PVP 20

Code: 20EE3301, 20EC3301

II B.Tech - I Semester – Regular/Supplementary Examinations
DECEMBER 2022

ELECTRONIC DEVICES AND AMPLIFIER CIRCUITS

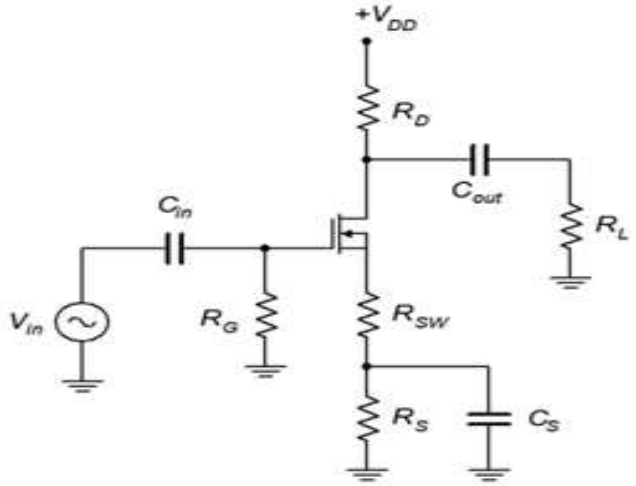
(Common for EEE, ECE)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Define transistor and explain different modes of BJT.	L2	CO1	7 M
	b)	What is the need of biasing in BJT amplifier circuits? And explain any one type of biasing in BJT amplifier.	L2	CO1	7 M
OR					
2	a)	How BJT works as a switch & an amplifier and analyze with examples.	L4	CO2	7 M
	b)	A BJT having β=100 is biased at a dc collector current of 1mA. Find the value of g_m, r_e and r_π at the bias point.	L3	CO4	7 M
UNIT-II					
3	a)	Explain the small signal operation of the enhancement MOSFET amplifier and derive voltage gain.	L3	CO2	7 M

	b)	Derive the expression for the voltage gain of Common source amplifier and Common drain amplifier configuration, under small signal low frequency conditions.	L3	CO2	7 M
OR					
4	a)	Outline the Biasing in MOS Amplifier Circuits.	L2	CO4	7 M
	b)	Draw and explain I-V characteristic of MOSFET.	L2	CO1	7 M
UNIT-III					
5	a)	Solve the mid band gain AM and the upper 3-dB frequency f_H of a CS amplifier fed with a signal source having an internal resistance R_{sig}=100kΩ. The amplifier has R_G=4.7M Ω, R_D=R_L=15k Ω, g_m=1mA/V, r_0=150k Ω, C_{gs}=1pF and C_{gd}=0.4pF.	L3	CO3	7 M
	b)	For the amplifier in Figure below determine the input impedance and load voltage. V_{in}= 10 mV, V_{DD} = 12 , R_G =1MΩ, R_D = 1.5 kΩ, R_{SW} = 10 Ω, R_S =200 Ω, R_L=12 kΩ, I_{DSS}=20 mA, $V_{GS(off)}$= −1V. 	L3	CO3	7 M

OR					
6	a)	Explain MOSFET internal capacitances and high frequency model in brief.	L2	CO3	7 M
	b)	Explain in brief the Low and High Frequency Response of Common source model.	L2	CO1	7 M
UNIT-IV					
7	a)	Derive gain, input and output impedance of Differential gain of the active loaded MOS pair.	L3	CO3	7 M
	b)	A MOS differential pair is driven with an input CM level of 1.6V. If I_{SS}=1mA, V_{TH}=0.5 V, $K_n^1 \left(\frac{W}{L}\right) = 4mA/V^2$, V_{D1}=1V and V_{DD}=2 V, what is the maximum allowable load resistance?	L3	CO3	7 M
OR					
8	a)	Explain two stages CMOS OP-AMP with neat diagram.	L2	CO3	7 M
	b)	A MOS differential amplifier is operated at a total current of 0.8mA, using transistors with a W/L ratio of 100, $kn'=\mu_n C_{ox}=0.2mA/V^2$, V_A=20V, and R_D=5kΩ. Find $V_{ov}=(V_{GS}-V_t)$, g_m, r_o, and A_d.	L4	CO3	7 M
UNIT-V					
9	a)	Analyze and explain basic MOSFET current source with neat diagram.	L4	CO4	7 M
	b)	Construct the basic MOSFET current steering circuits with working principle.	L3	CO4	7 M

		OR			
10	a)	Compare important characteristics of MOSFET and BJT.	L4	CO4	7 M
	b)	What is MOSFET and classify the MOSFET and write the advantages and Applications of MOSFET over BJT.	L2	CO4	7 M