Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

III SEMESTER B. TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, JANUARY 2019

SUBJECT: ANALOG ELECTRONIC CIRCUITS [ELE 2105]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 02, January 2019** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Sketch the steady state output voltage v_0 for each circuit in Figure 1A with input voltage v_I. Assume ideal diodes. ***(05)***

1B. Consider the circuit shown in Figure 1B. The Zener diode voltage is $V_Z = 3.9V$. Determine I_Z, I_L and the power dissipated in the diode. ***(03)***

1C. Assume $= 0$, compute $\frac{W}{L}$ of M_1 in Figure 1C, such that the device operates at the edge of saturation. Given $\mu_n C_{ox} = 200\,\mu A/V^2, V_{TH} = 0.4V$ ***(02)***

2A. Derive the on resistance of the MOSFET in the triode region. Prove that resistance is gate to source voltage dependent. ***(02)***

2B. For the MOSFET circuit shown in the Fig Q2B, find drain current, and voltage V_{DS},and comment on the region of operation if $V_{th} = 1.5V, \mu_n C_{ox}\frac{W}{L} = 10mA/V^2$,and

$i)\ V_G = 1V, R_D = 2K$ ii) $V_G = 3V, R_D = 1K$. ***(05)***

2C. Design common source stage for the voltage gain of 8dB with the following specifications. $\mu_n c_{ox} = 200uA/V^2$, Vth=0.6V.Current through R1, R2 is 100uA. Power delivered by DC source is 10mW. Find $\frac{W}{L}, R1, R2$. Refer Fig 2C. ***(03)***

3A. Draw the circuit diagram of common gate configuration, Develop the small signal model and derive small signal gain for the same. ***(06)***

3B. Determine the resistance R and V_{GS} required for a current mirror $\left({}^{(W}/_{L)_2}\right)\Big/\left({}^{(W}/_{L)_1}\right)$=5, $(\mu_n C_{ox}\frac{W}{L}) = 2mA/V^2$, Vth=1V. Refer Fig 3B. ***(02)***

3C. Determine the overall small signal gain for the cascaded MOS amplifier shown in Fig 3C. Draw the small signal model for the same. Assume Vth=0.4V ***(02)***

4A. Draw the circuit of a RC coupled amplifier and its typical frequency response. Explain the importance of all the resistors and capacitors. ***(07)***

4B. State and Prove Millers theorem. ***(03)***

5A. Classify the Power Amplifiers based on operating point. ***(02)***

5B. Draw the circuit of a transformer coupled class A power Amplifier and derive the expression for conversion efficiency, hence determine the maximum value. ***(04)***

5C. Write a note on Differential Amplifiers. ***(04)***

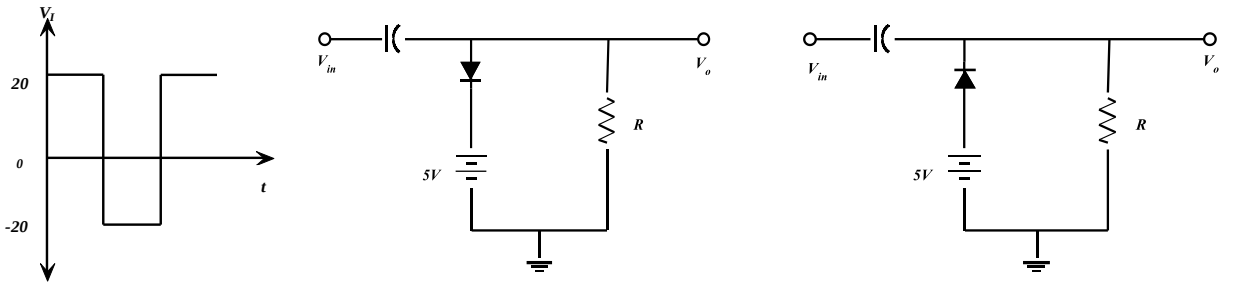


Fig 1A

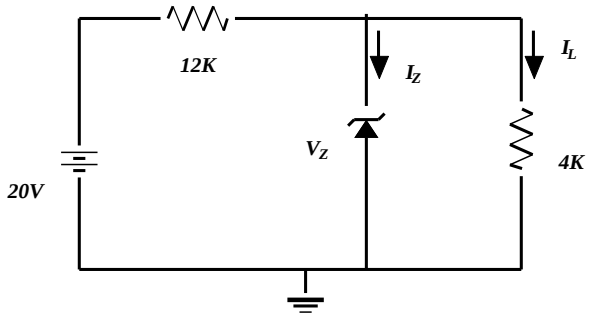


Fig 1B

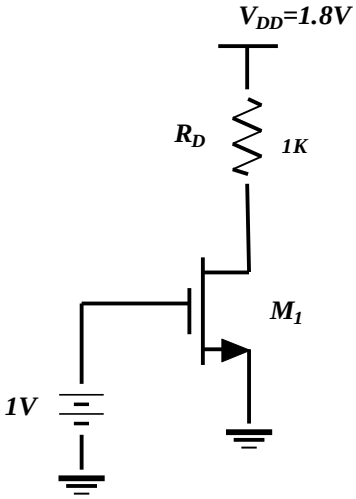


Fig1C

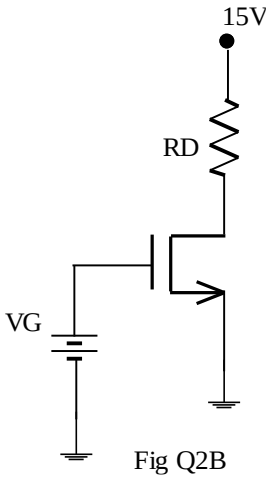


Fig Q2B

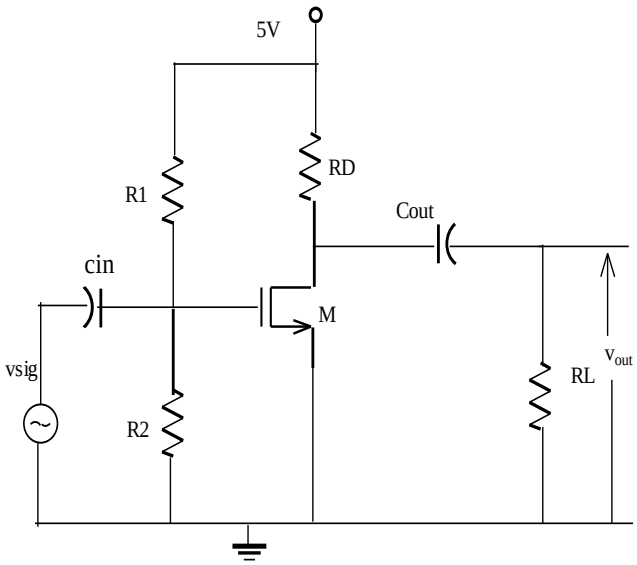
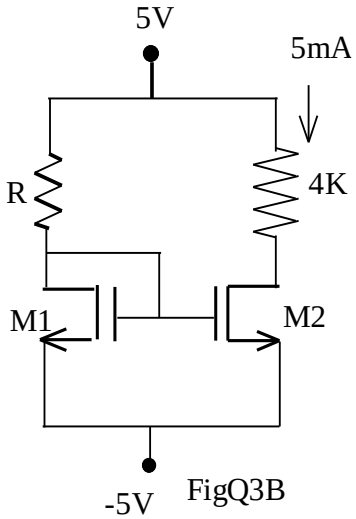


Fig Q2C



FigQ3B

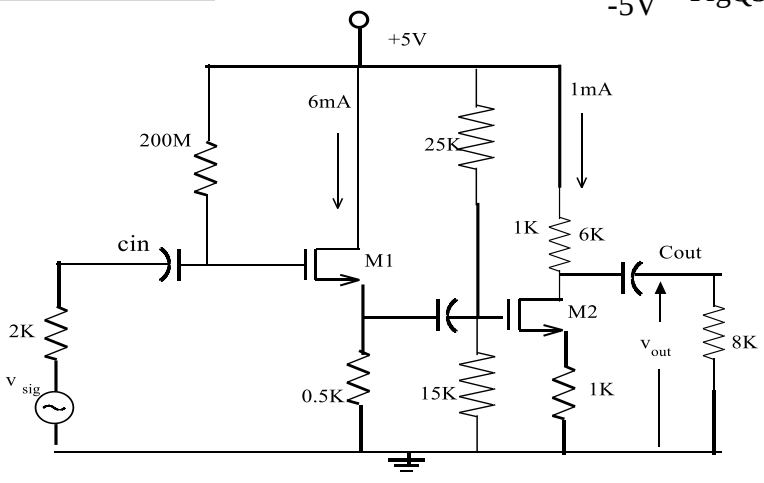


Fig Q3C