TEE-603   63

Even Semester Examination 2017-18

B.TECH. (SEMESTER-VI)

POWER ELECTRONICS

Time: 03:00 Hours   **Max Marks : 100**

Note: All questions are compulsory.

1.   Attempt any FOUR questions.

   (A)   Draw and explain the V-I characteristics of SCR.

   (B)   Explain various modes of operation of an SCR?

   (C)   Discuss the turn on and turn off characteristics of an SCR.

   (D)   Explain the operation of an SCR using two transistor model.

   (E)   Draw the circuit symbol of various switches. Mention the characteristics of an ideal switch.

   (F)   Discuss the constructional feature and operation of TRIAC?

2.   Attempt any FOUR questions.

   (A)   Explain the need of commutation in thyristor circuit. Discuss are classB commutation method with circuit diagram & wave form.

   (B)   A step upchopper with dc source voltage =240V, load resistance =15Ω has a voltage drop of 3V across chopper switch. When the duty cycle is of 0.2, calculate

      (a)   Average output voltage

      (b)   RMS values of output voltage.

TEE-603/1220   (1)   [P.T.O.]

     (c)   Chopper efficiency.

     (d)   Effective input resistance of chopper neglecting the switching loss

(C)   What is dc chopper? Describe the working principle of boostconverter.

(D)   Discuss the difficulty faced durring the parallel operation of an SCR. How the this problem is rectified.

(E)   Describe the principle of dc step down chopper operation and derive their expression?

(F)   Discuss various protection scheme of an SCR. How the low power gate drive circuit is protected from high power SCR circuit.

3.   Attempt any two questions.

(A)   Discuss the effect of source inductance on the output voltage of a 3 phasephase full wave converter. Draw necessary waveform.

(B)   Draw circuit diagram of 3phase dual converter & explain its working in continuous current mode and discontinuous current mode of operation. How are the firing angles of both converters decided?

(C)   Explain the operation of single phase full wave bridge converter for highly inductive load with the help of circuit diagram. A single phase full converter bridge connected to RLE type load.The source voltage is 220V,50 Hz.The average load current of 10A is constant over working range.for R=0.4Ω and L=2mH,compute

     (a)   Range of firing angle delay when E=110V

     (b)   Average output voltage when firing angle is 80^0.

4.   Attempt any two questions

(A)   How 1 phase full wave mid point type converter is different from 1 phase full wave bridge type converter.Describe the operation of 1-ph two pulse mid-point

TEE-603/1220   (2)

converter with relevant voltage and current waveform for continous conduction and discontinous conduction?

(B) Sketch output voltage waveform for a 3-ph to 3-ph cycloconverter for a firing angle delay of 30 and also obtain their expression for converter?

(C) Describe the effect of source inductance on the performance of a 3-ph full converter with waveform?

5. Attempt any two questions

(A) A single phase full bridge inverter may be connected to a load consisting of (a)R (b) RL load (c) RLC underdamped.For all these loads, draw the load voltage &load current waveform under steady operating conditions.disscuss thenature of these waveform.

(B) Explain the working of voltage source inverter in 120° mode of operation?

(C) What is current source inverter, describe a single phase capacitor-commutated CSI connected to load R with help of power circuit diagram and waveform for getting signals, load current, capacitor voltage, input voltage, voltage across one thyristor.

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