DIPLOMA IN ELECTRICAL ENGINEERING (DELVI)

Term-End Examination 00651

December, 2012

BIELE-005 : INDUSTRIAL ELECTRONICS

Time : 2 hours *Maximum Marks : 70*

Note : *(i) Question no.1 is **compulsory** (objective).*

*(ii) Attempt **any four** questions from rest of the questions.*

(iii) Draw neat and clean circuit diagrams if any required.

1. Attempt all objective type questions : **7x2=14**

(a) NPN transistors are prefered over PNP transistors because :

(i) Low heat dissipation

(ii) Cheap and easily available

(iii) High mobility of holes

(iv) Higher mobility of electrons than holes in PNP transistors.

(b) A power BJT is a

(i) Voltage controlled majority carrier device.

(ii) Current controlled majority carrier device.

(iii) Current controlled minority carrier device.

(iv) Voltage controlled minority carrier device.

(c) When a SCR gets turned ON, the gate drive :

(i) should not be removed or it will turn OFF the SCR

(ii) may or may not be removed

(iii) should be removed

(iv) should be removed in order to avoid increased losses and higher function temperature.

(d) Freewheeling diode at the output of a rectifier allows :

(i) SCR to trigger properly

(ii) Turn-OFF SCR at the end of half cycle.

(iii) Protection of SCR against over voltage.

(iv) None of these

(e) A four quadrant operations requires :

(i) two full converters in series

(ii) two full converters connected back to back.

(iii) two full converters connected in parallel.

(iv) two semi converters connected back to back.

(f) When a UJT is used for triggering of an SCR, the wave shape of the voltage obtained from UJT circuit is,

(i) sine wave

(ii) saw-tooth wave

(iii) trapezoidal wave

(iv) square wave

(g) In a three-phase half-wave rectifier the output voltage is equal to :

(i) the most positive input phase voltage at any instant

(ii) the difference of most positive and most negative input phases at any instant.

(iii) the average value of the three phases

(iv) the difference of the two positive phase voltages.

2. (a) Draw the symbols for the following : **7+7=14**

(i) SCR (ii) DIAC

(iii) TRIAC (iv) SCS

(v) SUS (vi) LASCR

(vii) IGBT

(b) Explain the two transistor analogy of an SCR.

3. (a) Describe basic structural features, working and equivalent circuit of an IGBT. **7+7=14**

(b) Discuss the advantages of SCR over power BJT.

4. (a) Discuss the working of a UJT relaxation oscillator. **7+7=14**

(b) Explain various types of triggering methods of SCR.

5. (a) Give schematic representation of a **7+7=14**

(i) 3-phase half-wave rectifier circuit

(ii) 3-phase full-wave rectifier circuit

(iii) compare the rectification properties of the two.

(b) Differentiate between a half controlled bridge and a fully controlled bridge.

6. (a) Explain the operation of full wave mid point converter with RL load. **7+7=14**

(b) With neat sketch, describe the function of a single phase half controlled bridge rectifier with resistive load. What will be the wave forms observed?

7. Discuss ***any two*** from the following : **2x7=14**

(a) Thyristor applications.

(b) FBSOA of BJT

(c) PUT relaxation oscillator

8. Write short notes on ***any four*** of the following : **4x3.5=14**

(a) IGBT operational characteristics

(b) SCR turn OFF methods

(c) Resistance firing circuit for SCR

(d) Capacitor firing circuit for SCR

(e) MCT's (Mos-controlled thyristor)

(f) RCT's (Reverse conducting thyristor)