Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS NOV/ DEC 2016

SUBJECT: ANALOG ELECTRONIC CIRCUITS [ELE 2105]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 06 December 2016** **MAX. MARKS: 50**

Instructions to Candidates:

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

1A. Plot the output waveform and transfer characteristics for the circuit shown in Fig. 1A. Assume V_D=0.3V. ***(04)***

1B. Analyze the waveforms shown in Fig. 1B and obtain the suitable diode based circuit. Assume V_D=0.7V. ***(03)***

1C. A Zener voltage regulator is employed to provide a constant output voltage of V_L = 10 V from a supply whose voltage varies between 11 V and 13.6 V. The load resistance may vary between 100 Ω and 1 kΩ. Assuming I_{zmin} = 0.1 times I_{zmax}, determine the power ratings of Zener diode and current limiting resistor employed. ***(03)***

2A. For the circuit shown in Fig. 2A, determine the value of V_{GS}, V_{DS} and g_m. Given V_{th} = 0.5 V, $\mu_n C_{ox}(W/L)$ = 2 mA/V². ***(04)***

2B. Determine the region of operation of MOSFET in each of the circuit shown in Fig. 2B, Assume V_{th} = 0.4 V. ***(02)***

2C. For the circuit shown in Fig. 2C, obtain an expression for small signal voltage gain $\frac{V_o}{V_s}$. Hence draw the small signal model. ***(04)***

3A. Find the bandwidth of three cascaded identical amplifiers, with each of them having 500 Hz as low cut off frequency and 25 kHz as upper cut off frequency. Also, draw the frequency response of cascaded amplifiers in comparison with single stage amplifier. ***(03)***

3B. Determine the small signal voltage gain and output resistance of the cascaded amplifier shown in Fig.3B. Assume $g_{m1} = g_{m2}$ = 1 mA/V², λ = 0. ***(05)***

3C. Find the transconductance and V_{GS} of n channel MOSFET. Vth=0.6V. $(\mu_n c_{ox})$=60μA/V, W/L=20, I_{DSAT}=1.5mA. ***(02)***

4A. In a MOSFET based common source amplifier circuit, maximum voltage gain at midband frequency is 5 V/V. The parameters are: $\mu_n C_{ox}$ =100 μA/V², V_{th} = 0.5 V, (W/L) = 10, V_{GS} = 1 V, V_{DD} = 1.8 V. In this circuit, if an $R_S = R_D$ is added, find the voltage gains across R_D and R_S with respect to the applied gate signal. Hence comment on the nature of these gains obtained. ***(04)***

4B. Determine (W/L) of the MOSFET and resistance R in the circuit shown in Fig. 4B, such that V_o = 0.9 V and I_{ref} = 90 μA. Assume M_1 and M_2 as identical and $\mu_n C_{ox}$ =90 μA/V², V_{th} = 0.6 V. ***(03)***

4C. Determine the lower and upper cut off frequencies for the circuit shown in Fig. 4C. ***(03)***

5A. With a neat circuit and diagram and necessary waveforms, obtain maximum efficiency of a transformer coupled class A power amplifier. ***(03)***

5B. For a class B amplifier providing a 18-V peak signal to a 16 Ω load and a power supply of $V_{DD}=|V_{SS}|=24$ V, determine the input power, output power and circuit efficiency. ***(03)***

5C. For the MOS Differential pair derive expression for CMRR. Also explain the importance of Active load with the help of relevant circuit diagram. ***(04)***

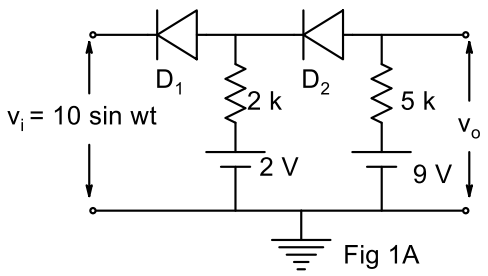

Fig 1A

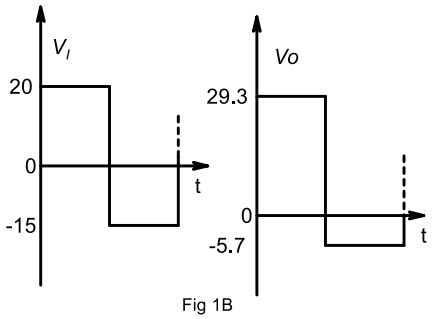

Fig 1B

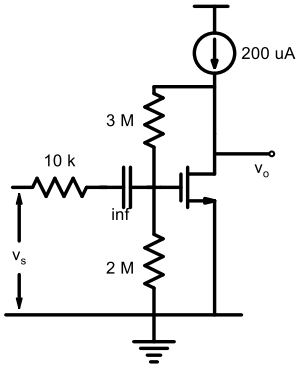

Fig 2A

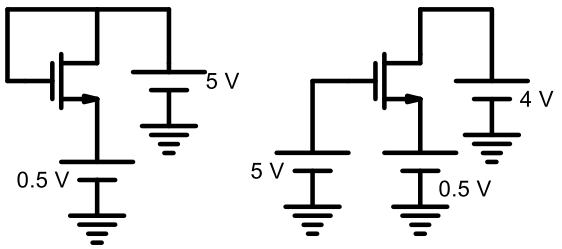

Fig 2B

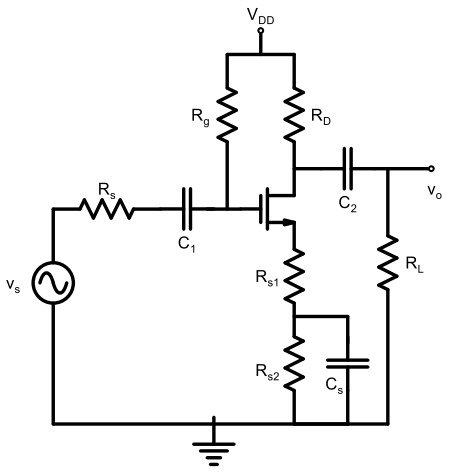

Fig 2C

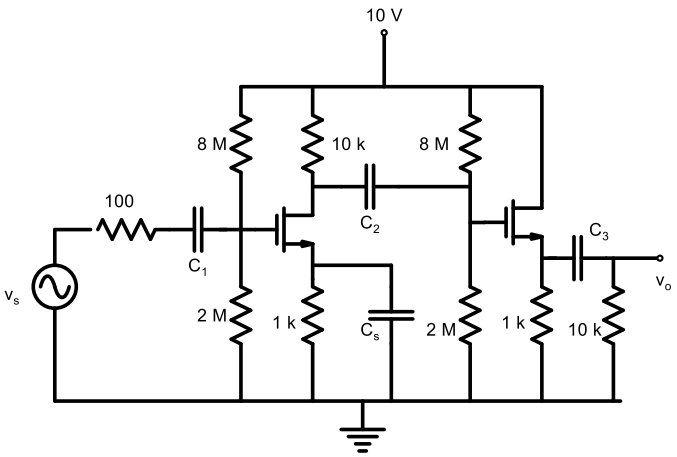

Fig 3B

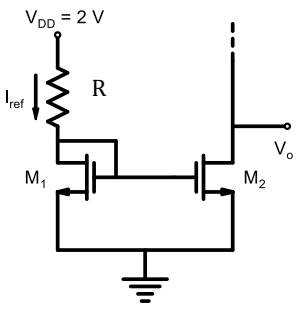

Fig 4B

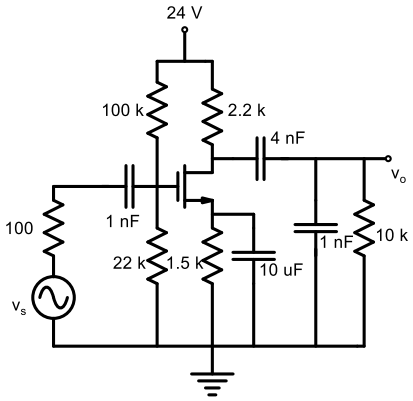

Fig 4C