

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

Term-End Examination

June, 2017

00934

**BIEE-030 : INDUSTRIAL DRIVES AND
CONTROLS**

Time : 2 hours

Maximum Marks : 70

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

1. Attempt the following objective type questions : $7 \times 2 = 14$

- (a) A controlled rectifier allows variation of output voltage by variation of
- (i) firing angle
 - (ii) commutation angle
 - (iii) load current
 - (iv) power loss

- (b) In a three-phase fully controlled converter, there are how many pulses of output in one cycle of input voltage ?
- (i) 3 pulses
 - (ii) 6 pulses
 - (iii) 9 pulses
 - (iv) 12 pulses
- (c) A full converter operates in
- (i) one quadrant
 - (ii) two quadrants
 - (iii) three quadrants
 - (iv) four quadrants
- (d) In the V/f method of speed control, which of the parameters of the induction motor remains constant ?
- (i) Rotor resistance
 - (ii) Magnetic field
 - (iii) Both (i) and (ii)
 - (iv) Neither (i) nor (ii)
- (e) Choppers are capable of _____ input DC voltage.
- (i) stepping up
 - (ii) stepping down
 - (iii) Both (i) and (ii)
 - (iv) Neither (i) nor (ii)

- (f) A cycloconverter can convert
- (i) voltage
 - (ii) current
 - (iii) power factor
 - (iv) frequency
- (g) SCR can be used as
- (i) Amplifier
 - (ii) Switch
 - (iii) Buffer
 - (iv) All of the above
2. A single-phase 230 V, 50 Hz supply feeds a separately excited DC motor through two single-phase semiconverters, one for the field and one for the armature. The firing angle of the semiconverter for the field is zero. The field resistance is 200 Ω and armature resistance is 0.3 Ω . The load torque is 50 Nm at 900 rpm. The voltage and torque constant is 0.8. Calculate : 14
- (a) Field current
 - (b) Firing angle of the converter in the armature circuit.
3. Explain the operation of a 3-phase fully controlled converter connected to a DC separately excited motor. Draw the wave shape for $\alpha = 30^\circ$ and derive the expression for output voltage and speed. 14

4. Describe the two quadrant operation of a DC series motor fed through a chopper. Draw proper wave shapes and explain the corresponding variations in speed-torque characteristics. 14
5. Explain the speed-torque characteristics of an induction motor. Also, explain the working of CSI fed single-phase induction motor for speed control using variable voltage. 14
6. Draw the complete block diagrams for closed loop control of DC motor drive. Explain each block and justify how it can improve the speed of response. 14
7. Write short notes on any **two** of the following : $2 \times 7 = 14$
- (a) PWM control of induction motor
 - (b) Three-phase semiconverter fed DC separately excited motor
 - (c) Four quadrant operation of chopper fed DC drive
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