* S B - 3 5 2 2 / 2 0 0 *

SB-3522

M. Sc. (Part - II) Examination

March / April – 2011

Electronics : Paper - II

(Integrated Circuit & Integrated Circuit Technology)

Time : **3** Hours] [Total Marks : **52**

Instructions :

(1)

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

Name of the Examination :
☛ **M. Sc. (Part - 2)**

Name of the Subject :
☛ **Electronics : Paper - 2**

☛ Subject Code No. : **3 5 2 2** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Use **separate** answer books for each sections.
(3) Symbols used have their usual meaning.
(4) Figures to the **right** indicate full marks.
(5) Assume data if require.

SECTION - I

1 (a) For operational amplifier define following parameters : **3**
(i) Input Offset voltage
(ii) Slew rate and
(iii) CMRR.

(b) Explain the concept of virtual ground. **2**

(c) How many different output voltages can an 8 bit DAC produce ? **2**

(d) Write expressions for the Voltage gain, input and output resistances and Bandwidth for an inverting amplifier configuration. **3**

2 (a) What is an instrumentation amplifier ? How is it useful in measurement of some physical quantities ? **4**

(b) Design a second order high pass filter to allow all frequencies above 700 Hz. Draw its expected frequency response. **4**

OR

2 (a) What is voltage to current converter ? With circuit diagram and formula, explain working of an operational amplifier based voltage to current converter circuit with floating load. 4

(b) Design operational amplifier based differentiator circuit that converts 1 kHz triangular wave into square waveform. 4

3 (a) Explain the operating principle of a PLL. With necessary circuit diagram and formula, explain any one application of PLL. 4

(b) Draw the circuit diagram of Sample and hold circuit and explain its working. 4

OR

3 (a) With the help of circuit diagram explain the working of a Successive Approximation ADC. 4

(b) Assuming logic "1"=5.0 volt and logic "0"=0.0, volt, draw equivalent circuit and calculate output voltage of 4-bit R-2R DAC for the following inputs : 4

(i) 1000_2

(ii) 0100_2

(iii) 0010_2

(iv) 0001_2

SECTION - II

4 (a) With necessary chemical equations, explain process to produce electronic grade silicom from silica. 4

(b) State the importance of ohmic contact fabricated by metallization in integrated circuits. 3

(c) Explain integrated resister fabrication method. 3

5 (a) With schematic diagram and necessary chemical reactions, explain a float zone method of crystal growth. Compare float zone crystal growth method with Czocharalski crystal growth method. 5

(b) Determine the capacitance per unit area of the 400 $\overset{o}{A}$ gate oxide of a MOSFET device. Relative permitivity of SiO_2 = 3.9. 3

OR

5 (a) What is sheet resistance ? Describe different technique to fabricate integrated resistance. **5**

(b) A base diffusion layer length is 100 μm and its width is 10 μm. The sheet resistance of the layer is 100 ohm/cm^2. Calculate its resistance. **3**

6 (a) Explain optical lithography and compare its merits and demerits over the x-ray lithography. **5**

(b) Explain Fick's one dimensional diffusion equation. **3**

OR

6 (a) With the help of schematic diagrams, explain fabrication process sequence steps for the fabrication of NMOS devices. **5**

(b) What is the stored charge and the number of electron on an MOS capacitor with an area of 4 μm^2, a dielectric of 200 $\overset{o}{A}$ thick SiO_2 and applied voltage of 5 Volt? (Assume $\in_o = 8.85 \times 10^{-14}$ F/cm and $\in_{Si}/\in_o = 3.9$) **3**