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

Term-End Examination 02969

June, 2012

BIEE-030 : INDUSTRIAL DRIVES AND CONTROLS

Time : 2 Hours *Maximum Marks : 70*

Note : (i) All the questions are to be answered in English only.
*(ii) Attempt **any five** questions . Question No. **1** is **compulsory**.*

Attempt the following objective type questions.

1. (a) Fully controlled converter means : **2**

(i) In which a.c. input current is bidirectional.

(ii) In which power flow can be in either direction.

(iii) In which a.c. input current is unidirectional.

(iv) None of the above.

(b) SCR can be turned ON by applying. **2**

(i) large anode voltage

(ii) anode voltage at a fast rate

(iii) large gate current

(iv) sufficiently large temperature to SCR

(v) all of the above

(c) Which motor should not run on no load or light load ? 2

(i) D.C . series motor

(ii) D.C. shunt motor

(iii) Induction motor

(iv) D.C. compound motor.

(d) In a 3-phase , six pulse diode rectifier, the average out put voltage in terms of maximum value of line voltage V_m is 2

(i) $\frac{3\sqrt{2}V_m}{\pi}$ (ii) $\frac{3V_m}{\pi}$

(iii) $\frac{3\sqrt{3}V_m}{2\pi}$ (iv) $\frac{3\sqrt{3}V_m}{\pi}$

(e) In dc choppers, if Ton 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) $\frac{V_s.Ton}{f}$ (ii) $\frac{V_s.f}{Ton}$

(iii) $\frac{V_s}{f.Ton}$ (iv) $V_s . f . Ton$

(f) In PWM method of controlling the average output voltage in a chopper, the on-time is _____(varied/kept constant) but the chopping frequency is (varied/kept constant) _____ . 2

(g) Which of the following statement / statements is/are correct in connection with inverters. 2

(i) VSI & CSI both require feedback diodes

(ii) Only CSI requires feedback diodes

(iii) GTOs can be used in CSI

(iv) Only VSI requires feedback diodes

2. (a) Describe the working of a single phase full converter fed d.c. drive with appropriate voltage and current wave forms. 7

(b) A 200V, 875 rpm , 150A separately excited dc motor has an armature resistance of 0.06 Ω. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50Hz. Assuming continuous conduction, calculate 7

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

(ii) Firing angle for rated motor torque and −500 rpm.

3. (a) Give the concept of electric drives. Illustrate your answer with examples. 7

(b) What is an ac - dc converter ? Explain the working of single phase half wave controlled rectifier using R and R-L load. 7

4. (a) Describe the use of a 3-phase semiconverter for the speed control of a dc series motor. Illustrate your answer with appropriate wave forms. 7

(b) Derive expressions for the rms values and average values of output current and voltage for 3 -phase semiconverter. 7

5. (a) Distinguish between two quadrant and four quadrant drives. 7

(b) Describe how a four quadrant drive can be obtained from a chopper fed separately excited dc motor. 7

6. (a) Describe the speed control method of D.C. series motor using chopper. 7

(b) For step up chopper input voltage is 220V and output voltage is 660V. If the non-conducting time of thyristor chopper is 100NS. Compute the pulse width of output voltage. 7

In case pulse width is halved for constant frequency operation. Find the new output voltage.

7. (a) What are ac. drives ? Give their merits and demerits with respect to dc drives. 7

(b) Induction motor speed control with constant supply voltage and reduced supply frequency is rarely used in practice, justify the statement. 7

8. Write short notes on *any four* : **3½x4=14**

(a) Closed loop operation of D.C. drives

(b) Three phase full converter drives

(c) Comparison of VSI and CSI

(d) Speed control of D.C .drives

(e) Slip torque characteristic of induction motor drive

(f) Step up chopper.