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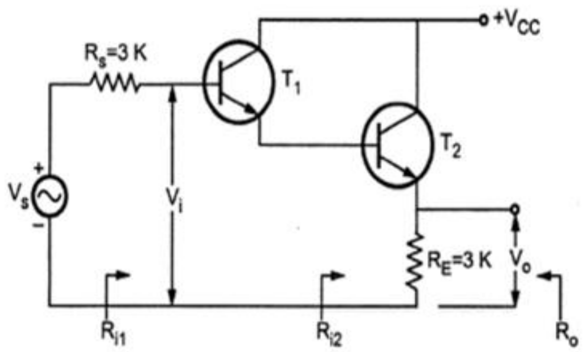
QUESTION BANK (DESCRIPTIVE)

Subject with Code : ELECTRONIC CIRCUIT ANALYSIS (20EC0409)

Course & Branch: B.Tech. – ECE **Year & Sem:** II-B.Tech.& II-Sem. **Regulation:** R20

UNIT-I
BJT HIGH FREQUENCY MODEL ANALYSIS & MULTISTAGE AMPLIFIERS

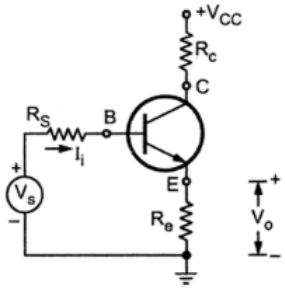
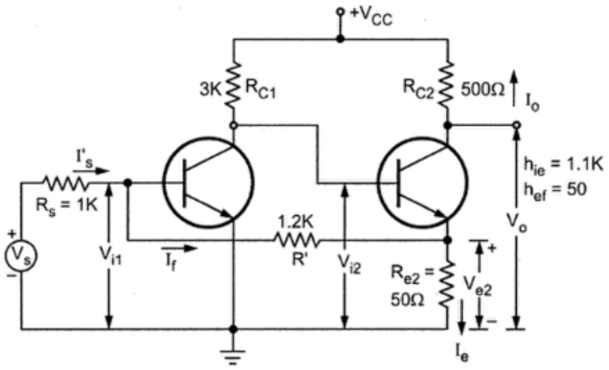
1	a)	Draw the Hybrid-pi model and explain the significance of each and every component in it.	[L3][CO1][4M]
	b)	Deduce the expressions for the hybrid π parameters g_m, $g_{b'e}$, $g_{b'c}$, $r_{bb'}$ and g_{ce}.	[L4][CO4][8M]
2	a)	Deduce the expression for Emitter diffusion capacitance of CE transistor at high frequency.	[L4][CO4][6M]
	b)	The following low frequency parameters are known for a given transistor at I_c=10mA, V_{CE}=10v and at room temperature: h_{ie}=500Ω, $h_{oe}=10^{-5}$A/v, h_{fe}=100, $h_{re}=10^{-4}$. At the same operating point, f_T=50MHz and C_{ob}=3pF. Compute the values of all the hybrid-π parameters.	[L3][CO5][6M]
3	a)	List the typical values of Hybrid –pi parameters.	[L1][CO4][4M]
	b)	Short circuit CE current gain of a transistor is 25 at a frequency of 2MHz. If f_β = 200KHz, Calculate (i) f_T (ii) h_{fe} (iii) Find $\|A_i\|$ at frequency of 10MHz and 100MHz.	[L3][CO5][8M]
4	a)	With the help of necessary circuit diagrams and approximations, deduce the expression for CE short circuit current gain. Also draw the frequency response.	[L4][CO4][8M]
	b)	Define f_T and derive the relation between f_β and f_T.	[L4][CO4][4M]
5		Deduce the expression for Current gain with resistive load and discuss the variation of frequency response with R_L.	[L4][CO4][12M]
6	a)	Define Cascading in amplifiers and explain the need for cascading.	[L1][CO1][4M]
	b)	Define Coupling and explain various types of coupling mechanisms used in multistage amplifiers.	[L2][CO2][8M]
7	a)	Analyze an n-stage cascaded amplifier for its overall parameters with the help of a block diagram.	[L3][CO5][6M]
	b)	Deduce the expressions for overall voltage gain, current gain, input and ouput resistances for a Cascade amplifier with neat circuit diagrams.	[L4][CO4][6M]
8	a)	Deduce the expressions for overall voltage gain, input resistance, current gain and output resistance for a Cascode amplifier with neat circuit diagrams.	[L4][CO4][10M]
	b)	List the applications of Cascode amplifier.	[L1][CO1][2M]
9	a)	Deduce the expressions for overall voltage gain, current gain, input and ouput resistances of a cascaded CC-CC amplifer with neat circuit diagrams.	[L4][CO4][8M]
	b)	For the circuit shown in Fig. Calculate R_i, A_i, A_V and R_o if the h – parameters are h_{ie}=1.1kΩ, h_{fe}=50, h_{oe} = 25μA/V and $h_{re} = 2.5 \times 10^{-4}$.	[L3][CO4][4M]



10	a)	Explain the effect of cascading on bandwidth in multistage amplifiers.	[L2][CO3][8M]
	b)	If the overall lower and higher cutoff frequencies of a two stage identical cascade amplifier are 600 Hz and 18 kHz respectively, compute the values of the cutoff frequencies of both the individual amplifier stages.	[L3][CO5][4M]

UNIT -II
FEEDBACK AMPLIFIERS

1	a)	Explain the basic concept of Feedback in amplifier with suitable block diagram.	[L2][CO1][8M]
	b)	List the characteristics of negative feedback amplifiers.	[L1][CO1][4M]
2	a)	Explain in detail about the basic Amplifiers used in Feedback amplifiers.	[L2][CO3][6M]
	b)	Explain Feedback amplifier topologies with necessary diagrams.	[L2][CO3][6M]
3	a)	Show that the bandwidth of an amplifier can be improved by using negative feedback.	[L2][CO5][8M]
	b)	An amplifier has voltage gain with feedback of 100. If the gain without feedback changes by 20% and the gain with feedback should not vary by more than 2%, determine the value of open-loop gain, A and feedback ratio, β.	[L3][CO5][4M]
4		Deduce the expressions for Gain, input and output resistances of a Voltage Shunt feedback amplifier.	[L4][CO4][12M]
5	a)	Deduce the expressions of Gain, input and output resistances for a Voltage Series feedback amplifier.	[L4][CO5][8M]
	b)	A voltage series negative feedback amplifier has a voltage gain without feedback of A = 500, input resistance R_i = 3kΩ, output resistance R_0 = 20kΩ and feedback ratio, β = 0.01. Calculate the voltage gain A_f, input resistance R_{if}, and output resistance R_{of} of the amplifier.	[L3][CO5][4M]
6	a)	Show that negative feedback reduces gain of an Amplifier.	[L2][CO4][4M]
	b)	Analyze the effect of negative feedback on Output resistance for Voltage series and Current series feedback amplifier.	[L4][CO5][8M]
7		Determine the input and output resistances of Current Shunt feedback amplifier.	[L3][CO5][12M]
8	a)	Analyze Emitter follower circuit with necessary diagrams for input and output resistances with feedback.	[L4][CO6][6M]

	b)	In the BJT emitter follower circuit shown in figure, the circuit component values are R_s= 600 Ω, R_C = 4.7 KΩ, R_E= 2 KΩ, h_{ie} = 5 KΩ, h_{fe}=80. Calculate A_{vf}, R_{if}, R_{of} and R'_{of}. 	[L3][CO5][6M]
9	a)	An RC coupled amplifier has a mid-frequency gain of 200 and a frequency response from 100 Hz to 20 KHz. A negative feedback network with β = 0.02 is incorporated into the amplifier circuit. Estimate the new system performance.	[L4][CO5][6M]
	b)	Explain the effect of negative feedback on input resistance for Current shunt and Voltage shunt Feedback amplifier.	[L2][CO3][6M]
10	a)	Compare various types of feedback amplifiers.	[L4][CO2][6M]
	b)	Compute A_i and A_{if} using feedback principle for the circuit shown in figure. Assume h_{fe} = 50 and h_{ie} = 1.1 KΩ. 	[L3][CO5][6M]

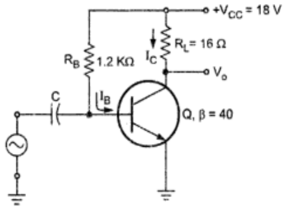
UNIT-III
OSCILLATORS

1	a)	Explain the principle of working of an oscillator with suitable diagram and Classify the various types of oscillators.	[L2][CO3][8M]
	b)	Explain Barkhausen criterion.	[L2][CO1][4M]
2	a)	Construct RC phase shift oscillator using BJT and deduce its expression for frequency of oscillations.	[L4][CO4][6M]
	b)	Determine the frequency of oscillations when a RC phase shift oscillator has R=10kΩ, C=0.01µF and R_C = 2.2 KΩ. Also find the minimum current gain needed for this purpose.	[L3][CO5][6M]
3	a)	Determine the condition for sustained oscillations for an RC phase shift Oscillator with necessary circuit diagrams.	[L3][CO4][6M]
	b)	Design an RC phase shift oscillator to generate 5 KHz sine wave with 20 V peak to peak amplitude. Draw the designed circuit. Assume h_{fe} = 150, R_E=1KΩ, C_E=100µF.	[L3][CO6][6M]
4	a)	Explain the working principle of Wein-bridge oscillator using BJT and deduce the expression for frequency of oscillations.	[L4][CO4][8M]
	b)	In a Wein-bridge oscillator, if the value of R is 100 KΩ, and frequency of	[L3][CO6][4M]

		oscillation is 10 KHz, Calculate the value of capacitor C.	
5		Analyze an LC Oscillator for a necessary equation to determine the criteria for oscillations.	[L4][CO5][12M]
6		Explain Hartley oscillator using BJT and deduce the expression for its frequency of oscillations and condition for sustained oscillations.	[L4][CO4][12M]
7	a)	Explain the working of a Crystal oscillator and sketch its characteristics.	[L3][CO4][8M]
	b)	In a transistorized Hartley oscillator, the two inductances are 2 mH and 20 μH while the frequency is to be changed from 950 KHz to 2050 KHz. Calculate the range over which the capacitor is to be varied.	[L3][CO6][4M]
8	a)	Draw the circuit diagram of Colpitts oscillator using BJT and deduce the expression for frequency of oscillations.	[L4][CO4][7M]
	b)	A Colpitts oscillator is designed with C_1 = 100 pF and C_2 = 7500 pF. The inductance is variable. Determine the range of inductance values, if the frequency of oscillations is to vary between 950 KHz to 2050 KHz.	[L3][CO6][5M]
9		Establish the condition for sustained oscillations for Hartley and Colpitts oscillator with suitable equation.	[L3][CO4][12M]
10	a)	Explain in detail the concept of stability in Oscillators.	[L2][CO1][8M]
	b)	In Colpitts oscillator, C_1 = 0.2μF and C_2 = 0.02 μF. If the frequency of oscillation is 10kHz, Calculate the value of inductor.	[L3][CO6][4M]

UNIT-IV
POWER AMPLIFIERS AND TUNED AMPLIFIERS

1.	a)	Classify the Large Signal Power Amplifier based on biasing condition.	[L4] [CO2][6M]
	b)	With neat diagram, explain Series fed directly coupled Class A Power Amplifier and determine its maximum efficiency.	[L2] [CO2][6M]
2.	a)	A series fed Class A amplifier shown in the Fig, operates from dc source and applied sinusoidal input signal generates peak base current of 9mA. Determine (i) Quiescent current I_{CQ}, (ii) Quiescent voltage V_{CEQ}, (iii) DC input power P_{DC}, (iv) AC output power P_{AC} and (v) Efficiency.	[L3] [CO4][6M]

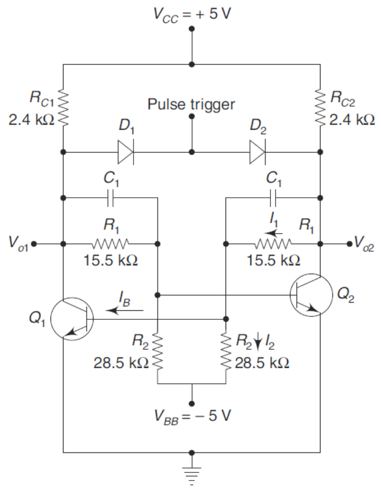
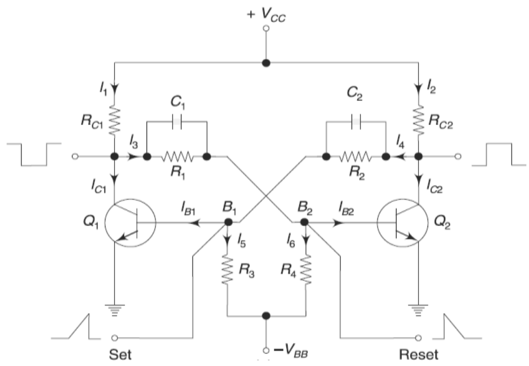


	b)	The loudspeaker of 8 Ω is connected to the secondary of the output transformer of a class A Amplifier. The quiescent collector current is 140 mA. The turns ratio of transformer is 3:1. The collector supply voltage is 10 V. If ac power delivered to the loudspeaker is 0.48 W, assuming ideal transformer, Determine (i) AC power developed across primary, (ii) RMS value of load voltage, (iii) RMS value of primary voltage, (iv) RMS value of load current.	[L3] [CO4] [6M]
3.	a)	Discuss about Transformer coupled Class A Power Amplifier with diagram and determine its Maximum efficiency.	[L3] [CO2] [6M]
	b)	Explain the working principle of Push Pull Class B Power Amplifier with neat diagram.	[L3] [CO1][6M]
4.	a)	Derive the expression for maximum efficiency of Push Pull Class B Power Amplifier with neat diagram.	[L3] [CO4][6M]
	b)	A Class B push pull amplifier drives a load of 16Ω, connected to the secondary of ideal transformer. The V_{cc} is 25V. If number of turns on primary is 200 and	[L3] [CO4][6M]

		secondary is 50. Determine maximum power output, DC power input and efficiency.	
5.	a)	Discuss Complementary Symmetry Class B Push Pull Power Amplifier with neat diagram and determine its efficiency.	[L3] [CO2][8M]
	b)	Write short notes on crossover distortion in class B power amplifier.	[L3] [CO3][4M]
6.	a)	Explain the operation of a single tuned capacitive coupled amplifier with necessary circuit diagrams.	[L4] [CO2][6M]
	b)	Deduce the expressions for Quality factor, voltage gain and bandwidth of a single tuned capacitive coupled amplifier.	[L4] [CO2][6M]
7.	a)	A single tuned RF amplifier uses a transistor with an output resistance of 50 KΩ, output capacitance of 15 pF and internal resistance of next stage is 20 kΩ. The tuned circuit consists of 47 pF capacitance in parallel with series combination of 1μH inductance and 2Ω resistance. Determine resonant frequency, effective quality factor and bandwidth of the circuit.	[L3] [CO3][6M]
	b)	Compare different types of tuned amplifiers.	[L2] [CO1][6M]
8.		Discuss about Double Tuned Amplifier with neat diagram and deduce the expression for its bandwidth.	[L1][CO2][12M]
9.	a)	Explain the effect of cascading single tuned amplifiers on bandwidth.	[L3] [CO1][6M]
	b)	The bandwidth of a single tuned amplifier is 20 kHz. Determine the bandwidth if three such stages are cascaded. Also calculate the bandwidth for four stages.	[L3] [CO3][6M]
10.	a)	With circuit diagram, describe the stagger tuning operation and derive the expression for relative gain. Also sketch the necessary waveforms.	[L3] [CO1][6M]
	b)	Discuss the stability considerations of a tuned amplifier.	[L2] [CO3][6M]

UNIT-V
MULTIVIBRATORS

1	a)	Define multivibrator? List out the types of multivibrators.	[L1][CO1][4M]
	b)	With a neat circuit diagram explain the working of a collector coupled Astable multivibrator and draw the necessary waveforms.	[L2][CO3][8M]
2	a)	Derive the expression for the time period(T) of the Astable multivibrator.	[L3][CO4][8M]
	b)	Determine the value of capacitors to be used in an Astable multivibrator to provide a train pulse 2μs wide at a repetition rate of 100 kHz, if $R_1 = R_2 = 20k\Omega$.	[L3][CO5][4M]
3	a)	Explain the modified and Emitter Coupled Astable multivibrator with a neat circuit diagram.	[L2][CO3][6M]
	b)	Justify the name Astable multivibrator and list its applications.	[L2][CO1][6M]
4	a)	What is a Monostable multivibrator? Explain its working with the help of a neat circuit diagram and waveforms.	[L2][CO3][6M]
	b)	Derive the expression for pulse width(T) of a collector coupled Monostable multivibrator.	[L3][CO4][6M]
5	a)	Explain the operation of the Emitter Coupled Monostable multivibrator.	[L2][CO3][6M]
	b)	Calculate the component values of a Monostable multivibrator developing an output pulse of 140μs duration. Assume h_{FEmin} =20, $I_{c(sat)}$ =6 mA, V_{CC}=6 V, V_{BB}= -1.5V.	[L4][CO6][6M]
6	a)	Design and draw a saturated collector coupled monostable multivibrator for the following specifications: V_{CC} = 10 V, V_{BB} = -5 V, pulse duration = 12ms, $I_{C(ON)}$= 2 mA and two NPN transistors with minimum h_{fe} =100 and I_{CBO}=0.	[L3][CO6][8M]
	b)	List the applications of Monostable multivibrator.	[L1][CO1][4M]

7	a)	Why triggering is needed for multivibrators? Explain a triggering method for a monostable multivibrator.	[L2][CO3][6M]
	b)	With the help of a circuit diagram explain the working of the Emitter coupled monostable multivibrator.	[L2][CO3][6M]
8	a)	Explain briefly the operation of the Bistable multivibrator with a neat circuit diagram and draw waveforms.	[L2][CO3][8M]
	b)	List the applications of the Bistable multivibrator.	[L1][CO1][4M]
9	a)	Design a collector coupled bistable multivibrator to operate from ± 5 V supply with $I_{c(sat)}$ =2 mA and h_{fe}= 70. 	[L3][CO6][6M]
	b)	Calculate the stable state currents and voltages for the bistable multivibrator having V_{CC} = 12 V, V_{BB} = -12 V, R_{C1} = R_{C2} = 2.2kΩ, R_1=R_2 = 15kΩ, R_3=R_4 = 100kΩ.Assume that a transistor having a minimum h_{fe} of 20 is used. 	[L4][CO5][6M]
10	a)	Explain the unsymmetrical triggering method for the Bistable multivibrator with a neat diagram.	[L2][CO3][6M]
	b)	Explain the symmetrical triggering method for the Bistable multivibrator with a neat diagram.	[L2][CO3][6M]

Prepared By :

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