Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, MAY 2018

SUBJECT: ANALOG ELECTRONIC CIRCUITS [ELE 2105]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 16 MAY 2018** **Max. Marks: 50**

Instructions to Candidates:

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

1A.	In the figure as shown in fig.Q1A, if Vi has a peak of 20 V, then draw the output waveform and transfer characteristics.	**4**
1B.	Discuss the importance of Diode based Clampers with suitable examples.	**3**
1C.	Write a note on Zener Voltage regulator.	**3**
2A.	Define transconductance of MOSFET. Hence derive the equations governing the relationship between transconductance, current, aspect ratio and gate overdrive voltage of the MOSFET.	**3**
2B.	Discuss the different regions of operation of MOSFET.	**3**
2C.	Design the circuit shown in Fig. Q2C for a voltage gain of 5V/V and a power budget of 6mW. Assume that the voltage divider branch consumes 5% of total power and voltage drop across Rs is equal to the overdrive voltage of the transistor. Also assume R_D= 200Ω, V_{TH} = 0.4 V, μnCox = 200 μA/V2, λ=0.	**4**
3A.	For the NMOS common source amplifier shown in Fig. Q3A, the transistor parameters are: V_{th} = 0.8 V, $\mu_n C_{ox}$ (W/2L) = 1 mA/V², V_{DD} = 5V, R_s = 1 kΩ, R_D = 4 kΩ, R_1 = 225 kΩ, R_2 = 175 kΩ. Calculate the quiescent values I_{DQ} and V_{DSQ}. Draw the small signal model and hence determine the small signal gain for R_L is infinite. Neglect Channel length modulation.	**5**
3B.	Determine the small signal voltage gain of the multistage cascade circuit shown in Fig. Q3B. Draw the small signal model and neglect channel length modulation.	**5**
4A.	Bandwidth of an amplifier lies between 100 Hz and 100 kHz. Find frequency range over which voltage gain is less than 1 dB from mid-band value.	**3**
4B.	Design an NMOS current mirror with V_{DD}=5V, V_{SS}=0V, I_{ref}=100μA. For the matched transistors L=10μm, W=100μm, V_{TH} =1V, $\mu_n C_{ox}$= 20μA/V².	**3**
4C.	State and prove Millers theorem.	**4**
5A.	Classify the power amplifiers based on the operating point.	**2**
5B.	Derive the expression for conversion efficiency of Class A Power amplifier.	**4**
5C.	Derive expressions for Differential gain, Common mode gain and CMRR of a MOS Differential Pair.	**4**

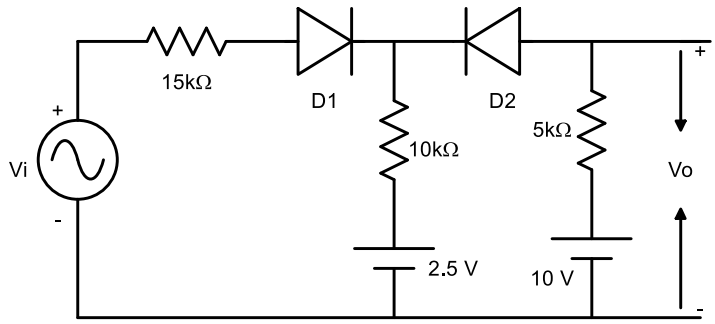

Fig Q1A

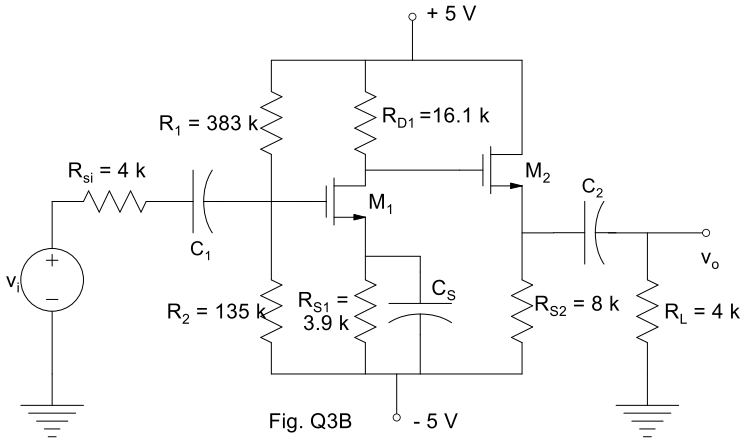

Fig. Q3B

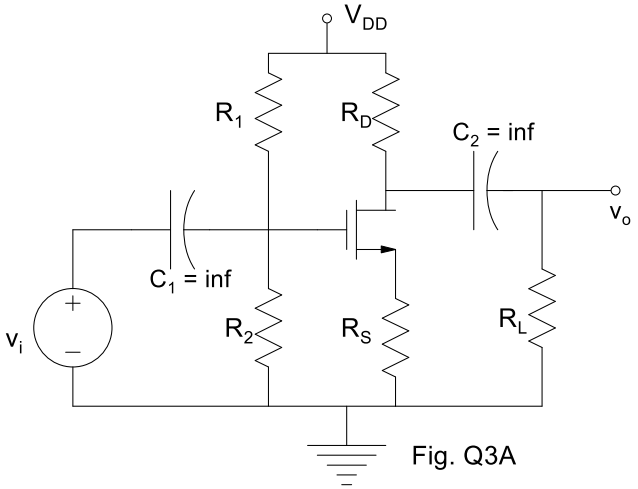

Fig. Q3A

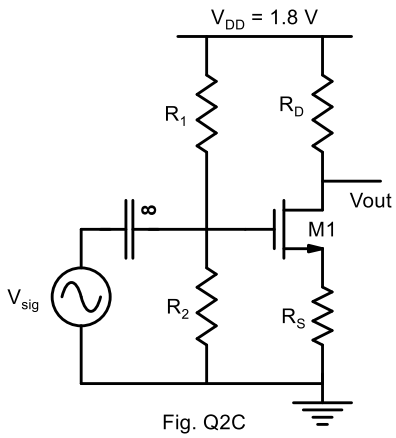

Fig. Q2C