Enrollment No: _____ Exam Seat No: _____

C.U. SHAH UNIVERSITY

Summer Examination-2016

Subject Name: Power Electronics - I

Subject Code: 4TE05PEL1 Branch: B.Tech (Electrical,EEE)

Semester :5 Date: 21/04/2016 Time: 02:30 To 05:30 Marks: 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) In a thyristor holding current is more then:
- (i) More than the latching current
- (ii) Less than the latching current
- (iii) Equal to latching current
- (iv) None of the above

b) IGBT is combination of
- (i) SIT and BJT
- (ii) BJT and MOSFET
- (iii) Power transistor and silicone transistor
- (iv) Power diode and phototransistor

c) Which semiconductor power device out of the following is not a current triggered device?
- (i) Thyristor
- (ii) GTO
- (iii) Triac
- (iv) MOSFET

d) Which following is a two terminal three-layer device?
- (i) Power BJT
- (ii) Power diode
- (iii) Power MOSFET
- (iv) Power IGBT

e) Power BJT is a
- (i) Voltage controlled device
- (ii) Current controlled device
- (iii) Frequency controlled device
- (iv) None of the above

f) Chopper control for DC motor provide variation in
- (i) Input voltage
- (ii) Frequency

(iii)Both (1) and (2)
(iv)None of the above

g) Phase controlled converter converts:
(i) ac voltage to dc voltage
(ii) dc voltage to dc voltage
(iii) ac voltage to ac voltage at same frequency
(iv) Ac voltage at supply frequency to ac voltage at load frequency

h) Triac can be used only in
(i) Inverter
(ii) Rectifier
(iii) Chopper
(iv) Cyclo-converter

i) In a single phase full wave converter (M2 connection) feeding a highly inductive load, the firing angle for each thyristor is an in the respective half cycle. The period of conduction of each Thyristor is
(i) $\pi - \alpha$
(ii) π
(iii) $\pi + \alpha$
(iv) $\pi - 2\alpha$

j) In a single phase Full converter number of Thyristor is
(i) 16
(ii) 8
(iii) 4
(iv) 2

k) In a 3 phase bridge inverter, the gating signal for the three phases have a phase difference of
(i) 120°
(ii) 60°
(iii) 240°
(iv) 90°

l) A 3 phase Half controlled converter is a
(i) 3 pulse converter
(ii) 6 pulse converter
(iii) 8 pulse converter
(iv) 12 pulse converter

m) The commutation method in an inverter is
(i) Line commutation
(ii) Forced commutation
(iii) Either (i) or (ii)
(iv) None of the above

n) Inverter find application in
(i) HVDC transmission
(ii) UPS
(iii) Variable speed ac drive
(iv) All of the above

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	a)	Give the comparison between power BJT and power MOSFET	**7**
	b)	Draw the symbol and V-I characteristics of following power device, i) Power Diode ii) Power BJT iii) Power MOSFET iv) SCR	**7**
Q-3		**Attempt all questions**	**(14)**
	a)	List triggering circuit of SCR and explain any one in detail.	**7**
	b)	Draw the circuit diagram of single phase current source inverter for and explain its operation.	**7**
Q-4		**Attempt all questions**	**(14)**
	a)	Explain 180˚ conduction mode of three-phase inverter with necessary waveform.	**7**
	b)	Explain single phase half-wave controlled converter for inductive load.	**7**
Q-5		**Attempt all questions**	**(14)**
	a)	Explain single phase ac voltage controller for resistive load with necessary waveforms.	**7**
	b)	Draw the waveforms of three-phase full wave converter with resistive load for firing angle 45˚, 90˚, 135˚.	**7**
Q-6		**Attempt all questions**	**(14)**
	a)	Explain basic principle and operation of single phase to single cyclo-converter.	**7**
	b)	Explain single phase half bridge inverter with resistive load.	**7**
Q-7		**Attempt all questions**	**(14)**
	a)	List voltage control technique for inverter and explain any two in detail.	**7**
	b)	Explain dynamic characteristic of SCR.	**7**
Q-8		**Attempt all questions**	**(14)**
	a)	Explain operation of N-channel enhancement type power MOSFET.	**7**
	b)	Explain principle of step-up chopper with necessary waveforms.	**7**