QUESTION BANK

Course Name : ANALOG ELECTRONICS
Course Code : EC302ES
Class : II B. Tech I Semester
Branch : Electronics and Communication Engineering
Year : 2017 – 2018
Course Faculty : Mr.S.Arvind Kumar.

OBJECTIVES:

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of MARRI LAXMAN REDDY Institute of Technology &Management, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

	UNIT-I **SHORT ANSWER TYPE**		
S. No.	**Question**	**Blooms Taxonomy Level**	**Course Outcomes**
1	List the classification of amplifiers based on the input & output.	Remember	j,d
2	Write the expressions for AV and Rin of a CB amplifier	Remember	j,d
3	Draw the hybrid equivalent model of CE Amplifier	Understand	a
4	List the classification of amplifiers based on the period of conduction.	Remember	j,d
5	What are the main characteristics of a Darlington amplifier?	Understand	a
6	Why direct coupling is not suitable for amplification of high frequency	Understand	a
7	List the classification of amplifiers based on the frequency &bandwidth .	Remember	j,d
8	Write the expressions for Ai and Rin of a CC amplifier	Remember	j,d
9	What is the frequency range employed for h-parameters?	Remember	j,d

10	Define various hybrid parameters in approximate model.	Remember	j,d
11	In a multistage amplifier, what is the coupling method required to amplify dc signals?	Understand	a
12	Draw the frequency response of the type of coupling employed mainly for the purpose of impedance matching.	Remember	j,d
13	Justify the requirement of Total Harmonic Distortion	Understand	a
14	Comment on the faults of h-parameter model.	Understand	a
15	Justify the effect of multistage amplifiers on bandwidth.	Knowledge	j,d
16	Relate the gain of 'n' identical stages with a single stage of amplification stages	Understand	a
17	Give the expression relating 'n' identical stages with gain 'A' with overall gain.	Knowledge	j,d
18	Define the concept of cascading.	Knowledge	j,d
19	List out the characteristics of CB amplifier.	Remember	j,d
20	Name the connection employed for impedance matching/	Understand	a
	LONG ANSWER TYPE		
S. No.	**Question**	**Blooms Taxonomy Level**	**Course Outcomes**
1	State Miller's theorem. Specify its relevance in the analysis of a BJT Amplifier & obtain the expressions.	Remember	j,d
2	Compute the overall lower cut-off frequency of an identical two stage cascade of amplifiers with individual lower cut-off frequency given as 432 Hz.	Evaluate	a,e,l,k
3	What is non-linear distortion? List the causes for this type of distortion in amplifiers.	Remember	j,d
4	Using h-parameter model, derive the expressions for A_I &$R_i$for a CE amplifier circuit.	Remember	j,d
5	Draw the circuit diagram of emitter follower & derive the expressions for A_I &R_i.	Remember	j,d
6	Compare CE, CC & CB amplifier in terms of Av, Ai, Ri& Ro.	Analyse	b
7	Draw the circuit diagram of Darlington pair circuit deriving its important characteristics.	Remember	j,d
8	Analyse the behaviour of CE amplifier with emitter resistance w.r.t Av & Ro using approximate	Analyse	b

	model.		
9	Draw the circuit diagram of CE amplifier& derive the expressions for A_I &R_i.	Remember	j,d
10	Define the expression for the Voltage gain & output impedance in the h-parameter.	Remember	j,d
11	For a single stage transistor amplifier, Rs=5KΩ, R_L=10 KΩ, hfe=50, hie=1.1 KΩ, hre=2.5*$10^{-4,}$ hoe=25μA/v. Find Ai, Ri, Av.	Evaluate	a,e,l,k
12	Draw the circuit diagram of CB amplifier & its h-parameter equivalent circuit. Give its characteristics.	Remember	j,d
13	In detail say about the existence of dual of Millers theorem.	Knowledge	j,d
14	Explain in detail the frequency response of RC coupling	Knowledge	j,d
15	Give the advantages & applications of Emitter follower	Remember	j,d
16	Explain in detail the frequency response of direct coupling	Knowledge	j,d
17	Write short notes on frequency distortion	Knowledge	j,d
18	Give the advantages & applications of Common base amplifier	Remember	j,d
19	Explain in detail the frequency response of transformer coupling	Knowledge	j,d
20	Give the advantages & applications of Common Emitter amplifier	Remember	j,d

UNIT – II **SHORT ANSWER TYPE**			
S. No.	**Question**	**Blooms Taxonomy Level**	**Course Outcomes**
1.	What is the relationship between fT and fβ? Discuss the significance of fT	Understand	a
2.	Define hybrid –π parameters	Remember	j,d
3.	Define logarithm and dB	Remember	j,d

4.	Write the expression for current gain for a CE amplifier with o/p short circuit	Analysing	b
5.	Give the essence of frequency response of an amplifier.	Remember	j,d
6.	Give the relation between Ic& temperature in terms of gm.	Remember	j,d
7.	Name the diffusion &transistion capacitance employed in hybrid-π model.	Understand	a
8.	Draw the small signal model of CS amplifier at lower frequency.	Remember	j,d
9.	Give the relation between f_β&f_T.	Remember	j,d
10.	Relate the parameter rbb'&rb'e	Analysing	b
11.	Say out the other name of hybrid –pi model.	Remember	j,d
12.	Name the diffusion capacitance included in the hybrid-pi-model	Remember	j,d
13.	What is the frequency range employed for hybrid pi model.	Knowledge	j,d
14	Which type of capacitance employed for hybrid pi model.	Knowledge	j,d
15	Name the transistion capacitance included in the hybrid-pi-model	Remember	j,d
16	What bias is applied to the gate of the CS amplifier	Knowledge	j,d
17	What is unity current gain frequency,	Knowledge	j,d
18	At lower frequency which capacitors have an effect on the circuit	Understand	a
19	In the case of CE short circuit current gain what is the value of the load.	Remember	j,d
20	Give the expression for rce in the hybrid –pi model	Remember	j,d

LONG ANSWER TYPE

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
1	Draw the circuit diagram of single stage RC coupled BJT amplifier. Discuss the effect of emitter bypass capacitor on lower frequency response.	Analysing	a,e,l,k
2	Define frequency response & explain the importance of roll-off frequencies.	Evaluate	a,e,l,k
3	Comparing the hybrid &hybrid-π model, obtain the expressions for 'gm' & 'rb'e'.	Analysing	a,e,l,k

4	Obtain the frequency expression at which the gain reduces to $2^{1/2}$ times the maximum value for a CE amplifier with R_L=0.	Knowledge	j,d
5	A PMOS transistor s operated in the triode region with the following specifications, Vgs= -4.5V,Vth= -1V, Vds= -2.2V, W/L=95, $\mu_n C_{ox}$=95μA/V^2. Find its drain current?	Evaluate	a,e,l,k
6	With a neat sketch explain the drain characteristics of the MOSFET amplifier	Understand	A
7	Explain & obtain the effect of coupling & shunt capacitors at lower frequencies.	Understand	A
8	Consider a CE stage with resistive load R_L, using Miller's theorem, derive the expression for Ai.	Understand	A
	Comparing the hybrid &hybrid-π model, obtain the expressions for 'rbb'' & 'rce'.	Analysing	a,e,l,k
10	At Ic=1mA, Vce=20V, a certain transistor data shows Cc=3pF, hfe=200,w_T=500Mrad/sec. Calculate gm, rb'e, cb'e.	Evaluate	a,e,l,k
11	Comparing the hybrid &hybrid-π model, obtain the expressions for 'rb'e' & 'rbb''.	Analysing	a,e,l,k
12	With a neat sketch explain the transfer characteristics of the MOSFET amplifier	Understand	A
13	With a neat circuit equivalent model, derive the expression for Av for CS amplifier with resistive load.	Remember	j,d
14	Comparing the hybrid &hybrid-π model, obtain the expressions for 'gm' & 'rce'.	Analysing	a,e,l,k
15	Derive the expression for CE short circuit current gain.	Knowledge	j,d
16	Draw the small signal equivalent circuit for an emitter follower at high frequency & obtain the expression Av.	Understand	A
17	With Ic=5mA, Vce=10V, at room temperature, hfe=100, hie=600 Ai=10,at 10MHz , Cc=3pF. Find f_β, gm, rb'e, rbb'.	Evaluate	a,e,l,k
18	Draw the hybrid-π model & obtain the expression for the diffusion capacitance.	Remember	j,d
19	Draw the hybrid-π equivalent of a CE transistor for high frequency & explain the significance of each parameter.	Remember	j,d
20	If the current gain of the CE amplifier is made equal to '1' then obtain the frequency expression.	Analysing	a,e,l,k

GROUP - III (ANALYTICAL QUESTIONS)

S. No	QUESTIONS	Blooms Taxonomy Level	Course Outcome
	UNIT-I **SINGLE STAGE & MULTISTAGE AMPLIFIERS**		
1.	A CE amplifier is driven by voltage source with internal resistance R_s=800Ω.The load impedance R_L=2k Ω. The h-parameters are h_{ie}=1.1K,h_{re}=2.5*10^{-4},h_{fe}=50,h_{oe}=25µA/V. Compute A_I,A_V, A_{Is}, R_i, Z_o& A_p.	Evaluate	1,8
2.	A CB amplifier is driven by voltage source with internal resistance R_s=800Ω.The load impedance RL=2k Ω. The h-parameters are h_{ib}=22 Ω ,h_{rb}=3*10^{-4},h_{fb}=-0.98,h_{oe}=0.5µA/V. Compute A_I,A_V, A_{Is}, R_i, Z_o& A_p.	Evaluate	1,8
3.	A CC amplifier is driven by voltage source with internal resistance R_s=800Ω.The load impedance RL=2k Ω. The h-parameters are h_{ic}=1.1K Ω ,h_{rc}=1,h_{fc}=-51,h_{oc}=25µA/V. Compute A_I,A_V, A_{Is}, R_i, Z_o& A_p.	Evaluate	1,8
4.	A CE amplifier is driven by voltage source with internal resistance R_s=600Ω, RL=1200Ω. The h-parameters are h_{ie}=1.1K,h_{re}=2.5*10^{-4},h_{fe}=50,h_{oe}=25µA/V. Compute A_I,A_V, A_{Is}, R_i, Z_o& R_{ot} using (a)exact analysis (b) Approximate analysis	Evaluate	1,8
5.	Draw the circuit of CE amplifier. Draw it's equivalent circuit using Approximate model. Calculate A_I,A_V, R_i, Z_o& R_{ot} if R_s=1000Ω, RL=1200Ω. The h-parameters are h_{ie}=1.1K,h_{re}=2.5*10^{-4},h_{fe}=50,h_{oe}=24µA/V.	Evaluate	1,8
6.	Draw the circuit of CB amplifier. Draw it's equivalent circuit using Approximate model. Calculate A_I,A_V, R_i, Z_o& R_{ot} if R_s=900Ω, RL=2000Ω. The h-parameters are h_{ie}=1.1K,h_{re}=2.5*10^{-4},h_{fe}=50,h_{oe}=24µA/V.	Evaluate	1,8
7.	Draw the circuit of CC amplifier. Draw it's equivalent circuit using Approximate model. Calculate A_I,A_V, R_i, Z_o& R_{ot} if R_s=500Ω, RL=2000Ω. The h-parameters are h_{ie}=1.1K,h_{re}=2.6*10^{-4},h_{fe}=54,h_{oe}=26µA/V.	Evaluate	1,8
8.	A CE amplifier with emitter resistor R_E=800Ω , R_L=1k Ω. The h-parameters areh_{ie}=1.1K,h_{re}=5*10^{-4},h_{fe}=50,h_{oe}=25µA/V. Compute A_I,A_V, A_{Is}, R_i, R_{ot} . Use the Approximate model if permissible.	Evaluate	1,8
9.	Draw the circuit of CE amplifier with emitter resistor R_E. Draw it's equivalent circuit using Approximate model. Calculate A_I,A_V, R_i, Z_o& R_{ot} if R_s=600Ω, RL=1000Ω, R_E=800Ω. The h-parameters are h_{ie}=1.2K,h_{re}=3*10^{-4}, h_{fe}=50, h_{oe}=25µA/V.	Evaluate	1,8
10.	A CC amplifier with emitter resistor R_E=800Ω , Rc=400 Ω in the collector circuit. The h-parameters are h_{ie}=1.1K, h_{re}=2.4*10^{-4},h_{fe}=60,h_{oe}=25µA/V. Compute A_I,A_V, R_i . Use the Exact model.	Evaluate	1,8
11.	A Darlington emitter follower circuit uses two identical transistors having the following h-parameters h_{ie}=1.1K, h_{re}=2.5*10 $^{-4}$,h_{fe}=60,h_{oe}=20µA/V. R_E=2KΩ , R_S=500Ω Compute overall A $_I$& A_V, R_i, R_o& R_{ot} .	Evaluate	1,8
12.	A Darlington emitter follower circuit uses two identical transistors having the following h-parameters h_{ie}=1.1K, h $_{re}$=2.2*10^{-4},h_{fe}=50,h_{oe}=20µA/V. R_{E2}=3KΩ , R_S=400Ω, . R1=90KΩ , R2=10KΩ Compute overall A $_I$& A_V, R_i, R_o&R_{ot} .	Evaluate	1,8
13.	A CE-CC Amplifier uses R_S=1KΩ, . R_{C1}= R_{E2}=4KΩ . The h-parameters h_{ie}=1.2K, h_{re}=5*10^{-4},h_{fe}=50,h_{oe}=25µA/V, h_{ic}=1.2 Ω ,h_{rc}=1,h_{fc}=-51,h_{oc}=25µA/V. Compute individual & overall A $_I$& A_V, R_i, R_o& R_{ot} .	Evaluate	1,8
14.	A CE-CB (cascode) Amplifier uses R_S=1KΩ, . R_{C1}=25KΩ, R_E=100Ω , R3=200KΩ R4=10KΩ . The h-parameters h_{ie}=2K, h_{re}=0,h_{fe}=100,h_{oe}=0.	Evaluate	1,8

	Compute individual & overall A_I & A_V, R_i,R_i', R_o & R_{ot} .		
15.	A CE-CE(cascade) Amplifier uses R_S=1KΩ, . R_{C1}=15KΩ, R_{E1}=100Ω , R_{C2}=4KΩ , R_{E2}=330Ω,R1=200KΩ R2=10KΩ for the first stage,for second stage R1=47KΩ R2=4.7KΩ . The h-parameters h_{ie}=1.2K, h_{re}=2.5*10^{-4},h_{fe}=50,h_{oe}=25*10^{-6} A/V. Compute individual & overall A_I & A_V, R_i,R_i', R_o	Evaluate	1,8

UNIT-II
BJT AMPLIFIERS-FREQUENCY RESPONSE

1.	A CE amplifier with the load impedance R_L=2k Ω. The hybrid-π parameters are$r_{b'e}$=1K Ω,C_e=100pF,h_{fe}=50,C_C =3pF,g_m=50mS. Draw the high frequency hybrid-π circuit neglecting R_1, R_2,$r_{bb'}$. Calculate the time constants of output & input circuits &f_H& A_I at 100 KHz.	Evaluate	2,8
2.	At I_C=1mA & V_{CE}=10V a certain transistor has C_c= $C_{b'c}$=3pF and w_t=500Mrad/sec. Calculate $r_{b'e}$,C_e,g_m& w_β.	Evaluate	2,8
3.	Short circuit current gain of CE amplifier is 25 at frequency=2Mhz. If f_β=200Khz.Calculate f_T, h_{fe}, $\|A_I\|$ at frequency of 10Mhz & 100 Mhz.	Evaluate	2,8
4.	A high frequency CE amplifier with the R_s=0 calculate f_H if load impedance R_L=0k Ω & R_L=1k Ω. Assume typical hybrid-π parameters.	Evaluate	2,8
5.	A high frequency CE amplifier with the R_s=1K Ω calculate f_H ,A_{VSlow} and A_{VShigh} if load impedance R_L=0k Ω & R_L=1k Ω. Assume typical hybrid-π parameters.	Evaluate	2,8
6.	A CE amplifier is measured to have a bandwidth of 4Mhz with the R_L=600 Ω calculateR_s that will give the required bandwidth. Assume typical hybrid-π parameters $r_{bb'}$=100Ω , ,h_{fe}=100,C_C =2pF, g_m=50mS, f_T=300Mhz.	Evaluate	2,8
7.	A BJT has the following parameters measured at I_C=1mA, ,h_{ie}=3k , h $_{fe}$=100, C_C =2pF , C_e =18pF ,f_T=4Mhz. Find , $r_{bb'}$, $r_{b'e}$,g_m&f_H for R_L=1K Ω .	Evaluate	2,8
8.	The hybrid-π parameters are $r_{b'e}$=1K Ω, $r_{b'c}$=4M Ω, r_{ce}=80K Ω, $r_{bb'}$=100Ω,C_e=100pF h_{fe}=50,C_C =3pF,g_m=50mS. Find upper 3db frequency of current gain A_I, A_{VS}.	Evaluate	2,8
9.	For a single stage CE amplifier Find the value of R_s that will give 3db frequency f_H which is twice the value obtained with R_s=∞(ideal current source). $r_{b'e}$=1K Ω, C_e=100pF, h_{fe}=50, C_C =3pF, g_m=50mS, $r_{bb'}$=100 Ω.	Evaluate	2,8
10	The following low frequency parameters are given at 300^0K, I_c=10mA, V_{ce}=8V, h_{ie}=500 Ω , h_{re}=10^{-4},h_{fe}=100,h_{oe}=2*10^{-4}A/V. Calculate the values of hybrid-π parameters.	Evaluate	2,8