

OR

Explain Sawtooth generator with the help of circuit diagram using GTO. Also give the wave-forms of the generator. What is the utility of the above in the industrial field.

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OR

A three-phase, three-wire full-wave phase control supply of 230 V rms. Calculate the rms output voltage for  $\alpha = \pi/3$ .

Unit-V

- a) Explain the working of a time switch for control low voltage.
- b) Draw the circuit of light divider using DIAC and TRIAC.
- c) Discuss any industrial application using GTO.
- d) Write short note on any two of the following:
  - i) Welding cycle
  - ii) Battery charger
  - iii) Induction heating
  - iv) Speed control of dc motor

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**EI-504****B.E. V Semester**

Examination, December 2015

**Power Electronics****Time : Three Hours****Maximum Marks : 70**

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
- ii) All parts of each questions are to be attempted at one place.
- iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
- iv) Except numericals, Derivation, Design and Drawing etc.

**Unit-I**

1. a) Give the complete classification of power semiconductor devices in terms of layers with examples.
- b) Draw the cross-sectional view and V-I characteristics of a Power diode.
- c) Draw and explain the turn-off characteristics of a thyristor.
- d) Discuss the transistor model of an IGBT with appropriate diagram. Also explain its V-I characteristics.

OR

Discuss the working of Triac in all modes of operations.

**Unit-II**

- What are the limitations of uncontrolled rectifier? How it can be overcome?
- Why fly wheel diode is used in controlled rectifiers?
- Explain the effect of source inductances in the full-wave controlled rectifier with the help of appropriate wave forms.
- Explain the working of a single-phase half controlled bridge configuration for resistive - inductive load. Derive the expressions for average dc value and rms value.

OR

A three phase half-wave controlled rectifier is connected to a 230 V ac input with a 100  $\Omega$  load resistance. If the desired average output voltage is 50% of the maximum possible average output voltage, calculate the delay angle  $\alpha$ .

**Unit-III**

- Discuss the merits and demerits of transistor and thyristor inverters.
- What do you mean by switch mode regulator?
- How full bridge regulator is derived from a buck regulator?
- What do you mean by power? Explain the working of a multiple pulse- width modulation.

OR

A buck regulator has an input of 110 V, the average load voltage is 60 V with average load current of 30 A. The switching frequency is 25 kHz. The peak-to-peak ripple current is 1.2 A. Calculate the value of the inductor.

**Unit-IV**

- What is an ac voltage controller? Give its industrial applications.
  - Explain why cycloconverters are more efficient than the dc link converter.
  - Why is the common cathode configuration normally used as compared to other circuit configurations? Explain.
  - Discuss a three-phase to single-phase cycloconverter.

OR

A three-phase, three-wire fullwave phase controller with a star connected resistive load of  $R = 30 \Omega$ , is fed from supply of 230 V rms. Calculate the rms output phase voltage for  $\alpha = \pi/3$ .

**Unit-V**

- Explain the working of a triac switch for controlling the low voltage.
  - Draw the circuit of light divider using Diac and Triac.
  - Discuss any industrial application using GTO.
  - Write short note on any two of the following :
    - Welding cycle
    - Battery charger
    - Induction heating
    - Speed control of dc motor.