SUBJECT CODE NO:- P-298
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EEP/EE/EEE) Examination MAY/JUNE-2016
Power Electronics
(Revised)

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

"Please check whether you have got the right question paper."

N.B   1)   Q.No.1 & 6 are compulsory.
             2)   Solve any two questions form remaining from each section.
             3)   Draw neat waveforms wherever necessary.
             4)   Assume suitable data if required.

Section A

Q.1   Solve any five.   10
        a)   What are the different methods to turn on the thyristor?
        b)   Define: - i) Latching current &   ii) holding current of thyristor.
        c)   What are the differences between MOS FET & IGBT?
        d)   What are the advantages of freewheeling diode in controlled rectifier?
        e)   What are the differences between fully controlled & half controlled rectifiers?
        f)   State the performance parameters of controlled rectifier.
        g)   What do you mean by dc chopper?
        h)   What are the advantages of dc chopper over controlled rectifiers?

Q.2   a)   Explain with neat circuit the trigging requirements of IGBT.   07
        b)   Explain the most sensitive operating modes of TRIAC.   08

Q.3   a)   State the controlled rectifier's classification on the basic of quadrant of operation. Explain with neat   08
             circuit & waveform the inversion operation of 1-ϕ fully controlled bridge rectifier.
        b)   Single phase full converter delivers a constant load current I_o. Express its source current in Fourier series   07
             and derive the expressions for following performance parameters.
        1)   Displacement factors.
        2)   Power factor.
        3)   Active & reactive power inputs.

Q.4   a)   Explain principle of operation of time ratio control & current limit control strategies for chopper circuit.   08
        b)   A step down chopper supplied from dc source of 200V. The load parameter are R=6Ω, L=10m H & E=60V.   07
             The chopper is operating with chopping frequency of 1200Hz & duty cycle of 0.6.
             Assuming continuous conduction. Determine.
             i)average load current   ii)current ripple

Q.5   Write short notes.
        a)   Working of 3-ph fully controlled bridge rectifier.   08
        b)   Dynamic character of SCR.   07

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Section B

Q.6   Solve <u>any five</u>.   10
   a) Why thyristors are not preferred for inverters?
   b) What are the advantages of PWM control of inverter?
   c) Draw the circuit diagram of three phases MC Murray bridge inverter.
   d) What do you mean by switch mode converter?
   e) What are the four basic types of switching mode regulators?
   f) What are the performance parameters of a PWM converter?
   g) What are the effects of chopping frequency on filter sizes?
   h) A single phase full wave ac voltage controller has a resistive load of R=10Ω & input voltage is Vs=100V, 50Hz. The delay angle of thyristor T_1&T_2 are $\alpha_1 = {}^{\pi}/_2$ & $\alpha_2 = \pi + \frac{\pi}{2}$ respectively. Determine
      a) The rms value of output voltage Vo
      b) Average input current.

Q.7   a) Explain with neat circuit diagram the 120^0 mode operation of 3-ph VSI.   10
       b) State the different voltage control methods used to control the output voltage of inverter. Explain   05
          internal gain control method.

Q.8   a) What is PWM? What are its advantages? Explain single pulse width modulation tech.   07
       b) Explain with neat circuit diagram & waveform the operation of buck-boost converter.   08

Q.9   a) Prove that the peak to peak ripple current for buck converter is given by   10
          $$\Delta I = \frac{V_s k(i - k)}{f\, L}$$
       b) List out the applications of PWM diode converters.   05

Q.10   Write short notes.
       a) Three phase to single phase cycloconverter.   08
       b) Power conditioners.   07

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