BITS PILANI DUBAI
INTERNATIONAL ACADEMIC CITY,DUBAI

III Year EEE – I Semester 2007-2008
Comprehensive Exam
ELECTRONIC DEVICES & INTEGRATED CIRCUITS
EEE UC381

Date: 06/01/08 Time:3 Hrs
Max Marks: 40 Weightage: 40%

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1. a)Derive Ebers-moll equation 2M
   b) Explain the Pinch -off & Saturation in a JFET with appropriate diagrams 3M
   c) Explain Transistor operation in terms of a biasing circuit for a 2-terminal & 3- terminal non-linear device along with the I-V characteristics & loadline
   (Draw neat diagrams) 3M

2. a)What is Transferred Electron Mechanism 3M
   b) Draw a neat diagram for CMOS invertor showing the waveforms for V_{in}, V_{out}, i_d. 3M
   c)Mention the advantages of Integration in IC's 2M

3 .Write short notes on (4x2=8)
   a. Lasers
   b. P-n-p-n Diode

4. a)Explain the requirements of solar cells to improve efficiency 4M
   b) Explain the Population Inversion at a junction for semiconductor lasers , Explain using relevant diagrams & equations 4M

5.a) Explain Zener Breakdown, briefly mention the Tunneling effect , What do you mean by Impact Ionization & Carrier Multiplication in Avalanche Breakdown (Draw neat Diagrams) 4M

b) Find an expression for the electron current in the n-type material of a Forward biased pn junction 3M

c) Differentiate between Direct & Indirect Semiconductors 1M

ALL THE BEST

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TEST:2

Sub: Electronic Devices & Integrated Circuits

Marks: 20 **Date: 06/12/07**

1. Explain Modulation Doped F.E.T (2M)

2 Write a note on Etching with a neat diagram (2M)

3.Fill in the blanks: (4 x 1= 4M)

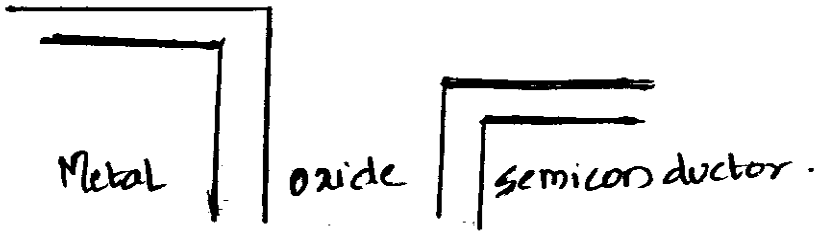
a. _____ & _____ determines how transistors (small devices) are closely packed in an circuit component.

b. _____ has the ability to increase the electron mobility when a potential well is formed.

c. For a p-n-p transistor, hole life-time should be long enough & n-type base region should be narrow, this is summed up by _____

d. Using _____ considerable light is focused on to the solar cell

4. Find the depletion layer capacitance for the structure given below (3M)



Given : $N_a = 10^{18}\ cm^{-3}$, $n_i = 1.7 \times 10^{12}$, relative dielectric constant= 11.8

5. State whether TRUE or FALSE (4x1=4M)

a. Shorter the wavelength , shorter will be the Depth Of Focus

b. BJT is suited for controlled switching between a conducting state & non-conducting state

c. In Solar cells ,Large contact potential is obtained by light doping the junction

d. It is not possible to inject minority carriers in to the neighborhood of the Junction optically

6. Derrive EBBER's MOLL equation (2M)

7. Derrive an expression for current & voltage in an illuminated junction (3M)

BITS, PILANI -DUBAI
Dubai International Academic City, Dubai, UAE

3 rd year EEE - First Semester 2007-2008
Test 1
ELECTRONIC DEVICES & INTEGRATED CIRCUITS
EEE UC381

Date: 21/10/07 Time :50 min
Max Marks :25 Weightage:25%

1.a. Show the Fermi Dirac distribution for intrinsic , n- type & p-type semiconductors at thermal equilibrium (3M)

b. A sample of GaAs has free electron density of 10^{17} cm^{-3}. Calculate the position of the Fermi level. ni = 4.45x $10^{17}cm^{-3}$ (3M)

c. Name 3 impurities for each of the following
   a. To create n-type material
   b. To create p-type material (4M)

2.Derive the expression for carrier life time (5M)

3. Explain the following:
   a. Thermal Oxidation (2M)
   b. Chemical Vapour deposition (3M)

4.a. Name 2 devices that operate on electroluminescence (1M)

b. Find the resistivity of an n-type Si doped with 10^{16} phosphorous atoms/cm3
   Assume μn=1300. q=1.6x10^{-19} C (2M)

c. If Dn = 1.04x10^{-2} & recombination time = 0.6ns, Calculate Diffusion Length (2M)