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CODE NO:- U- 41

FACULTY OF ENGINEERING

Third Engg Examination

DECEMBER2014

Power Electronics

T.E (EEP/EE/EEE)-(Revised)

[Time: THREE *Hours*] **[Max. Marks: 80]**

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

N.B 1) Question number 1 & 6 are compulsory.
2) Solve any two question from remaining questions of sections A & B.

SECTION A

Q.1 Answer any five questions. 10

i) What is avalanche breakdown in a SCR?
ii) Define latching current & holding current in a SCR.
iii) What is power electronics? Justify it.
iv) Give any two power ratings of any two power devices.
v) Define ideal & practical switch in case of power electronic devices.
vi) Explain gate sensitivity of a TRIAC.
vii) What is the main difference between enhancement mode &depletion on mode MOSFEET? (MOSFET)?
viii) Give the reason for GTO is a current controlled minority carrier device.

Q.2 a) Draw construction features of MOSFET. Explain its switching characteristics 08
b) Draw & explain the switching characteristics of SCR during its turn on & turn off process. 07

Q.3 a) How does GTO differ from conventional thysistor? Give the circuit symbol & static V-I characteristics of GTO. Also discuss the turn-off process of GTO. 08
b) With neat circuit diagram explain the working principle of single phase semi converter draw its waveforms. 07

Q.4 a) How MCT is related two MOSFET? Explain its working & construction with turn on process as well as turn off process with neat diagram & wave forms. 08
b) In a phase controlled converts has a purely resistive load of R & the delay angle is $\propto = \pi/2$ determine a) rectification efficiency b) form factor c) ripple factors d) TUF 07

Q.5 a) Explain with neat circuit diagrams & waveforms of a single phase dual converter 08
b) In the single phase full converter has a RL load having L=6.5 MH R=0.5Ω& E=10v. the input voltage is v_s=120v at (rms) 60 Hz. Determine 07
i) The load current IL_O at wt = $\propto = 60$
ii) The average thyristor current I_A
iii) The rmsthyristor current I_R
iv) The rms output current Irms
v) The average output current Idc.

SECTION B

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Q.6 Solve any five 10

i) What are PWM techniques?
ii) What is chopper & list out the types of chopper circuits?
iii) What is the difference between firing angle ($\propto$)& conduction angle (β)
iv) What is duty cycle & modulation index? Explain it briefly.
v) Define THD &HF.
vi) Give the basic switching operation of inverter.
vii) What is the use of freewheeling diode? & where it is used?
viii) What is dual converter?

Q.7

a) With an appropriate diagram explain the principle of working of three phase bridge inverter. Draw the phase & line voltage waveforms for 180^0 conduction mode. 08

b) A dc battery is charged from a constant dc source of 200v through a chopper. The dc battery is to be charged from its 50v to 100v. The battery has internal resistance of 1Ω. For a constant charging current of 10A, calculate the range of duty cycle. 07

Q.8

a) State different methods of pulse width modulation techniques used in inverter explain any one in detail. 08

b) Explain the control techniques for output voltage of chopper. 07

Q.9

a) Derive the expression for I_{Omax}& $I_{O\ min}$ for class A chopper. Also derive the expression for per unit ripple factor. 08

b) The single phase full bridge inverter has the resistive load of 24Ω& dc input voltage of 48 volts. Determine: 07

i) The R.M.S output voltage at fundamental frequency
ii) The output power
iii) The average & peak current of each thyristors.
iv) PIV ratting of each thyristor.

Q.10

a) What is cyclo converter? What are its types? Explain advantages & disadvantages of cyclo converter. State factors affecting the harmonics in cyclo converter. 08

b) A dc chopper is operating at a frequency of 2KHZ from 96v dc source to supply a load resistance of 8Ω. The load time constant is 6ms. If the averages load voltage is 57.6volt. Find Ton period of chopper, the average load current,and the magnitude of the ripple current. 07

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