## **C.U. SHAH UNIVERSITY Summer Examination-2016**

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## Subject Name: Power Electronics - I

\$	Subject Code: 4TE05PEL1			Branch: B.Tech (Electrical, EEE)		
	Semeste		Date: 21/04/2016	Time: 02:30 To 05:30	Marks: 70	
	(1) (2) (3)	Use of Prog Instructions Draw neat	s written on main answ	& any other electronic instrument over book are strictly to be obeyed if necessary) at right places.	1	
Q-1	a)	In a thyri (i) M	<b>the following question</b> stor holding current is fore than the latching curses than the latching	more then: current		(14)

- (iii)Equal to latching current
- (iv)None of the above
- IGBT is combination of b)
  - (i) SIT and BJT
  - (ii) BJT and MOSFET
  - (iii)Power transistor and silicone transistor
  - (iv)Power diode and phototransistor
- Which semiconductor power device out of the following is not a current triggered **c**) 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
- Power BJT is a e)
  - (i) Voltage controlled device
  - (ii) Current controlled device
  - (iii)Frequency controlled device
  - (iv)None of the above
- Chopper control for DC motor provide variation in f)
  - (i) Input voltage
  - (ii) Frequency

Page 1 || 3



I)

(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) *π* 2*α*
- 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°
- I) 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

Page 2 || 3



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

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



