Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2016 - JAN 2017

SUBJECT: ANALOG ELECTRONIC CIRCUITS [ELE 2105]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 06 January 2017** **MAX. MARKS: 50**

Instructions to Candidates:

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

1A. Sketch the output voltage waveform and voltage transfer curve over the input voltage waveform for the circuit shown, in fig Q1A, given that the input varies linearly from 0 to 150V. Assume the diode as ideal. ***(04)***

1B. For the circuit shown in fig Q1B(i) and figQ1B(ii) Analyze and conclude which logic function X of A&B and Y of A&B ***(03)***

1C. For figQ1C, determine ID, Io and Vo. Cut in voltage=0.7V. ***(03)***

2A. The reverse current in a certain 6V, 1W Zener diode must be atleast 6mA to ensure that the diode remains in the breakdown. The diode is used in the regulator circuit where Vin varies from 18V-30V and RL=200Ω, Determine R_S and its power. ***(04)***

2B. For the MOSFET Amplifier circuit shown in fig Q2B(i) and fig Q2B(ii), determine the DC operating voltages VGS, VG, VD and VS. Assume $\mu_n c_{ox} W/L = 2mA/V^2$. Assume V_{th} = 1 V. ***(04)***

2C. Define MOS Transconductance hence derive for the same. ***(02)***

3A. Determine the required aspect ratio of the MOSFET and resistance R in the circuit fig Q3A, such that V0=0.6V and Iref=200uA. Assume M1 and M2 are identical. $(\mu_n c_{ox})=185\mu A/V^2$, V_{th} = 0.4 V. ***(03)***

3B. Develop the small signal model and determine all the Q points and output voltage when vin=0.5mV applied at the input of the amplifier shown in the fig Q3B. **λ** = 0. Vth=0.7V. ***(07)***

4A. Develop the small signal model and determine the overall gain of cascaded configuration shown in FigQ4A. Assume λ1= λ 2= 0. Find Rin and Rout. $\left(\frac{1}{2}\mu_n c_{ox}\frac{W}{L}\right)_1$ = 400uA/ V² and $\left(\frac{1}{2}\mu_n c_{ox}\frac{W}{L}\right)_2$ = 250uA / V², Vth1=Vth2=1.5V. I_{DQ1}=0.3mA, I_{DQ2}=0.6mA. $V_{DSQ1}=V_{DSQ2}$=8V. ***(07)***

4B. Determine input Miller effect capacitance if |Av|=10 for common source Amplifier configuration, if f= 1kHz ***(03)***

5A. A Power amplifier of class A type with transformer coupling delivers a maximum of 12W to a 8Ω load resistance. The Q point is adjusted for symmetrical clipping. and V_{DD}=20V, Find i)Turns ratio of transformer ii)slopes of DC and AC load line iii)Q point iv)Maximum Efficiency ***(04)***

5B. Derive the efficiency of class B Power Amplifier with the block diagram. ***(03)***

5C. MOS differential pair operated at a bias current of 2mA employs transistor with aspect ratio of 100, $\mu_n C_{ox}$=0.4mA/v2,R_D=8k and R_{SS}=30K.Find the differential gain common mode gain and common mode rejection ratio if the output is taken single ended and the circuit is perfectly matched. ***(03)***

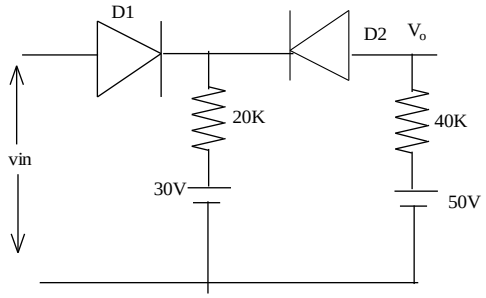
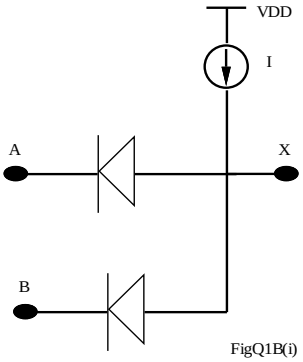
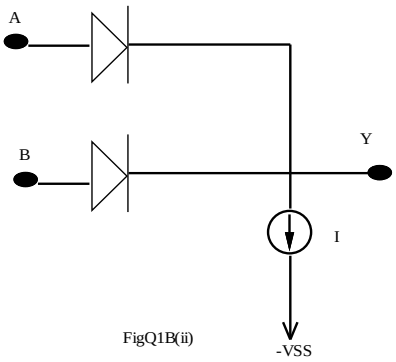


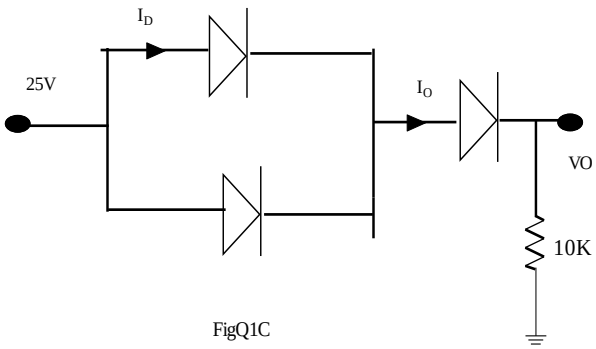
Fig Q1A



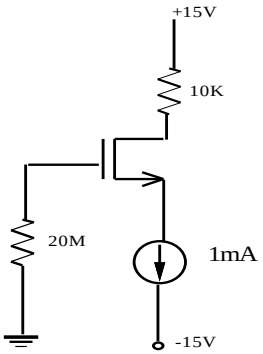
FigQ1B(i)



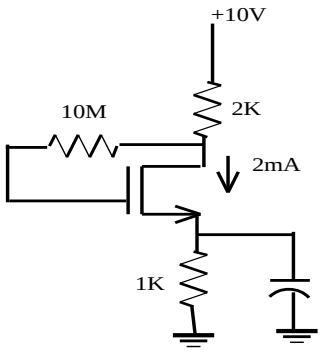
FigQ1B(ii)



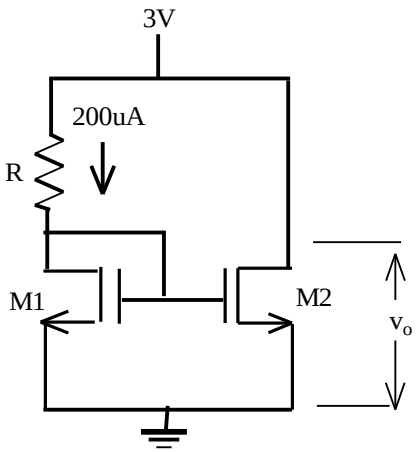
FigQ1C



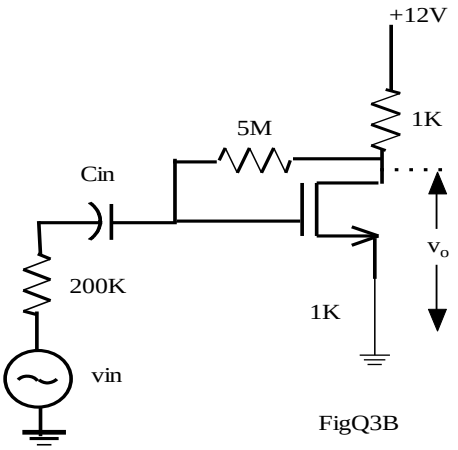
FigQ2B(i)



FigQ2B(ii)



FigQ3A



FigQ3B

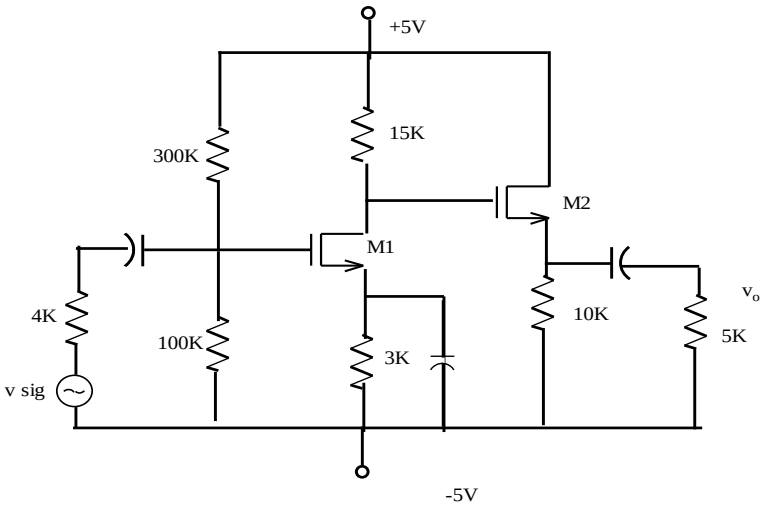
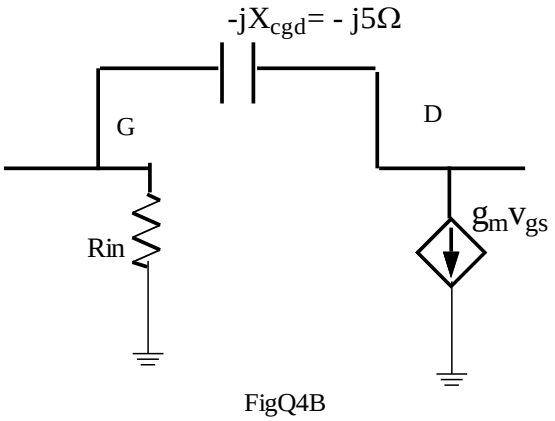


Fig Q4A



FigQ4B