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RM-6485

B. E. - II (Sem. IV) (EC/ECC) Examination

May / June – 2010

Solid State Devices

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. - 2 (Sem. 4) (EC/ECC)**

Name of the Subject :

☛ **Solid State Devices**

☛ Subject Code No. : **6 4 8 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Figures to the right indicate full marks.

(4) Assume suitable data wherever necessary.

(5) Use of scientific calculator CASIO fx 82/83 fx-100 or equivalent is allowed.

SECTION - I

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

(i) What is the recombination centers? **2**

(ii) Give the expression for continuity equations. **2**

(iii) Draw the symbols of N-channel depletion MOSFET and P-channel enhancement MOSFET. **2**

(iv) Define mean-life-time of carrier. **2**

(v) Define "VOH-equivalent" of temperature. **2**

(b) (i) Explain difference between band-structure of semiconductor, insulator and Metal. **6**

(ii) Define terms conductivity and mobility in semiconductor. **4**

2 (a) Find the concentration of holes and electrons in N-type silicon if the conductivity is 0.1 $(\Omega \text{ cm})^{-1}$. 7

(b) Explain the conductivity modulation taking place in semiconductor. 8

OR

2 (a) Explain the base-width modulation in BJT. 7

(b) Explain the maximum voltage rating in transistor. 8

3 Attempt any **three** : 15

(i) Compare BJT and FET.

(ii) Explain CMOS as an inverter.

(iii) Comparison of P-channel with n-channel FET.

(iv) Describe briefly the construction of charge-coupled device.

SECTION - II

4 Do as directed: 16

(i) (a) Space charge region. 12

(b) Electric field intensity at diode junction

(c) Storage time

(d) Transition time

(e) Diffusion capacitance

(f) Cut in voltage for diode

(ii) Diffusion capacitance is directly proportional to current. True or False? 1

(iii) More is the acceptor or donor impurity density, more is the width of depletion layer at that side of junction; true or false? 1

(iv) SCR is ________ device (controlled or uncontrolled) 1

(v) Diac is ________ layer device. (2,3,4,5) 1

5 Attempt any **four** : **16**

(i) Draw full wave converter/rectifier using SCR, derive output DC voltage in terms of input voltage AC voltage.

(ii) Explain UJT as a relaxation oscillator.

(iii) Describe steps to fabricate resistor on Integrated circuit.

(iv) Explain Tunnel diode and current flow mechanism.

(v) Explain charge control mechanism in diode, with the help of neat and clean diagram.

(vi) Explain phenomenon of Avalanche break down for diode.

6 Write short notes on any **three** : 18

(i) Internal structure and current flow mechanism of LED

(ii) Internal structure and current flow mechanism of SOLAR Cell

(iii) Internal structure and current flow mechanism of LDR

(iv) Digital voltmeter

(v) SCR