K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22

(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

Nov – Dec 2021

Program: B.Tech

Examination: SY Semester: III

Course Code: 1UEX303 and Course Name: Electronic Devices and Circuits

Duration: 03 Hours
Max. Marks: 60

Instructions:

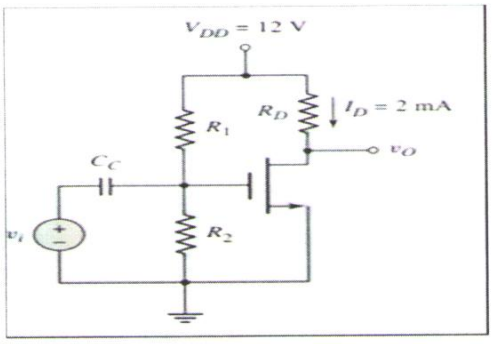
(1)All questions are compulsory.

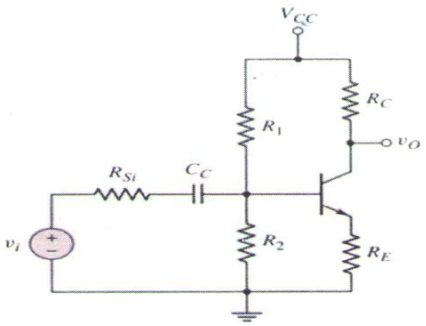
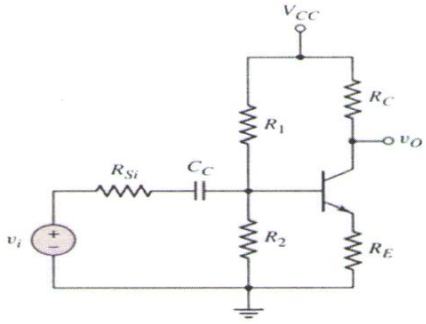
(2)Draw neat diagrams wherever applicable.

(3)Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	State the mathematical equation of PN junction diode current.	**2**	CO3	U
ii)	Define differential mode gain and common mode gain.	**2**	CO2	U

iii)	Differentiate class A, class B power amplifier	2	CO6	Ap
iv)	Draw hybrid pi model of BJT.	2	CO3	U
v)	Explain the concept of DC load line.	2	CO2	U
vi)	Draw symbol of N- MOSFET and P- MOSFET	2	CO2	R
vii)	Compare self bias and fixed bias (BJT biasing).	2	CO2	Ap
viii)	If a transistor has beta 100, base current is 50 microampere then find emitter current and collector current.	2	CO3	Ap
Q.2	**Solve any four questions out of six.**	**16**		
i)	What is crossover distortion and suggest a solution over it.	4	CO2	Ap
ii)	Compare E- MOSFET with D-MOSFET.	4	CO3	Ap
iii)	What is biasing? Explain the need of biasing.	4	CO4	U
iv)	Explain the effect of bypass capacitor and parasitic capacitance on frequency response of an amplifier	4	CO5	U
v)	Draw and explain the energy band diagram of BJT.	4	CO1	U
vi)	Find the position of Q point if $\beta = 100$, $R_1 = 39k\Omega$, $R_2 = 3.9k\Omega$, $R_C = 10k\Omega$, $R_E = 1.5k\Omega$, Vcc = 22V. (Voltage divider biasing)	4	CO2	Ap

Q.3	**Solve any two questions out of three.**	**16**		
i)	What is line and load regulation? Explain the working of zener diode regulator with varying load resistance and varying input voltage.	**8**	CO2	U
ii)	Explain the terms drift and diffusion current density. Calculate drift current density for given semiconductor. Consider silicon at T=300K doped with arsenic atoms at a concentration of N_D= $8\times10^{15}cm^{-3}$. Assume mobility values of μ_n =1350 cm^2/V-S μ_p =480 cm^2/V-S. Assume the applied electric field is 100 V/cm.	**8**	CO1	Ap
iii)	Design the bias of a MOSFET circuit such that Q point is in the middle of the saturation region and I_{DQ}=2mA Determine the resulting small signal voltage gain. Refer Figure 1. Let R1||R2=100KΩ. A transistor with parameters V_{TO}=1V, k_n`=80μA/V^2, W/L=25 and λ=0.015V^{-1} is available.  Figure 1	**8**	CO5	Ap
Q.4	**Solve any two questions out of three.**	**16**		
i)	Calculate the maximum gain of a bipolar common emitter circuit with coupling capacitor. For the circuit shown in Figure.2 Parameters are R_1=51.2KΩ, R_2=2K, R_E=0.4K, R_{Si}=0.1K, C_C=1μF and V_{CC}=10V. The transistor parameter are: $V_{BE(on)}$=0.7V, β=100, and	**8**	CO4	Ap

	VA=∞.  Figure 2			
ii)	Derive for the corner frequency and maximum gain of a bipolar common emitter circuit with coupling capacitor. For the circuit shown in Figure 3.  Figure 3	**8**	CO3	
iii)	Derive the expression of CMRR for differential amplifier using E-MOSFET.	8	CO6	Ap