No. of Printed Pages : 4

BIEE-030

DIPLOMA IN ELECTRICAL ENGINEERING (DELVI) / ADVANCED LEVEL CERTIFICATE COURSE IN ELECTRICAL ENGINEERING (ACELVI)

00796

Term-End Examination

June, 2016

BIEE-030 : INDUSTRIAL DRIVES AND CONTROLS

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any* ***five*** *questions. Question no.* ***1*** *is* ***compulsory****. Use of scientific calculator is allowed.*

1. Attempt the following objective type questions : *7×2=14*

(a) In a single phase full converter, for continuous conduction, each pair of SCRs conduct for

(i) $\pi - \alpha$

(ii) π

(iii) α

(iv) $\pi + \alpha$

(b) The minimum current required by a thyristor for turn on is known as

(i) latching current

(ii) holding current

(iii) continuous current

(iv) None of the above

(c) The frequency of the ripple in the output voltage of a 3-phase semi-converter depends on

(i) firing angle and load resistance

(ii) firing angle and load reactance

(iii) the supply frequency

(iv) firing angle and supply frequency

(d) A converter which can operate in both 3-pulse and 6-pulse mode is a

(i) 1-phase full converter

(ii) 3-phase half converter

(iii) 3-phase semi-converter

(iv) 3-phase full converter

(e) In dc choppers, the waveforms for input and output voltages are respectively,

(i) discontinuous, continuous

(ii) both continuous

(iii) both discontinuous

(iv) continuous, discontinuous

(f) A chopper can be used on

(i) PWM only

(ii) FM only

(iii) AM only

(iv) both PWM and FM

(g) In V/f control method, an induction motor drive operates in

(i) constant power mode

(ii) constant torque mode

(iii) None of the above

(iv) both (i) and (ii)

2. A 200 V, 875 rpm, 150 A separately excited dc motor has an amature resistance of 0·06 Ω. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220 V, 50 Hz. Assuming continuous conduction, calculate : *14*

(i) Firing angle for rated motor torque and 750 rpm.

(ii) Motor speed for $\alpha = 160°$ and rated torque.

3. Explain the operation of a single phase fully controlled converter fed dc separately excited motor. Draw the wave shapes corresponding to continuous conduction. Also derive the expression for output voltage. *14*

4. Explain the operation of 3-phase fully controlled converter connected to dc separately excited motor. Draw the wave shapes for $\alpha = 30°$ and derive the expression for speed. *14*

5. (a) A 230 V, 960 rpm and 200 A separately excited dc motor has an armature resistance of 0·02 Ω. The motor is fed from a chopper. Calculate the duty ratio of the chopper, if the motor is running at 350 rpm. *7*

   (b) Describe the operation of a chopper fed dc series motor. Draw the speed – torque characteristics for increasing duty ratio (δ). *7*

6. How is variable frequency control of induction motor obtained *14*

   (i) Voltage source inverter ?

   (ii) Current source inverter ?

7. Write short notes on any ***two*** of the following : *2×7=14*

   (i) Closed loop operation of multi-motor drive.

   (ii) PWM control of induction motor.

   (iii) Four quadrant chopper fed separately excited dc motor.