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SF-7089

B. E. - III (Sem. VI) (ECC) Examination

May / June – 2011

Industrial Electronics

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - III (Sem. VI) (ECC)**

Name of the Subject :

☛ **Industrial Electronics**

☛ Subject Code No. : **7 0 8 9** ☛ Section No. (1, 2,.....) : **NIL**

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Figure to the right indicate marks.

(4) Assume suitable data wherever requiered.

1 (a) Answer the following : **10**

(1) Define latching current.

(2) The full wave converter with firing angle delay greater that 90^0 is known as _____.

(3) Define firing angle.

(4) A single phase half wave controlled converter always operaters in the _____ conducting mode.

(5) In the inverter mode of operation electrical power flows from the _____ side to _____ side.

(6) Snubber circuit is used for _____ protection.

(7) In a single phase full controlled converter average output voltage is given by _____.

(8) What is the function of free-wheeling diode ?

(9) Half wave converter is also known as half controlled converter. True/false.

(10) State different operating mode of thyristors.

(b) SCRs with a rating of 1000v and 200A are available to be used in a string to handle 6 kV and 1 kA. Calculate the number of series and parallel units required in case derating factors is (a) 0.1 (b) 0.2. **05**

(c) Explain IGBT and discuss its characteristics with necessary diagrams. **05**

2 (a) Compare an UJT firing circuit with R and RC firing circuit. **08**

(b) A unijunction transistor used in relaxation oscillator has the following data : **07**

$\eta = 0.67,\ Iv = 10mA, Vv = 2.5V, Ip = 15\mu A.$

An oscillator with an oscillator frequency of 1 KHz is to be designed by this UJT. Compute the values of charging resistor and external resistors needed in the base circuits. Take C=0.4 μF, forward voltage drop of E-B junction as 0.5 V, source voltage is 24 V dc and triggering pulse width is 50 μsec.

OR

2 (a) Explain dynamic characteristics of thyristors and it's significance in power electronics circuits. **08**

(b) Explain the concept of voltage and current commutation of thyristors. **05**

(c) Explain in brief a process of commutation failure. **02**

3 (a) What is dual converter ? Explain the practical dual converter. **08**

(b) Explain the effect to battery load on the performance of single phase fully controlled bridge converter. **07**

OR

3 (a) For single phase full converter derive the expression below with source inductance effect **08**

$Cos(\alpha + \mu) = Cos\alpha - (\omega Is / Vm) / I_0$

(b) Explain working of 3-ϕ full converter with RLE load. **07**

4 Attempt the following, state whether true or false and justify. **7×2=14**

(a) (1) In 180^0 mode of operation of 3ϕ (three phase) bridge inverter each thyristor conducts for 180^0 in each cycle.

(2) In sinusoidal pulse width modulation, the width of different pulses are not the same.

(3) A chopper can not be line commutated.

(4) Morgan's chopper uses a saturable reactor.

(5) Thristors are not suitable for logic circuits.

(6) In a 3ϕ (three phase) converter the ripple in DC o/p current is lesser than in a single phase covnerter.

(7) RLE load means, load consisting of a resistance, inductance and motor.

(b) A DC chopper has an input voltage of 230V and an output voltage of 115V. It is operating at a frequency of 2KHz. Find the period of conduction and blocking in each cycle. **3**

(c) A series inverter has R=90Ω, L = 10mH & c = 1μF. check whether the circuit will work as a series inverter. Find the maximum output frequency.

5 (1) Draw the diagram of series inverter and discuss the modes of operation. Also state its disadvantages. **08**

(2) Explain three phase bridge inverter with 120^0 mode of operation. **07**

OR

5	(1)	What is Mc Murray full bridge single phase inverter. Draw its diagram and discuss its operation.	**08**
	(2)	What is sinusoidal pulse width modulation ? How is it obtained ? Explain with the help of neat diagram	**07**
6	(1)	Explain with appropriate waveform the variable frequency system strategy used for obtaining variable output voltage from a DC chopper.	**08**
	(2)	Draw the diagram of current commuted chopper and discuss modes of operation.	**07**

OR

6	(1)	Write voltage equations governing the performance of type-A chopper during ToN and ToFF periods for on RLE load. Hence obtain there form expression for maximum and minimum currents taken by the load.	**08**
	(2)	Describe the operation of class-D chopper. Also draw its wave form.	**07**