[Total No. of Printed Pages:2] **CODE NO:- Z-306**

FACULTY OF ENGINEERING

T.E (EEP/EE/EEE) - Year Examination June – 2015

Power Electronics

(Revised)

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

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

i) Question No. 1 and Question No. 6 are compulsory.
ii) Solve any two questions from remaining questions of sections A & B
iii) Draw neat waveforms
iv) Figures to the right indicate full marks

SECTION A

Q.1 Answer any five questions 10

i) What is power electronics?
ii) What is the purpose of dv/dt & di/dt ratings?
iii) What is the on state condition of thyristor
iv) What is the meaning of metal oxide in MOSFET?
v) What is the important of buffer layer in IGBT?
vi) Give the reason for "GTO is a current controlled minority carrier device"
vii) Define ideal switch & practical in case of power electronic devices.
viii) Draw the transfer characteristics of MOSFET & IGBT.

Q.2 a) Draw & explain the switching characteristics of SCR during its turn-on & turn –off process 08

b) Draw construction features of MOSFET explain its switching characteristics 07

Q.3 a) How does GTO differ from conventional thyristor? Give the circuit symbol & static V-I characteristics of GTO. Also discuss the turn-off process of GTO 08

b) In a phase controlled converter has a purely resistive load of R & the delay angle is $\alpha = \frac{\pi}{2}$. Determine 07

a) Rectification efficiency b) form factor c) ripple factor d) TUF (total utilization factor)

Q.4 a) Discuss how conduction takes place in PMOSFET of n- channel type 08

b) A 3-phase half-wave controlled converter is fed from 3 phase, 400v 50Hz source & is connected to load taking a constant current of 36A. Thyristors have a constant drop of 1.4v. 07

a) Calculate average value of load voltage for a firing angle of 30^0 & 60^0
b) Determine average & rms current ratings as well as PIV of thyristors
c) Find the average power dissipated in each thyristors

Q.5 a) Explain with neat circuit diagram & waveforms of dual converter 08

b) In the single phase full converter has a RL load having L= 6.5mu. $R = 0.5\Omega$ & E = 10v. the input voltage is $v_s = 120v$ at (rms) 60Hz. Determine 07

a) The load current IL_0 at $wt = \alpha = 60$
b) The average thyristor current I_A
c) The rms thyristor current I_R
d) The rms output current I_{rms}
e) The average output current I_{de}

SECTION B

Q.6 Answer any five questions 10

i) What is pwm?
ii) Define Buck-Boost converter
iii) Define voltage source & current source inverter
iv) What do you mean by duty cycle & modulation index?
v) List out the types of choppers
vi) What is the use of freewheeling diode?
vii) What is dual converter?
viii) List out the different types of converters

Q.7 a) State different methods of pulse width modulation technique used in inverter. Explain any one in detail 08
b) Explain the control techniques for output voltage of chopper 07

Q.8 a) Derive the expression for Io max & Io 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 24 Ω & dc. Input voltage of 48 volts. Determine 07
a) the rms output voltage at fundamental frequency
b) the output power
c) the average & peak current of each thy ristors
d) PIV rating of each thyristor

Q.9 a) Explain with neat circuit diagram & waveforms of a step-up & step-down choppers 08
b) A step –up chopper has input voltage of 220v & output voltage of 660. If the conducting time of thyristor chopper is 100μs (microsecond) compute the pulse width of output voltage. In case output voltage pulse width is halved for constant frequency operation, find the average value of new output voltage 07

Q.10 a) What do you mean by cyclo-converter? What are its types? Explain advantages and disadvantages of cyclo converter state the factors affecting the harmonics in cyclo converter 08
b) Explain four quadrant chopper in detail & modes of quadrant operation 07