CONTINUOUS INTERNAL EVALUATION- 1

Dept:EC	Sem / Div:IV A&B	Sub:Analog Circuits	S Code:18EC42
Date:24/05/2021	Time: 3:00-4:30 pm	Max Marks: 50	Elective:N
Note: Answer any 2 full questions, choosing one full question from each part.			

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QN		Questions	Marks	RBT	COs
		PART A			
1	a	Explain the design constraints of a classical discrete-circuit biasing arrangement with circuit and relevant equations. How does RE provide a negative feedback action to stabilize the bias current?	9	L2	CO1
	b	Explain the three basic configurations of MOSFET	6	L2	CO1
	c	Design the classical discrete circuit bias network to establish a current IE = 1 mA using a power supply VCC = +12 V. The transistor is specified to have a nominal β value of 100. calculate the expected range of IE if the transistor used has β in the range of 50 to 150. Express the range of IE as a percentage of the nominal value (IE =1 mA) obtained for β = 100. do it for both the designs i.e, design 1: considering voltage devider current as 0.1IE. For design 2: considering voltage devider current as IE	10	L3	CO1
		OR			
2	a	With a neat circuit diagram and ac equivalent circuit derive the expressions for R_{in}, A_{vo}, A_v and R_o for common source amplifier	10	L2	CO1
	b	Considering the conceptual circuit of common emitter configuration, derive the expressions for gm, rΠ, and re. Draw the hybrid –Π model of a transistor.	9	L2	CO1
	c	Derive the Voltage gain with respect to small signal operation of BJT. Also obtain the relation between emitter and base resistance.	6	L3	CO1
		PART B			
3	a	A CS amplifier utilizes a MOSFET biased at ID=0.25mA with VOV=0.25V and RD=20kΩ. The device has VA=50V. The amplifier is fed with a source having Rsig=100kΩ, and a 20-kΩ load is connected to the output. Find Rin, Avo, Av and Ro and GV. If to maintain reasonable linearity, the peak of the input sine-wave signal is limited to 10% of ($2V_{OV}$) what is the peak of the sinewave voltage at the output?	10	L3	CO1
	b	With a neat circuit diagram and ac equivalent circuit derive the expressions for R_{in}, A_{vo}, A_v and R_o for common source amplifier with source resistance.	10	L2	CO1
	c	Compare BJT with MOSFET	5	L2	CO1
		OR			
4	a	In the circuit shown, find the overall voltage gain Av=vo/vi. Assume β=100. Draw the dc equivalent circuit. Also write the small signal equivalent circuit using hybrid-π model	10	L3	CO1

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		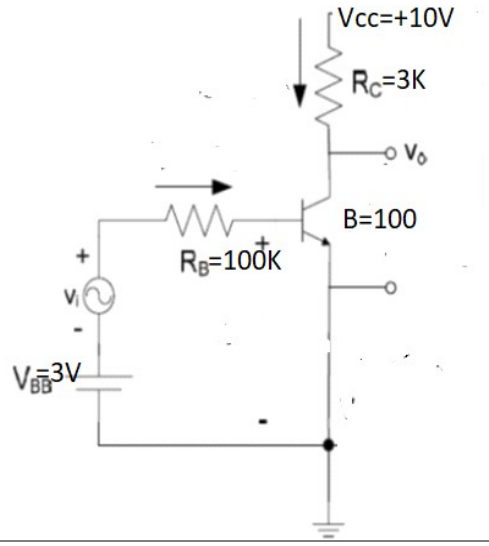			
	b	A BJT having β=100 is biased at a DC collector current of 1mA. Find the value of gm, re and rΠ at the bias point	6	L3	CO1
	c	A BJT CE amplifier is biased to operate at a constant collector current , VBE is adjusted to yield a dc collector current of 1 mA. Let VCC = 15 V, RC = 12 kΩ, and β = 80. Find the voltage gain Vce/Vbe. If vbe = 0.002 sinω t volt, find vC(t) and iB(t).	9	L3	CO1