

## Rules:

Closed book/notes/phone

Calculator allowed

1-sided Annotated Instructor Note  $\frac{1}{2}$  Sheet allowed

Note sheet must be submitted with test

Answer 16 out of problems 1-20 (5 pts each)  
 Quick Answer questions (10 pts total)  
 Fill in the blank (10 pts total)  
 Word Match (10 pts total)  
 Concept questions (2) (10 pts total)  
 120 pts

Extra Credit is OPTIONAL (5pts)

### HW, Quizzes, Practice Problems

1.38	3.7	9.2	16.1
1.40	3.11	9.3	16.4
1.42	3.27	9.4	16.31
1.44	3.29	9.6	16.32
1.47	3.50	9.9	16.47
2.1	5.20	9.16	16.49
2.5	5.22	9.38	16.58
2.14	5.24	9.44	17.6
2.20	5.46	15.2	17.28
2.31		15.5	17.30
2.64			

Unless specified – assume

$$V_T = kT/q = 26\text{mV @ RT}$$

$$V_D = 0.7\text{V}$$

$$V_{BEon} = 0.7\text{V}$$

$$V_{CEsat} = 200\text{mV}$$

$$V_{Tn} = 1\text{V}, \quad k'n = 14\mu\text{A}$$

$$V_{Tp} = 1\text{V}, \quad k'p = 4.5\mu\text{A}$$

$$I_D = I_S \left[ e^{\left(\frac{qV_A}{nkT}\right)} - 1 \right] = I_S \left[ e^{\left(\frac{V_A}{nV_T}\right)} - 1 \right]$$

$$I_C = I_S \left[ e^{\left(\frac{V_{BE}}{nV_T}\right)} \right] \quad I_C = I_S \left[ e^{\left(\frac{V_{EB}}{nV_T}\right)} \right]$$

$$I_D = \frac{k'_n W}{2} \frac{W}{L} [2(V_{GS} - V_{tn})V_{DS} - V_{DS}^2]$$

$$V_{DSSat} = V_{GS} - V_{th}$$

$$I_D = \frac{k'_n W}{2} \frac{W}{L} (V_{GS} - V_{tn})^2$$

$$I_D = \frac{k'_p W}{2} \frac{W}{L} [2(V_{SG} - V_{tp})V_{SD} - V_{SD}^2]$$

$$V_{SDsat} = V_{SG} - V_{th}$$

$$I_D = \frac{k'_p W}{2} \frac{W}{L} (V_{SG} - V_{tp})^2$$

$$v(t) = v_{final} + (v_{initial} - v_{final})e^{-t/\tau}$$

Half Sheet  
One sided only