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DE-5425-5426

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

November / December – 2006

Industrial Electronics

Time : Hours] [Total Marks : 100

DE-5425

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. - 3 (ECC) (SEM. 6)

Name of the Subject :

☛ INDUSTRIAL ELECTRONICS

☛ Subject Code No. : 5 4 2 5 ☛ Section No. (1, 2.....) : 1

Seat No. :

Student's Signature

1 (a) Explain IGBT and discuss its characteristics with necessary diagrams. 6

(b) Explain operation of TRIAC and its control strategies. 6

(c) The gate current of a forward biased SCR is gradually increased from zero until the device in turned on. It is observed that gate current just prior to the instant of turn ON, is 1 mA and soon after SCR goes into conduction, gate current decays to about 0.3 mA. Discuss how it happens. 6

2 (a) Classify different methods of commutations for thyristors. Explain each in brief. 8

(b) (i) Compare an UJT firing circuit with R and RC firing circuit. 8

(ii) A unijunction transistor used in relaxation oscillator has the following data :

$\eta = 0.67$, $I_V = 10\ mA$, $V_V = 2.5\ V$, $I_P = 15\ \mu A$.

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 $C = 0.4\ \mu F$, Forward-voltage drop of E-B, junction as 0.5 V source voltage is 24 V dc and triggering pulse width is 50 μ sec.

OR

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

(b) Discuss the conditions which must be satisfied for turning ON an SCR with a gate signal. 4

(c) Explain the concept of voltage and current commutation of thyristor. 4

3 (a) Explain the operation of three phase half controlled bridge converter with associated waveforms. 10

(b) Explain the effect of battery load on the performance of single phase fully controlled bridge converter. 6

OR

3 (a) Explain the three phase fully controlled bridge converter with R-L load with the help of necessary diagrams and waveforms. 10

(b) Explain effect of source impedance on performance of single phase fully controlled bridge converter 6

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☛ B. E. - 3 (ECC) (SEM. 6)

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4 (a) Explain type-E chopper with proper waveforms. 8

(b) Explain load commutated chopper with its voltage and current waveforms. 8

5 (a) Explain the single phase full bridge inverter connected to RL load. 10

(b) What is modulation index for an inverter ? Explain the multi pulse modulation technique to show how it can be used for voltage control and harmonic reduction. 8

OR

5 (a) Explain with the help of appropriate waveform the working of a three phase bridge inverter for 180° conduction mode. Compare it with 120° mode of concluding. 10

(b) Why voltage control is required in Inverters ? Discuss briefly different methods of voltage control for 1 – Φ Inverters. 8

6 Write short notes on (any two) : 16

(a) Speed control of DC drives using single phase full bridge converter.

(b) Schemes for induction motor speed control.

(c) Over voltage protection for thyristors

(d) Over current protection for thyristors.