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BIEE-030

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

00856

Term-End Examination

June, 2015

BIEE-030 : INDUSTRIAL DRIVES AND CONTROLS

Time : 2 hours *Maximum Marks : 70*

Note : *All questions are to be answered in English only. Attempt any* ***five*** *questions. Question no.* ***1*** *is* ***compulsory.***

1. Attempt the following objective type questions.

(a) A fully controlled converter has 2

(i) only diodes

(ii) only thyristors

(iii) both diodes and thyristors

(iv) only resistors

(b) SCR can be turned off 2

(i) if a reverse biased voltage comes across it.

(ii) if the current is below holding current.

(iii) Both (i) and (ii)

(iv) Either (i) or (ii)

(c) Which motor is having almost flat speed-torque characteristics ? 2

(i) DC series motor

(ii) Induction motor

(iii) DC shunt motor

(iv) DC compound motor

(d) The average value of output voltage for half wave fully controlled rectifier with R-Load is 2

(i) $\frac{V_m}{2\pi}(1 + \cos\alpha)$

(ii) $\frac{2V_m}{\pi}\cos\alpha$

(iii) $\frac{2V_m}{\pi}$

(iv) $\frac{V_m}{2\pi}(\cos\alpha - 1)$

(e) In dc chopper, if T_{on} is the on period and f is the chopping frequency, the output voltage in terms of input voltage V_s is given by 2

(i) $\frac{V_s \cdot T_{on}}{f}$

(ii) $\frac{V_s \cdot f}{T_{on}}$

(iii) $\frac{V_s}{f \cdot T_{on}}$

(iv) $V_s \cdot f \cdot T_{on}$

(f) For a three-phase bridge inverter having 180° connection, which statement is true ? 2

(i) Each thyristor conducts for 180°.

(ii) Thyristors conduct for 120°.

(iii) Two thyristors conduct at any instant.

(iv) Conduction period cannot be controlled.

(g) In a CSI, the _____ is constant. 2

2. (a) Describe the working of a single-phase half-wave converter-fed dc drive with proper voltage and current waveforms. 7

(b) A single-phase full converter connected to 230 V, 50 Hz ac supply is feeding a dc motor having armature resistance of 0·5 Ω. Calculate the firing angle, if back emf E is (i) 100 V and (ii) – 100 V. 7

3. What are the methods of speed control of a dc separately excited motor ? Explain the concept of constant power and constant torque drives for field flux control and armature voltage control. *14*

4. (a) Explain the concept of electric drives. What is the function of feedback in electric drives ? Explain each block with example. *7*

(b) Draw the waveforms of a semi-converter for R and R – L Load. *7*

5. (a) What are the distinct features of two quadrant and four quadrant drives ? Explain with quadrant diagram. *7*

(b) Explain the methods to control the speed of a dc series motor using dc chopper. *7*

6. (a) A dc chopper has input voltage of 200 V and output voltage of 150 V. Load resistance is 10 Ω. Find

(i) duty cycle,

(ii) average and rms load currents. *7*

(b) Why is forced commutation necessary for choppers ? *7*

7. (a) What are the merits and demerits of ac drives over dc drives ? 7

(b) Explain the v/f method of speed control of an induction motor. 7

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Step-up Chopper

(b) Speed – Torque Characteristics of Induction Motors

(c) Comparison of VSI and CSI

(d) PWM Control

(e) Bridge Type Cycloconverter

(f) Thyristor Characteristics