


University : Menoufia Faculty : Electronic Engineering Department : Electronics and Communications Engineering Academic level : Fourth Year Course Name : IC Design (مقرر اختياري 5) Course Code : ECE 425		Date : Jan. 2019 Time : 180 Minutes No. of pages : 1 Full Mark : 70 Marks Exam : Final Exam Examiner : Assoc. Prof. Ahmed Nabih Zaki Rashed
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– مراعاة ترتيب الاسئلة – الاجابة من الجزء الايمن الى الجزء الايسر – اجابة كل سؤال في صفحة مستقلة

Q1: Complete the following sentences with the correct answer (40 Marks):

- The type of diffusion layer determines the type of, and
- An inverter driven directly from the output of another should have a $Z_{p.d.}/Z_{p.u.}$ ratio of, while an inverter driven through one or more pass transistors should have a $Z_{p.d.}/Z_{p.u.}$ ratio of.....
- Process line is determined byand
- Design rules is the communication link between and, whereas the stick diagram is used tothe layer information through a
- The color code for metal layer is....., color code for p-diffusion is, while the color code for n-diffusion is
- MOS circuits are formed on four basic layers that are.....,,, these layers are isolated from one another byor Silicon dioxide.
- Bi-directional capability means that.....and a near CMOS technology employment is in.....
- The basic differences between NMOS, CMOS inverters are

Q2: Answer the following items (30 Marks):

- Find the drain to source current in saturation region for MOSFET transistor technology if the gate capacitance is 0.1 pf, electron mobility is $650 \text{ cm}^2/\text{V.s}$, channel length is $1 \mu\text{m}$, channel width is $0.5 \mu\text{m}$, and drain to source voltage is 3 Volt. Then find g_m if the gate to source voltage is 1.2 Volt, $\beta=1.2 \text{ A/V}^2$ and threshold voltage is 0.2 Volt.
- Find the average collector current per unit area if the base resistance is $100 \text{ K}\Omega$, electron mobility is $650 \text{ cm}^2/\text{V.s}$, and base transit time ranges from 10 to 30 psec.
- Estimate the transconductance of bipolar transistor technology if the saturation current is $0.1 \mu\text{A}$, $V_{be}=0.7 \text{ Volt}$, and ambient temperature is $50 \text{ }^\circ\text{C}$.

مع تمنياتي لكم بالنجاح والتوفيق

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