Roll No ....

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 thysister.

d) Discuss the transister model of an IGBT with appropriate diagram. Also explain its V-I characteristics.

OR

Discuss the working of Triac in all modes of operations.

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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Unit-V

5. a) Explain the working of a triac switch for controll low voltage.

b) Draw the circuit of light divider using Diac and Th

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.

Unit-II

a) What is the limitations of uncontrolled rectifier? How it can be overcome?

b) Why fly wheel diode is used in controlled rectifiers?

c) Explain the effect of source inductances in the full-wave controlled rectifire with the help of appropriate wave forms.

d) 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 Ω load resistance. If the desired average output voltage is 50% of the maximum possible average output voltage, calculate the delay angle α.

Unit-III

a) Discuss the merits and demerits of transister and thysister inverters.

b) What do you mean by switch mode regulator?

c) How full bridge regulator is derived from a back regulator?

d) What do you mean by power? Explain the working of a multiple pulse- width modulation.

OR

A back 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

4. a) What is an ac voltage controller? Give its industrial applications.

b) Explain why cycloconverters are more efficient than the dc link converter.

c) Why is the common cathode configuration normally used as compared to other circuit configurations? Explain.

d) 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 Ω, is fed from supply of 230 V rms. Calculate the rms output phase voltage for $a = \frac{\pi}{3}$.

Unit-V

5. a) Explain the working of a triac switch for controlling the 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.