SUBJECT CODE NO:- E-32
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EEP/EE/EEE) Examination Nov/Dec 2017
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 remaining each section.
iii) Draw appropriate waveforms if required
iv) Assume suitable data if necessary.   .

Section A

Q.1   Solve any five   10

     a) Draw V-I characteristics of IGBT.

     b) Compare TRIAC with SCR

     c) Give the merits and demerits of a GTO as compared to conventional SCR.

     d) What are the two control techniques used in chopper.

     e) What are the advantages of six pulse converter over two pulse converter

     f) List the advantages of Power MOSFET.

     g) What are different classifications of Rectifiers

     h) Compare circulating and non-circulating current mode of dual converter.

Q.2   a) Draw and explain the gate characteristics of SCR   07

     b) A single phase half wave controlled rectifier has a purely resistive load of R and delay angle 08
is $\propto = \pi/3$.
Determine i) Rectification efficiency
           ii) Form Factor
           iii) Ripple factor
           iv) Transformer utilization factor (TUF)

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Q.3   a) Explain the working principle of Dual Converter   07

       b) A 1-Phase fully controlled bridge converter supplies on Inductive Load. Assume output   08
          current is virtually constant, and equal to Id, Calculate the following if supply voltage is
          230v and firing angle $\pi/6$ radian.
          i). Average output voltage
          ii) Supply RMS current
          iii) Supply fundamental RMS current
          iv) Fundamental power factor and supply power factor
          v) Supply harmonic factor

Q.4   a) Explain with neat circuit diagram and waveform, operation of Single phase fully controlled   07
          bridge rectifier with R-L Load

       b) Explain Principle of step up chopper and derive expression for average output voltage.   08

Q.5   a) Explain PWM and FM Techniques of chopper used for operation control.   07

       b) A highly inductive dc load requires 12A at 150V from a 230V single phase AC supply.   08
          Give design details for this requirement using midpoint connection. Assume each SCR have
          to a voltage drop of 1.5V.

                                            Section B

Q.6   Solve any five   10
       a) What are applications of PWM convertors.

       b) What is UPS and Power conditioners

       c) Compare 120^0 & 180^0 mode of operation of VSI

       d) Define cycloconverter and give its applications

       e) Define Inverter and give its different types.

       f) Draw circuit diagram of 3Φ to 1Φ cycloconverter

       g) Draw circuit diagram of buck-boost converter

       h) List the different voltage control & PWM technics used for single phase inverter.

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Q.7 a) Explain with neat circuit diagram and waveform operation of single phase half bridge Inverter with R-L Load. 07

b) A single phase full bridge inverter is operated from a 48 v battery and is supplying power to a pure resistive load of 10 ohm. Calculate 08
i). Fundamental output voltage and the First five harmonics

ii) RMS value of output voltage

iii) Output rms power and fundamental power

Q.8 a) Explain with neat circuit diagram and waveform operation of single phase to single phase Cycloconverter with R-L Load. 07

b) For Single phase half bridge Inverter, DC input voltage is 200v with 5Ω resistive load. Determine, i) RMS output voltage 08
    ii) output power
    iii) PIV
    iv) Total Harmonic Distortion

Q.9 a) Explain with neat diagram and waveforms operation of Buck converter 07

b) Explain with neat diagram and waveform of 180^0 mode of operation of 3phase Inverter with R- Load. 08

Q.10 a) Compare Buck, Boost and Buck-Boost converter on the basis of performance parameters 07

b) An AC voltage controller has resistive load of 20 ohm and RMS input voltage is 230V 50Hz. The ScRs are switched on for n = 25 cycles and off for m=75 cycles 08
Determine: i) RMS output voltage
    ii) Input Power
    iii) Average and RMS current ratings of SCR.

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