17638

15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. a) Answer any THREE of the following: **12**

(i) Draw the symbols of -

1) SCR

2) GTO

3) IGBT

4) TRIAC

(ii) State the necessity of converters and give the classification of controlled converters.

Marks

(iii) Draw and explain the working of single phase half bridge inverter.

(iv) Draw and explain the working of DC static circuit breaker.

b) Answer any ONE of the following: **06**

(i) Draw a neat circuit diagram of parallel inverter. Explain its working with necessary waveforms.

(ii) Draw a neat circuit diagram 1ϕ fully controlled bridge rectifier with RL load. Explain the working with waveforms.

2. Answer any FOUR of the following: **16**

a) Draw the V-I characteristics of SCR. Define:

(i) latching current

(ii) holding current

b) Compare single phase and three phase converter on the basis of

(i) RMS voltage

(ii) average voltage

(iii) ripple factor

(iv) efficiency

c) Draw and explain the working of 1ϕ half wave controlled rectifier with RL load. Explain the effect of four wheeling diode.

d) State the classification of choppers.

e) Describe the speed control by dc series motor using single phase half controlled bridge converter.

f) With a neat circuit explain the operation of step up chopper.

Marks

3. Answer any FOUR of the following: **16**

a) Describe $\frac{dv}{dt}$ triggering of SCR.

b) Define firing angle and conduction angle. Find the value of firing angle so as to get a conduction angle of 135°.

c) Describe the four specifications of SCR.

d) Draw and explain a Jones chopper.

e) Describe automatic street lighting circuit using SCR.

4. a) Answer any THREE of the following: **12**

(i) Draw and explain the operations of class C chopper.

(ii) Explain pulse gate triggering of SCR.

(iii) Draw and explain the working of a chopper controlled dc drive (step down)

(iv) Define duty cycle of a chopper. Explain various control techniques used in chopper.

b) Answer any ONE of the following: **06**

(i) Describe the operation of 3ϕ series inverter with c/p-o/p waveforms and circuit diagram.

(ii) Draw and explain a 3ϕ fully controlled bridge converter with R load. Explain the working with waveforms.

Marks

5. Answer any FOUR of the following: **16**

a) Describe the principle of dielectric heating. State two applications of it.

b) With necessary circuit explain auxiliary commutation in chopper.

c) Describe harmonic reduction by single pulse width modulation.

d) Draw and explain electric welding control circuit using SCR.

e) State the methods of o/p voltage control of inverters. Explain PWM control in detail.

f) Draw and explain modified series inverter.

6. Answer any FOUR of the following: **16**

a) Draw the circuit diagram of class E-chopper and explain its working.

b) Explain the principle of static VAR compensation.

c) Compare induction heating and dielectric heating on the basis of

(i) material

(ii) rate of heating

(iii) frequency

(iv) applications

d) Explain the two transistor model of SCR.

e) State the speed control methods of 3ϕ induction motor. Explain variable frequency control.