0.075\ \Omega$, $L_a = 1.5$ mH, J = 0.15, $I_f = 1$ Amp. viscous friction const. = 0.2 Nm, Input gain = 200 voltage feedback gain = 1.0 V/A rad/sec. Calculate 10

(i) The response due to reference voltage

(ii) Speed in steady state if ref voltage is 0.25 V and load Torque = 70% of rated.

(b) Chopper fed dc drive is used. Deduce expression for current and draw waveforms for chopper working under (a) continuous current mode (b) discontinuous mode (c) at the boundary of continuous and discontinuous mode. 10

(c) Explain the operation of static Ward - Leonard control of machines. 10

5 Solve any **two** of the following :

(a) A 3 ϕ 400 V, 50 Hz Y connected, 6 pole inverter fed induction motor is operating under constant v/f control. Motor parameters are as follows : $R_1 = R_2 = 0.04\ \Omega/\phi$.

$X_1 = X_2 = 0.2\ \Omega/\phi$. Find the starting torque and rotor currents at 15 Hz in terms of their values at 50 Hz.

R_1, X_1 = stator quantities, R_2, X_2 = Rotor Quantities

(b) Discuss the principle of operation of slip recovery using static kramer drive. **10**

(c) How vector control technique is applied for speed control of permanent Magnet synchronous motors. Draw layout for above scheme and explain operation of each unit. **10**
