CODE NO:- K-36
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EEP/EE/EEE) Examination Nov/Dec 2015
Power Electronics
(Revised)

[Time: Three Hours]   [Max. Marks: 80]

"Please check whether you have got the right question paper."
N.B   i) Q.No.1 and Q.No.6 are compulsory.
             ii) Solve any two questions from the remaining from each section.
             iii) Draw neat waveforms wherever necessary
             iv) Assume suitable data, if required.

SECTION-A

Q.1   Solve <u>any five</u>   10
       a)   What are the advantages of GTO over SCR?
       b)   Draw the v-I characteristic of IGBT.
       c)   List the advantages & disadvantages of MOSFET.
       d)   Depending on the controllability criteria how power semiconductor devices are classified?
       e)   What are the two types of control strategies used in chopper?
       f)   What are the advantages of six pulse converter over two pulse converters?
       g)   What is meant by step UP & step down chopper
       h)   Draw the circuit diagrams of single phase fully controlled bridge rectifiers & write its av. Output voltage
            equation.

Q.2   a)   State & derive the performance parameters of single phase semi converter with R land.   08
       b)   A single phase fully controlled bridge rectifier is supplied from 230v, 50Hz, source. The load consists of R = 10Ω   07
            & a large inductance so as to load current is continuous for a firing angle delay of 45^0, determine
            i)   Average output voltage
            ii)   Average output current
            iii)   Average & rms values of thyrister currents.

Q.3   a)   Explain the working principle of a single phase dual converter with waveforms.   08
       b)   A chopper circuit is operating on TRC principle at a frequency of 5 KHZ on a 220v dc supply. If the load voltage is   07
            150v, compute the conduction & blocking period of chopper in each cycle.

Q.4   a)   A three phase semi converter is connected to a highly inductive load show that the average output voltage is   08
            given by $V_{oav} = \frac{3\ \sqrt{3}\ v_m}{2\pi}\ (1 + cos\alpha)$
            Where
            v_m- peak phase volt of star connected source

       b)   A step down chopper fed from 200v dc is connected to RL load with R = 10 Ω and L= 150mH for a chopper   07
            frequency of 1KHZ and duty ratio of 0.5 calculate
       i)   Minimum & maximum values of load current
       ii) maximum value of ripple current

Q.5   a)   Explain the pwm & fm techniques used for chopper control.   08
       b)   Explain with neat waveform discontinuous current conduction operation of step down chopper.   07

SECTION-B

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Q.6   Solve <u>any five</u>   10
       a) What are advantages of sinusoidal pwm over single pulse pwm technique?
       b) Compare 180^0 & 120^0 mode operation of VSI
       c) Define modulation index of pwm inverter.
       d) What is the effect of inductive load on the delay angle of ac voltage controller?
       e) What is cyclo converter? State its applications & limitations
       f) What are the advantages of switch mode converter over chopper?
       g) Draw circuit diagram of three phase to single phase cyclo converter
       h) What is power conditioner?

Q.7   a) With neat circuit & waveform explain the working principle of six step VSI operates in 180^0 mode.   10
       b) The single phase full bridge inverter has a resistance load of 10Ω & the dc input voltage is $v_s = 220v$. Determine 05
           a) Rms output voltage at the fundamental frequency
           b) The output power P_0

Q.8   a) With the help of waveform, explain the part played by the diodes in a single phase bridge inverter   08
       b) Explain how voltage control of VSI is achieved by controlling dc link voltage.   07

Q.9   a) With neat diagram & waveform explain the working principle of bock converter   08
       b) The boost converter has an input voltage $v_s = 6v$. The average output voltage $v_o = .5v$ & peak topeak output 07
           ripple voltage is 10mv. The switching frequency is 20KHZ. The peak to peak ripple current of inductor is limited
           to 0.5 Amp. Determine
           a) Duty cycle b) the filter inductance 'L' c) the filter capacitor 'C'

Q.10   a) With neat circuit diagram & waveform explain the operation of single phase cyclo converter   08
       b) Write short note on working principle of single phase ac voltage controller.   07