No. of Printed Pages : 4

BIEEE-016

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

00144

June, 2017

BIEEE-016 : INDUSTRIAL DRIVES

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume suitable data, wherever not provided.*

1. What do you mean by "Individual Drive" and "Group Drive" ? Explain their relative merits and demerits. Where is the use of Individual drive recommended and why ? *10*

2. What do you mean by "Load Equalization" ? A flywheel is not used with a synchronous motor for load equalization. Why ? Is it possible to apply load equalization for reversible drive ? Discuss. *10*

3. The speed of a 20-hp, 300 V, 1800 rpm separately excited dc motor is controlled by a three-phase full converter drive. The field current is also controlled by a three-phase full converter and is set to the maximum possible value. The ac input is a three-phase, star-connected, 208 V, 60 Hz supply. The armature resistance R_a = 0·25 Ω, the field resistance R_f = 245 Ω and the motor voltage constant is K_v = 1·2 V/A rad/s. The armature and field currents can be assumed to be continuous and ripple free. The viscous friction is negligible. Determine

   (a) the delay angle of the armature converter, if the motor supplies the rated power at the rated speed.

   (b) the no-load speed if the delay angles are the same as calculated in (a) and the armature current at no-load is 10% of the rated value.

   (c) the speed regulation. *10*

4. What is the purpose of a converter in dc drives ? Explain the principle of regenerative braking of dc-dc converter-fed dc motor drives. *10*

5. How can the control characteristic of an induction motor be made to behave like a dc motor ? Explain the field-weakening mode of an induction motor drive. *10*

6. Explain with the help of neat illustrations, the Static Scherbius Drive scheme of slip-power recovery. *10*

7. A three-phase, 11·2 kW, 1750 rpm, 460 V, 60 Hz, four-pole star-connected induction motor has the following parameters :

$R_s = 0$, $R_r' = 0{\cdot}38\ \Omega$, $X_s = 1{\cdot}14\ \Omega$, $X_r' = 1{\cdot}71\ \Omega$ and $X_m = 33{\cdot}2\ \Omega$

The motor is controlled by varying the supply frequency. If the breakdown torque requirement is 35 N-m, calculate

(a) the supply frequency, and

(b) the speed ω_m at the maximum torque. *10*

8. What is a self-controlled mode of synchronous motor ? Explain the operation of a self-controlled synchronous motor drive employing cycloconverters. *10*

9. Write short notes on any ***two*** of the following : *2×5=10*

(a) Solar and Battery Powered Drives

(b) Brushless DC Motor Drives

(c) Dual Converter Fed DC Drives

10. Explain the operation of a VSI-fed PWM controlled induction motor drive with the help of a suitable control schematics. *10*
