Code: DE22 **Subject: INDUSTRIAL ELECTRONICS**
Time: 3 Hours **Max. Marks: 100**

JUNE 2011

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. An SCR can be operated

(A) Only under reverse biased condition
(B) Only under forward biased condition
(C) Both forward & reverse bias conditions
(D) Without biasing

b. A 3-phase full wave fully controlled bridge rectifier uses

(A) 4 SCR's **(B)** 6 SCR's
(C) 8 SCR's **(D)** 3 SCR's

c. According to their connections inverters are classified as

(A) Series inverters **(B)** Parallel inverters
(C) Bridge inverters **(D)** All of the above

d. Average output of a dc chopper is given by

(A) $V_O = V_{dc}$ / duty cycle **(B)** $V_O = V_{dc} \times$ duty cycle
(C) V_O = duty cycle / V_{dc} **(D)** none of these

e. A cycloconverter is a device which

(A) Measures frequency of A.C. mains.
(B) Converts A.C. of one frequency to A.C. of other frequency.
(C) Converts A.C. into D.C.
(D) Converts D.C. into A.C.

f. UJT is used for

(A) Controlling the power. **(B)** Triggering a triac.
(C) Triggering an SCR. **(D)** Triggering a Diac.

g. In dielectric heating process the supply requires

(A) Low frequency. **(B)** Very low frequency.
(C) High frequency. **(D)** Very high frequency.

h. ON and OFF frequency of a chopper depends on

(A) Applied voltage. **(B)** The load current.
(C) Type of the chopper. **(D)** Output voltage.

i. Induction heating is used for

(A) Melting **(B)** Annealing
(C) Forging **(D)** All the above.

j. Induction heating requires

(A) A.C. input. **(B)** High frequency A.C. input
(C) D.C. input. **(D)** Both A.C. and D.C. input

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain the Principle of operation & V-I Characteristics of an SCR. **(8)**

b. Explain light triggering and dv/dt triggering circuit of an SCR. **(4+4)**

Q.3 a. Explain the circuit of a three - phase bridge inverter for 180^0 conduction. Also draw the waveforms. **(8)**

b. A three - phase bridge inverter is fed by a 400 volts battery. The load is star connected and has a resistance of 10 ohms per phase. Find rms load current, power output, and average and rms thyristor current. Assume 120^0 mode of operation. **(8)**

Q.4 a. Explain the circuit of a single-phase fully controlled bridge rectifier with resistive R- load. Also draw the waveforms. **(8)**

b. Explain the principle of operation and application of a single-phase cyclo - converter. **(8)**

Q. 5 a. Explain the different commutation methods for choppers. **(8)**

b. A dc chopper has an input voltage of 230 V and an output voltage of 150 V. It is operating at a frequency of 1 kHz. Find the periods of conduction and blocking in each cycle. **(8)**

Q. 6 a. In a dielectric heating process a voltage of 230 V is applied at 30kHz .if the electrodes used have area of 4 cm^2 separated by 8 cm what is the dielectric loss filled between the electrodes? Assume phase angle of dielectric = 30^0 and dielectric constant is 10. **(8)**

b. Explain the process of resistance welding with a suitable diagram. Also give the applications of resistance welding. **(8)**

Q. 7 a. What is meant by thermal loss in dielectric heating? Explain the process of dielectric heating. **(8)**

b. Give the classification of inverters and applications of series and parallel inverters. **(4+4)**

Q. 8 a. Explain the circuit of the single-phase fully controlled rectifier with RL load and with freewheeling diode. Discuss the function of the diode? Also draw the waveforms. **(8)**

b. Why induction heating is preferred over other types of heating? Where all is it used? **(8)**

Q.9 Write notes on: -

(i) D.C. motor speed control. **(5)**
(ii) Application of choppers. **(5)**
(iii) SCR rating. **(6)**