

Roll. No. _____

B.E /B.TECH (Full Time) DEGREE END SEMESTER EXAMINATIONS NOV/DEC 2012
DEPARTMENT OF ELECTRONICS ENGINEERING
III SEMESTER
EC 272 - ELECTRONIC CIRCUITS I
(Regulation 2004)

Time: 3 hour

Max Mark: 100

Answer ALL Questions

Part-A (10x2=20)

1. Define noise margin in CMOS inverters.
2. Define CMRR. How is the CMRR improved in differential amplifier circuits?
3. What is meant by aspect ratio in NMOS inverters?
4. Draw a CMOS common source amplifier circuit.
5. The parameters of a transistor are: $\beta_o = 120$, $f_T = 500\text{MHz}$, $r_{\pi} = 5\text{k}\Omega$ and $c_{\mu} = 0.2\text{pF}$. Determine c_{π} and f_{β} .
6. Define gain bandwidth product.
7. What are heat sinks?
8. Compare power BJT and power MOSFETs.
9. Compare the different types of filters.
10. Give the various performance measure of a HWR.

Part B (5x16=80)

11. a) i) Determine the differential and common mode gains of a differential amplifier : $V^+ = 10\text{ V}$, $V^- = -10\text{ V}$, $I_Q = 0.8\text{mA}$, $R_c = 12\text{k}\Omega$, $\beta = 150$, $R_o = 22\text{ k}\Omega$, $V_A = \infty$, source resistance $R_B = 0$. Use one sided output at V_{c2} . (6)
ii) How is the CMRR improved in a differential amplifier circuit. (4)
iii) Draw and explain the small signal equivalent circuit of a Darlington pair configuration. Determine the overall current gain. (6)
12. a) Draw and explain the common drain follower configuration using CMOS and highlight its characteristics. (16)
(Or)
b) i. Draw and explain the working of a NMOS inverter with and depletion load and draw its voltage transfer characteristics. (8)
ii. Determine the transition point and minimum output voltage of an NMOS inverter with resistor load. Given $V_{DD} = 5\text{V}$, $R_D = 20\text{k}$, $V_{TN} = 0.8\text{ V}$ and $K_n = 0.2\text{ mA/V}^2$. (8)

13. a) Determine the frequency of a zero and a pole in the high frequency response of an emitter follower. Consider the emitter follower with parameters $V^+ = 5V$, $V^- = -5V$, $R_s = 0.1k\Omega$, $R_1 = 40k\Omega$, $R_2 = 5.72k\Omega$, $R_e = 0.5k\Omega$, $R_L = 10k\Omega$, $\beta = 150$, $C_n = 35pf$, $C_\mu = 4pf$, and $I_{CQ} = 1.02mA$. Also give comment on its bandwidth. (16)

(Or)

b) Draw and explain the high frequency common-emitter equivalent circuit and derive the expression for its mid band gain and upper corner frequencies. (16)

14. a) i) Explain the operation of a class AB output stage and state its importance. (8)

ii) Draw a basic complementary push-pull output stage and explain how cross over distortion is virtually eliminated. (8)

(Or)

b) Explain a transformer coupled Class A Power Amplifier with neat diagram and obtain an expression for efficiency and Figure of merit (16)

15. a) with neat circuit diagrams explain the working of a capacitor filter and derive expression for the ripple factor of an inductor filter used in HWR and FWR. (16)

(Or)

b) Write short notes on:

(i) C filters and L-filters (8)

(ii) SMPS (8)