B.E / B.Tech (Part - time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY2014

Department of Electronics and Communication Engineering

Second Semester

PTEC8202– ELECTRONIC CIRCUIT I

(Regulation R2013.)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. How MOSFET (N channel) has to be biased to function as amplifier?
2. What are factors that affect the stability of the operating point?
3. In a common base amplifier circuit the input resistance is 58Ω, find the trans conductance of the active device.
4. What are the ideal characteristics of difference amplifier?
5. Draw a common gate MOSFET amplifier circuit with biasing arrangement.
6. Compare voltage gain of JFET amplifier in all three configurations.
7. Why gain drops at high frequencies?
8. BJT CE amplifier with gain of -10 has cb'c = 3pf and cb'e = 101pf. Calculate the Miller's capacitance of input and output ports of the amplifier.
9. In MOS current source I_{ref} = 100μA, find the output current if aspect ratio of diode connected MOS is 5/1 and that of output MOS is 3/1.
10. Draw a MOSFET amplifier in common source configuration using NMOS diode as active load.

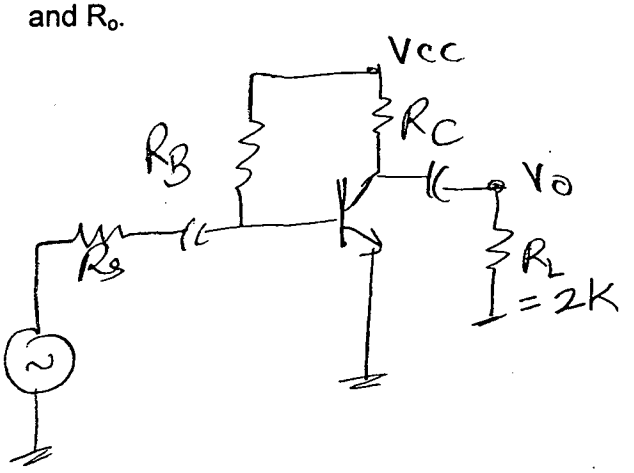
Part – B (5 x 16 = 80 marks)

11.(i) Explain self biasing circuit of BJT and JFET with circuit diagrams (6)
(ii) Explain the compensation methods to stabilize the operating point (6)
(iii)How an AC load will affect limit the swing of the amplifier,illustrate graphically (4)

12.(a) Draw a Bootstrapped CC amplifier with AC resistive load and with equivalent circuit derive for A_V ,Ri ,Ai and Ro

(OR)

12.(b) For the circuit shown draw the small signal equivalent circuit and calculate A_{vs}, A_{is}, R_{in} and R_o.



$h_{fe} = 100$

$I_{CQ} = 1mA$

$R_C = 5K$

$R_S = 5K$

$R_B = 3.8M\Omega$

13.(a)(i) Draw a JFET common drain amplifier and perform small signal analysis and obtain the expression for A_v, R_{in} and R_o for both the circuits. **(12)**

(ii) Find the transconductance of a JFET with I_{DSS} = 12mA and V_{gsoff} = -4V and V_{gso} = -2V **.(4)**

(OR)

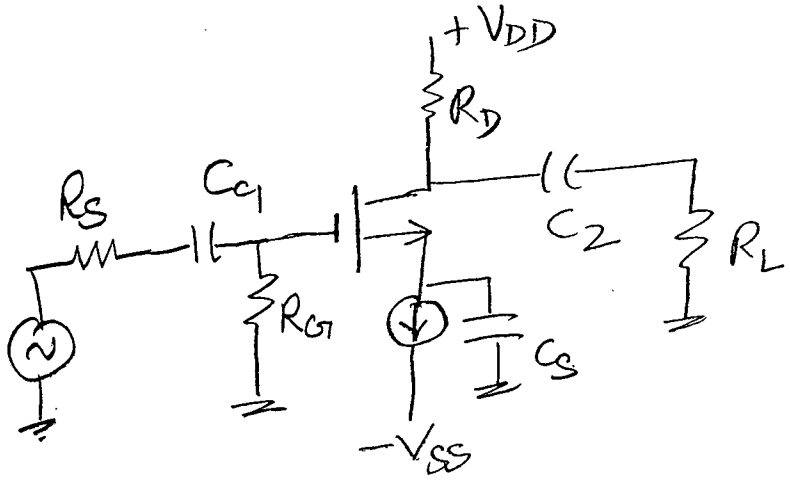
13.(b)(i) Draw a discrete MOSFET Common Gate amplifier circuit and perform small analysis and obtain expressions for A_v, R_{in} and R_o. **(12)**

(ii) Find the drain current of a MOSFET with UnCo = 200μA/V^2 (ω/L) = 3/1 and overdrive voltage ($V_{gs} - V_t$) = 1.2V.when the working in Triode region **(4)**

14.(a) Draw a Cascode amplifier .With equivalent circuit derive for mid band gain.Write the expressions for lower and Higher cut off frequecies RL≠∞ and RS≠0

(OR)

14.(b) For the circuit shown find the cut-off frequencies due to C_1 and C_2 and higher cut-off frequencies due to C_{gs} and C_{gd}. Also find the mid band gain and gain at cut-off frequencies



$R_S = 100K\Omega$
$R_g = 4.7M\Omega$
$R_D = R_L = 15K\Omega$

$g_m = 1mA/V$
$r_o = 150K\Omega$
$C_{gs} = 1pF$
$C_{gd} = 0.4PF$

$C_1 = C_2 = 10\mu F$
$C_S = 100\mu F.$

15(a) For the amplifiers shown deive for the resistance of active load with small signal circuitand also derive for the voltage gain with $\eta \neq 0$ and $\lambda \neq 0$.

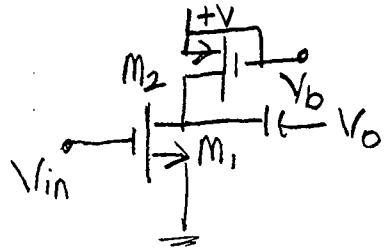


fig1

(OR)

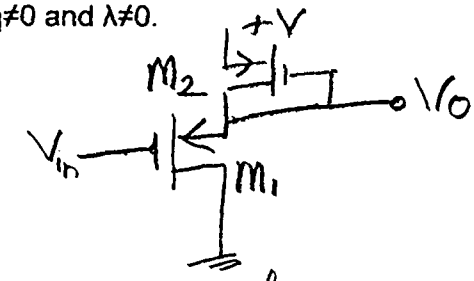


fig2

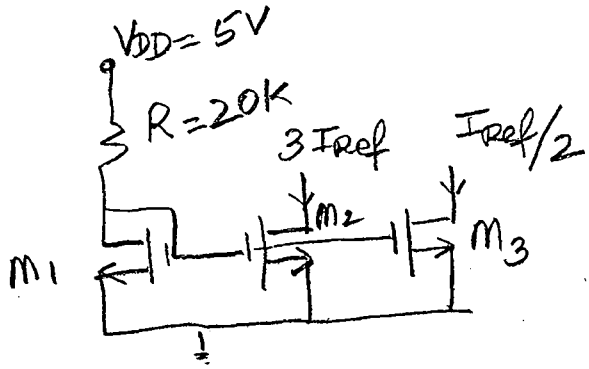
15.(b) (i)Calculate CMRR of NMOS differential amplifier with PMOS current source as active load (8)

Data given: $(W/L)_n = 100$ $\quad V_{An} = |V_{Ap}| = 20V$

$(W/L)_p = 200$ $\quad I = 0.8mA$

$\mu_n C_o = 2\mu_p C_o = 200\mu A/V^2$ $\quad R_{ss} = 25K$. (current source o/p resistance)

(ii)Design a multiple output current source shown below (8)



$\mu_n C_o = 200\mu A/V^2$

$V_{gs} = 1.6V$

$V_{tn} = .7V$