DSY

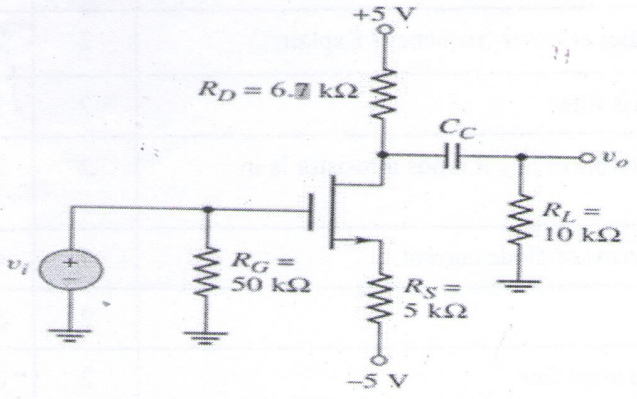
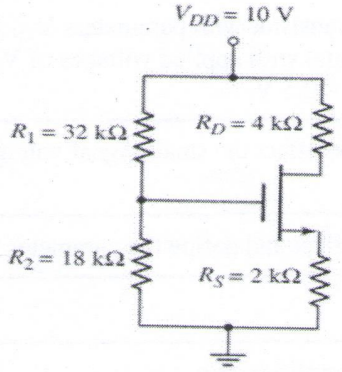
K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

April-May 2023
(B.Tech)
Examination: SY Semester: III
Course Code: EXC303 Course Name: Electronic Devices and Circuits
Duration: 2.5 Hours Max. Marks: 60 Date of Exam:30/05/2023

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Describe the channel length modulation effect and define the parameter.	2	1	U
ii)	Which factor decreases gain of amplifier at lower frequency? Explain.	2	2	U
iii)	Write transfer function of RC high pass filter.	2	1	U
iv)	Write down the expression of V_{GS} in terms of I_{Dsat} if nmos transistor is in saturation region.	2	3	U
v)	State expression of diode voltage in terms of diode current.	2	4	R
vi)	Define CMRR.	2	5	R
vii)	State expression for Vo for differentia amplifier.	2	6	U
viii)	Draw n channel EMOSFET cross section diagram for $V_{GS}<V_{TN}$ showing channel area clearly.	2	2	
Q.2	Solve any four questions out of six.	16		
i)	Calculate the drain current in an NMOS transistor with parameters $V_{TN} = 0.8$ V, $k'n = 80\ \mu A/V^2$, $W = 10\ \mu m$, $L = 1.2\ \mu m$, and with applied voltages of $V_{DS} = 0.1$ V and (a) $V_{GS} = 0$, (b) $V_{GS} = 1$ V, (c) $V_{GS} = 2.5$ V	4	1	AP
ii)	How does a transistor width-to-length ratio affect the small-signal voltage gain of a common-source amplifier?	4	3	U
iii)	Describe the channel length modulation effect and define the parameter λ.	4	4	U
iv)	Explain effect of Miller capacitance.	4	2	U
v)	Explain the effect of R_{sig} and R_L on the amplifier gain.	4	5	U
vi)	Describe an amplifier system with one application as Example.	4	6	U
Q.3	Solve any two questions out of three.	16		

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

i)	Discuss, using the concept of a load line superimposed on the transistor characteristics, how a simple common-source circuit can amplify a time-varying signal.	8	1	U
ii)	Draw high frequency equivalent circuit model for nmos.	8	2	U
iii)	Explain MOSFET I-V characteristic in details and state expression for small signal parameter.	8	3	U
Q.4	Solve any two questions out of three.	16		
i)	How does a transistor width-to-length ratio affect the small-signal voltage gain of a common-source amplifier? Explain by deriving gain of amplifier.	8	5	U
ii)	The circuit in Figure is to be used as a simple audio amplifier. Find lower corner frequency if Cc=0.477uF and Cc1=1uF. 	8	4	AP
iii)	In the circuit in Figure below the transistor parameters are V_{TN} = 0.8 V and K_n = 0.5 mA/V^2 . Calculate V_{GS} , I_D, and V_{DS} . 	8	6	AP

****