CMR Engineering College
Kandlakoya(V), Medchal Road, Hyderabad

Department of Electronics and Communication Engineering

COURSE FILE

Sub: Electronic Circuit Analysis **A.Y.2022-2023**
Year: II Year II Semester

Contents of Course file

17. References (Text books/websites/Journals)

HOD **PRINCIPAL**

1. Vision & Mission of the Department:

Vision

To promote excellence in technical education and scientific research in electronics and communication engineering for the benefit of society.

Mission

- To impart excellent technical education with state of art facilities inculcating values and lifelong learning attitude.
- To develop core competence in our students imbibing professional ethics and team spirit.
- To encourage research benefiting society through higher learning

2. PEOs & POs

PEO

1. Excel in professional career & higher education in Electronics & Communication Engineering and allied fields through rigorous quality education.
2. Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.
3. Solve real life problems relating to Electronics & Communications Engineering for the benefits of society.

PSO

1. Ability to apply concepts of Electronics & Communication Engineering to associated research areas of electronics, communication, signal processing, VLSI, Embedded systems
2. Ability to design, analyze and simulate a variety of Electronics & Communication functional elements using hardware and software tools along with analytic skills

POs

1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

3. Mapping of course objectives, course out comes with PEOS and Pos

Course Outcomes:

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C225.1	**Extract** the equivalent models for BJT & JFET at low & high frequencies so as to analyze any electronic circuit.
C225.2	**Differentiate** between the positive & negative feedback concepts as applied to various electronic circuits
C225.3	**Design** and analyze oscillator circuits to generate audio & radio frequency sinusoidal signals.
C225.4	**Realize** different types of power amplifiers for practical applications as per the specifications.

C225.5	**Analyze** various non-sinusoidal signals using different multivibrators for various electronic applications. Apply time base generator circuits which is used in applications like CRO & TV.

CO-PO matrices:-

Course Outcomes	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	2	-	-	-	-	-	-	-	3
CO2	2	2	-	2	-	-	-	-	-	-	2	3
CO3	2	3	3	2	-	-	-	-	-	-	2	3
CO4	2	3	3	-	-	-	-	-	-	-	2	3
CO5	2	3	3	-	-	-	-	-	-	-	-	-
AVG	2	3	3	2	-	-	-	-	-	-	2	3

4. SYLLABUS – JNTU

Course Objectives:

- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback
- To construct various multivibrators using transistors and sweep circuits.

Course Outcomes: Upon completing this course, the student will be able to

- Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to

generate sustained oscillations

- Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
- Design Multivibrators and sweep circuits for various applications.

UNIT – I

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different couplingschemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascaded RCCoupled amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency: Hybrid - model of Common Emitter transistor model, fα, fβ and unitygain bandwidth, Gain-bandwidth product.

UNIT-II

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – Generalcharacteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics –Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simpleproblems.

UNIT -III

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridgeOscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and ColpittsOscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

UNIT -IV

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, ConversionEfficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations,Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers.

Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response of tunedamplifiers, Concept of stagger tuning and synchronous tuning.

UNIT –V

Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitttrigger using Transistors.

Time Base Generators: General features of a Time base Signal, Methods of Generating Time BaseWaveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearityimprovement.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education.
2. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, Pearson.

REFERENCE BOOKS:

1. Electronic Devices and Circuits, David A. Bell – 5^{th} Edition, Oxford.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11^{th} Edition, 2009, Pearson

5. INDIVIDUAL TIME TABLE

Mrs.G.Kalpana **ECA-II ECE-B &C**

DAY/ TIME	9.10AM- 10.10AM	10.00AM - 11.00AM	11.00A.M 11.50A.M	11.50A.M 12.40 PM		1.20PM- 2.20PM	2.20PM- 3.10PM	3.10PM- 4.00PM
MON		ECA-C			LUNCH **12.40 PM - 1.20 PM**			ECA-B
TUE	ECA-B			ECA-C				
WED								
THU		ECA-B						
FRI	ECA-C							
SAT	ECA-B			ECA-C				

6.SESSION PLAN (attached) & Detailed Lecture Plan
Electronic Circuit Analysis(Lesson) Plan

Subject code	Name of the subject	Year/Branch	Name of the Faculty
EC405PC	Electronic Circuit Analysis	II B.Tech I Sem ECE	G.KALPANA

S.NO	Topic (JNTU Syllabus)	Sub-Topic	No. of Lectures Required	Suggested Books	
UNIT – I Multistage Amplifiers Transistor at High Frequency	Classification of Amplifiers	Different categories of amplifiers	L1	T2, R2	
	Distortion in Amplifiers	Amplitude, Frequency & Phase distortions	L2	T2, R2	
	Different couplingschemes used in amplifiers	RC, Transformer, Direct coupled amplifiers	L3, L4, L5	T1, T2,R1	
	Frequency response and Analysis of multistage amplifiers	Low, Mid, High frequency considerations	L6	T1, T2,R1	
	Cascaded RCCoupled amplifiers,	Design of single Stage RC Coupled Amplifier using BJT	L7	T1, T2,R1	
	Cascode amplifier, Darlington pair	Analysis of Cascode Amplifier	L8	T1, T2,R1	
	The Hybrid pi (Π)	Transconductance model	L9	T1, T2,R4	
	CE Short Circuit Current Gain	Derivation for CE Short Circuit Current Gain	L10	T1, T2,R4	

	Current Gain with Resistive Load	Derivation for Current Gain with Resistive Load	L11	T1, T2,R4	
	Gain Bandwidth Product	Gain Bandwidth Product	L12	T1, T2,R4	
	Emitter Follower at high frequencies	Analysis of Emitter Follower at high frequencies	L13	T1, T2,R4	
	Basic Concepts	Non-linear system analysis	L14	T3, T2	
	TOTAL NO OF CLASSES 14				
UNIT – II Feedback Amplifiers	Concepts of Feedback,	Block diagram of feedback amplifier, Positive & Negative feedbacks	L15,16	T2, R1, R4	
	Classification of Feedback Amplifiers	Voltage & Current series, Voltage & Current shunt feedback amplifiers	L17	T2, R1, R4	
	General characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier Characteristics	Gain , Bandwidth, Noise, Distortion, Input & output resistances	L18	T2, R1, R4	
	Voltage Series & Current Series Feedback Configuration	Effect of feedback on input and output resistances	L19	T2, R1, R4	
	Voltage Shunt & Current Shunt Feedback Configuration	Effect of feedback on input and output resistances	L20	T2, R1, R4	
	Illustrative Problems	Problems	L21,22	T2, R1, R4	

	TOTAL NO OF CLASSES 8				
UNIT – III Oscillators	Classification of Oscillators, Conditions for Oscillations	Different oscillators, Barkhausen criterion	L23	T1, T2, R1, R4	
	Wein Bridge Oscillators	BJT,FET Wein Bridge oscillators operation	L24,25	T1, T2, R1, R4	
	Generalized analysis of LC Oscillators	Operation of tank circuit	L26,27	T1, T2, R1, R4	
	TOTAL NO OF CLASSES 5				
UNIT – IV Large Signal Amplifiers&Tuned Amplifiers	Classification of Large Signal Amplifiers	Class A, B, C & AB large signal amplifiers	L28,29	T1, T2,R2	
	Class A Large Signal Amplifiers	Efficiency of Series Fed Class A Large Signal Amplifiers	L30	T1, T2,R2	
	Transformer Coupled Class A Audio Power Amplifier	Efficiency of Transformer Coupled Class A Audio Power Amplifier	L31,32	T1, T2,R2	
	Distortion in Power Amplifiers	Three point method second harmonic distortion	L33	T1, T2,R2	
	Class B Push-Pull Amplifier	Analysis of Class B Push-Pull Amplifier	L34	T1, T2,R2	
	Complementary Symmetry Class B Push-Pull Amplifier	Analysis of Complementary Symmetry Class B Push-Pull Amplifier	L35	T1, T2,R2	

	Thermal Stability and Heat Sinks	Condition for Thermal Stability and Heat Sinks	L36	T1, T2,R2	
	Introduction, Q-Factor	Coil Losses, Loaded & Un-Loaded Q	L37	T2, R4	
	Small Signal Tuned Amplifiers	Single & Double tuned amplifiers	L38,39	T2, R4	
	Effect of Cascoding Single Tuned Amplifiers on Bandwidth	Bandwidth equation for Single Tuned Amplifiers	L40	T2, R4	
	Effect of Cascoding Double Tuned Amplifiers on Bandwidth	Bandwidth equation for Double Tuned Amplifiers	L41	T2, R4	
	Stagger Tuned Amplifiers	Analysis of Stagger Tuned Amplifiers	L42	T2, R4	
	Stability of Tuned Amplifiers	Neutralization methods for Stability of Tuned Amplifiers	L43	T2, R4	
TOTAL NO OF CLASSES16					
Unit V Multivibrators & Time Base Generators	Analysis of Bi-stable Multi vibrators.	Analysis of Bi-stable Multi vibrators.	L44	T1, T2,R2	
	Design of Bi-stable Multi vibrators using Transistors	Design of Bi-stable Multi vibrators using Transistors	L45	T1, T2,R2	
	Analysis of Mono-stable Multi vibrators	Analysis of Mono-stable Multi vibrators	L46	T1, T2,R2	
	Design of Mono-stable Multi vibrators	Design of Mono-stable Multi vibrators	L47	T1, T2,R2	

	Problems on astable,monostable and bistable multivibrators	Problems on astable,monostable and bistable multivibrators	L48	T2, R4	
	Analysis of As table Multi vibrators	Analysis of As table Multi vibrators	L49	T2, R4	
	Design of As table Multi vibrators using Transistors	Design of As table Multi vibrators using Transistors	L50	T2, R4	
	Analysis of Schmitt trigger	Analysis of Schmitt trigger	L51	T1, T2,R2	
	Design of Schmitt trigger using Transistors	Design of Schmitt trigger using Transistors	L52	T1, T2,R2	
	General features of a Time base signal,	General features of a Time base signal,	L53	T1, T2,R2	
	Methods of Generating Time Base Waveform	Methods of Generating Time Base Waveform	L54	T1, T2,R2	
	Miller Time Base Generators-Basic Principle	Miller Time Base Generators-Basic Principle	L55	T1, T2,R2	
	Transistor Miller Time Base generator	Transistor Miller Time Base generator	L56	T1, T2,R2	
	Transistor Bootstrap Time base Generator ,Bootstrap Time Base Generators-Basic Principle	Transistor Bootstrap Time base Generator ,Bootstrap Time Base Generators-Basic Principle	L57	T2, R4	
	Transistor Current Time Base Generators Problems, Methods of Linearity improvement	Transistor Current Time Base Generators Problems, Methods of Linearity improvement	L58	T2, R4	
TOTAL NO OF CLASSES 15					

TOTAL NO OF CLASSES	58

8. Session Execution Log:

Sl.no	Syllabus	Scheduled completed date	Completed date	Remarks
1	I-UNIT	**15/04/2021**	**17/04/2021**	Completed
2	II-UNIT	**01/05/2021**	**08/05/2021**	Completed
3	III-UNIT	**02/06/2021**	**05/06/2021**	Completed
4	IV-UNIT	**20/06/2021**	**22/06/2021**	Completed
5	V-UNIT	**02/08/2021**	**04/08/2021**	Completed

9. ASSIGNMENT QUESTION

Unit – I

SET 1:

1. Obtain the expressions for the voltage gain in the low frequency, medium frequency and high frequency ranges in case of single stage amplifier.
2. Explain the Principle of opeartion of direct coupled ampli er and mention its advantages.
3. What is the use of transformer coupling in the output stage of multi stage amplier?
4. Why RC coupling is mostly used for voltage amplier.

SET 2:

1. Define unity gain frequency. Obtain the necessary relation using transistor frequency response.

2. Differentiate between direct and capacitive coupling of multiple stages of amplifiers.

3. With the help of a neat circuit diagram, describe the working of a cascode amplifier.

4. What are the merits and demerits of a cascade amplifier over a simple Common Emitter amplifier.

SET 3:

1. With the help of circuit diagram and equivalent circuit of a Darlington amplifier generate the expression for the overall input impedance of the pair.

2. Develop a generalized expression for overall current gain(A_{IS}) when two transistor stages with $R_{OUT2} < R_L$, $R_{OUT1} > R_{IN2}$, $R_{IN1} > R_S$ and individual voltage gains are A_{v1}, A_{v2}
3. Derive expressions for overall voltage gain and overall current gain of a two-stage RC coupled amplifier.

4. List out the special features of Darlington pair and cascode amplifiers.

SET 4:

1. Discuss various possibilities of inter-stage coupling of amplifiers.

2. Write the equation for overall gain of a n - stage cascaded Ampli er.

3. How does the frequency response an ampli er change with cascading of ampli er stages?
5.
4. Explain the choice of con guration in a cascade of ampliers.

Unit - II

SET 1:

1. Draw the circuit of a voltage series feedback circuit and explain it.

2. What are the possible ampli ers circuits in any feedback system? Discuss.

3. Draw a feedback ampli er in block diagram form and explain each block giving its function.
4. Distinguish between regenerative and degenerative feedback in ampliers.

SET 2:

1. Draw the equivalent circuit for a current ampli er and what are the values of R_i& R_o for ideal ampli er?

2. The open loop gain of an ampli er is 100. What will be the overall gain when a negative feed back of 0.5 is applied to the ampli er?

3. What are the di erent mixing techniques used in any feed back system? Ex-plain.

4. State the condition in terms of (1 + A) which a feed back ampli er must satisfy in order to be stable.

SET 3:

1. If negative feedback with a feedback factor, β of 0.01 is introduced into an amplifier with a gain of 200 and bandwidth of 6 MHz, obtain the resulting bandwidth of the feedback amplifier.

2. With the help of a suitable BJT based voltage series feedback amplifier diagram, explain the features and benefits of negative feedback in amplifiers.
3. If the non-linear distortion in a negative feedback amplifier with an open loop gain of 100 is reduced from 40% to 10%with feedback, compute the feedback factor, β of the amplifier.

4. Draw the circuit diagram of a current series feedback amplifier, Derive expressions to show the effect of negative feedback on input & output impedances, bandwidth, distortion of the amplifier.

SET 4:

1. Through the block schematics, show four types of negative feedback in amplifiers.

2. List the advantages of negative feedback in amplifiers.
3. Derive an expression for the transfer gain of a feedback amplier.

4. Discuss about the types of negative feedback ampli ers giving the effect of each type of feedback on the parameters of the amplier.

Unit - III

SET 1:

1. Give the two Barkhausen conditions required in order for sinusoidal oscillations to be sustained.

2. Draw the circuit diagram of RC phase - shift oscillator and derive the expression for frequency of Oscillations & condition for sustained Oscillations.

3. In a colpitts oscillator, C_1 = 0.2 F and C_2 = 0.04 F. If the frequency of oscillation is 10KHz, nd the value if Inductor. Also, nd the required gain for oscillation.

4. Determine the frequency of oscillations in a wien bridge oscillator.

SET 2:

1. Draw the colpilts oscillator circuit and explain its working.
2. Substantiate the requirement of positive feedback in amplifier for oscillations. Relate the requirement to Barkhausen Criterion.

3. With the help of neat circuit diagram, explain how sustained oscillations are obtained in RC phase shift BJT based oscillator. Derive the expression for frequency of oscillation.

4. Differentiate between RC and LC type oscillators.

SET 3:

1. Derive the expression for frequency of oscillation in a Hartley Oscillator.

2. State Barkhausen Critterion for Oscillations
3. Starting from the description of a generalized oscillator, derive the expression for frequency of oscillation in a colpitts oscillator.
4. List out the merits & demerits of oscillators.

SET 4:

1. Draw the electrical model of a piezoelectric crystal.

2. Over what portion of the reactance curve do we desire oscillations to take place when the crystal is used as part of a sinusoidal oscillator? Explain.

3. Sketch a circuit of a crystal - controlled oscillator and explain its function.

4. Explain the frequency - stability criterion for a sinusoidal oscillator.

Unit –IV

LARGE SIGNAL AMPLIFIERS

SET 1:

1. Show that the maximum conversion efficiency of the idealized class B push - pull circuit is 78.5%.
2. Explain the origin of crossover distortion. Describe a method to minimize this distortion.

3. What is class B amplifier? Why is it employed? Give its circuits, design equations, characteristics & limitations.

4. A transformer coupled Class A large signal amplifier has maximum and minimum values of collector to emitter voltage of 25V and 2.5V. Determine its collector efficiency.

SET 2:

1. A single stage class A amplifier V_{cc}=20V, V_{CEQ} =10V, I_{CQ} =600mA, R_L=16 Ω. The ac output current varies by ± 300mA, with the ac input signal. Find

   i) The power supplied by the dc source to the amplifier circuit.
   ii) AC power consumed by the load resistor.
   iii) AC power developed across the load resistor.
   iv) DC power wasted in transistor collector.
   v) Overall efficiency
   vi) Collector efficiency.

2. List the advantages of complementary-symmetry configuration over push pull configuration.

3. Derive the expression for maximum conversion efficiency for a simple series fed Class A power amplifier.

4. What are the drawbacks of transformer coupled power amplifiers?

SET 3:

1. With the help of a suitable circuit diagram, show that the maximum conversion efficiency of a class B power amplifier is 78.5%.

2. Explain how Total harmonic distortion can be reduced in a Class B push-pull amplifier.

3. State the merits of using push pull configuration? Describe the operation of class B push pull amplifier and show how even harmonics are eliminated.

4. A single ended class A amplifier has a transformer coupled load of 8 Ω. If the transformer turns ration is 10, find the maximum power output delivered to the load. Take zero signal collector current of 500mA.

SET 4:

1. What is push-pull configuration and how does this circuit reduce the harmonic distortion?
2. Derive an expression for the output power of a class A large - signal amplifier in terms of Vmax, V_{min} I_{max}& I_{min}.
3. What is a class B amplifier? Where is it employed? Give its circuits, design equations, characteristics & limitations.
4. A transistor supplies 0.8W to a 5K load. The zero signal dc collector current is 30mA, and the dc collector current with signal is 36mA. Determine the percent second - harmonic distortion.

TUNED AMPLIFIERS

SET 1:

1. Why two tuned circuits are used in double tuned amplifier?
2. What the advantages are of stagger tuned amplifier?
3. Compare neutralization and unilaterlization methods of tuned amplifiers
4. What the limitations are of stagger tuned amplifiers?

SET 2:

1. What happen when no. of stages is increased in single tuned cascaded amplifiers
2. How the frequency response of doubled tuned amplifier depends on degree of coupling between two tank circuits?
3. Draw the equivalent circuit of double tuned amplifier and derive the expression for gain at resonance.
4. Derive the expression for effective bandwidth of cascaded tuned amplifier.

SET 3:

1. Describe briefly Stagger Tuned Amplifiers – Operation and comparison with synchronous tuning
2. List possible configurations of tuned amplifiers.

3. Derive an expression for bandwidth of a capacitive coupled tuned amplifier in CE configuration.

4. What is stagger tuning? Suggest possible applications.

SET 4:

1. What the limitations are of stagger tuned amplifiers?

2. List possible configurations of tuned amplifiers.

3. Derive the expression for effective bandwidth of cascaded tuned amplifier.

4. Why two tuned circuits are used in double tuned amplifier?

UNIT V

SET-1

1(a) With reference to multivibrators, explain: i) stable-state ii) loop-gain iii) quasi stable-state

(b) Describe multivibrators from the viewpoints of construction, principle of working, classification based on the output states, applications and specifications. Mention one specific application of each.

2. Draw and explain the circuit of Astable Multivibrator with necessary waveforms and also derive the Expression for its frequency of oscillations.

3. (a) What is meant by triggered sweep? What are the merits and demerits of triggered sweep circuits?
   (b) What is relaxation oscillator? Name some negative resistance devices used in relaxation oscillators and give its applications

4. Explain the principle of working of Miller sweep circuit. Derive the expression for sweep speed by taking Miller integrator circuit.

SET-2

1. Explain the operation of emitter-coupled bistable multivibrator. Also discuss different methods of triggering a bistable multivibrator.

2. What is dead-band in a Schmitt trigger? Draw the hysteresis loop and explain how hysteresis can be eliminated in a Schmitt trigger.

3. (a) What is a linear time base generator?
   (b) Write the applications of time base generators.
   (c) Define the sweep speed error, displacement error and transmission error of voltage time base Waveform

4. (a) Draw the circuit of a Boot strap sweep generator and explain its operation. Derive an expression for its sweep time.
   (b) Explain with a circuit the working of a UJT sweep circuit and obtain the expressions for the intrinsic standoff ratio (η).

SET-3

1. (a) Explain the reason for the occurrence of overshoot at the base of normally ON transistor of one shot.

Derive an expression for overshoot.

(b) Discuss a few applications of a monostable multivibrator. Explain how it differs with that of a binary.

2. (a) Draw the equivalent circuit diagram for differential amplifier used as an astable multi vibrator.

(b) Draw the various waveforms at base and collector of transistors of the astable multivibrator

3. (a) Briefly describe various methods to achieve sweep linearity in time-base circuits.

(b) Draw the circuit of a constant current sweep circuit, explain its operation and derive the expression for sweep voltage.

4 Draw a bootstrap sweep circuit using Darlington pair. Explain its operation with neat waveforms also mention its merits and limitations

SET-4

1. What is a monostable multivibrator? Explain with the help of a neat circuit diagram the principle of operation of a monostable multi, and derive an expression for pulse width. Draw the wave forms at collector and Bases of both transistors

2.(a) Define sweep speed error, transmission error and displacement error pertaining to sweep circuits. Also derive the expressions for the same with respect to an exponential sweep circuit

(b) Explain the operation of an emitter coupled monostable multivibrator.

3. (a)Define the three errors that occur in a sweep circuit and obtain an expression for these errors for an exponential sweep circuit

(b)What are the essential requirements of TV horizontal sweep circuit? How do you achieve them using a current sweep?

4. (a) With neat sketches and necessary expressions, explain the transistor Miller time-base generator

(b) Compare the principle of operation of Miller sweep circuit and Bootstrap sweep circuit

10. Sample assignment Script
(Attached Separately)

11. Unit Wise Subject Materials
(Attached Separately)

ECA Material.rar

12. Mid- I exam question paper

I-SET

1.a)Draw the Comparison table of CE,CB and CC Amplifier interms of A_V,A_I,Z_I,Y_O,A_{VS},A_{IS}Equations?

b)What is the Draw back of Darlington amplifier. How it overcomes in Bootstrap cc Amplifier?

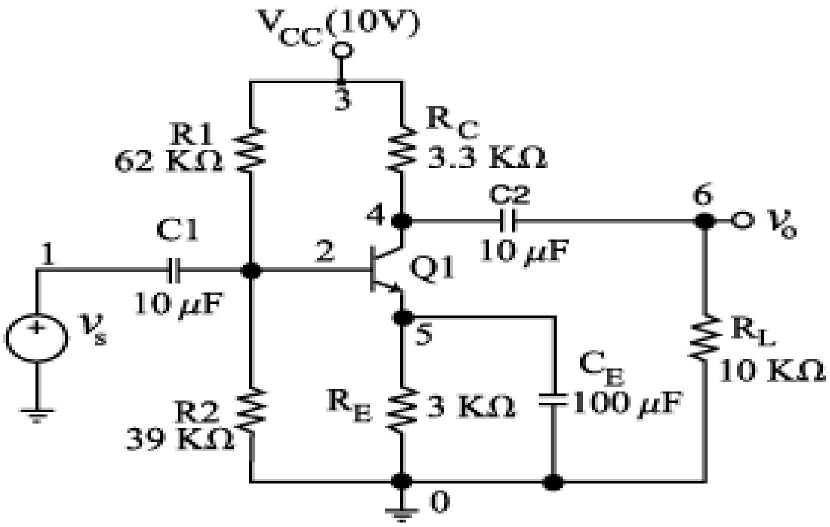
2. a)State and Prove the Miller's Theorem and Dual of Miller's Theorem?

b) What is the use of Transformer Coupling in the output Stage of Multi Stage Amplifier ?

3. a)Draw the CE amplifier with un bypassed emitter resistance and Derive the expression for R_i & A_v?

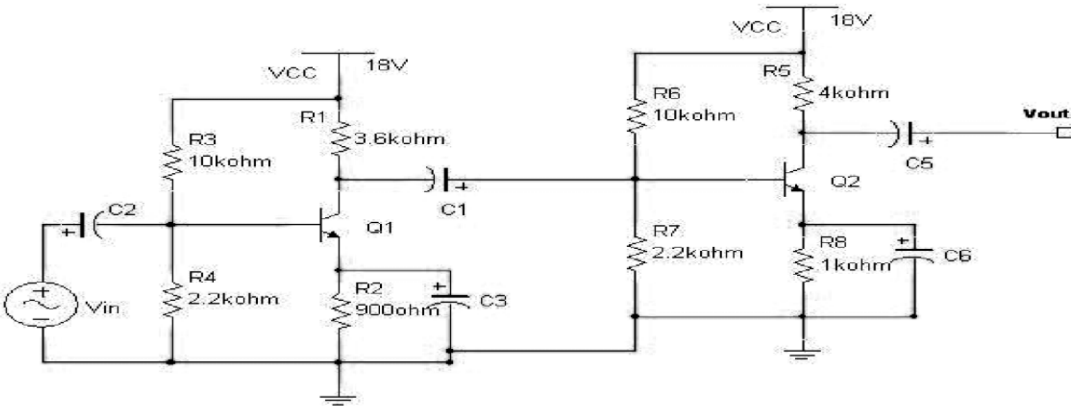
b)Explain the effect of coupling and bypass capacitor in CE amplifier on low frequency response of amplifier?

4. Compute the Voltage gain,Current gain and input resistance for the amplifier circuit shown below.Assume hie=1.1Kohm,hfe=60.Also assume that the effects of hre and hoe are negligible.



II-SET

1) For the two-stage RC coupled amplifier circuit shown, calculate the Individual stage voltage gains and the overall voltage gain. Input impedance of individual stages is given as 2.4 KΩ and β of individual transistors as 80.



2.a 3) Draw the circuit Diagram for CE Amplifier (Hybrid pi Model) and calculate the Short circuit Current Gain?

4)a)Compare Direct coupled Amplifier with RC Coupled Amplifier?

b) Derive the Equation for Lower 3db frequency of CE configuration?

III-SET

1. a)Obtain CC h parameter interms of CE Parameters?

b)Design single stage CE am[plifier with R_s=5Ω,R_1=100k Ω, R_2=100 Ω, R_C=2k Ω, R_E=1k Ω, R_L=1k Ω.assume h_{fe}=100,h_{ie}=2k Ω,hre is negligible and $h_{oe}=10^{-5}$ mhos.

2.a)Derive the Expression for over all β and Ove rall input impedance of Darlington pair?

b)Derive the Expressions for Transconductance(g_m),Feedback conductance($g_{b'c}$) and Output Conductance(g_{ce})?

3)a)Explain Small Signal Eqivalent Circuit For an Emitter Follower at Higher Frequencies with neat circuit Diagram?

4.)a) Derive the Equation for Lower 3db frequency of CE configuration?

b) List out the special features of Darlington Pair and Cascode Amplifiers?

MID-II

1Q) State and briefly explain Barkhausen criterion for oscillation. Derive the expression for frequency of oscillation of BJT RC phase shift oscillator with necessary explanation.

2Q) a) Derive the efficiency of a class A power amplifier with necessary diagram.

b) what are the drawbacks of transformer coupled power amplifiers?

3Q) a)Define Q-factor of a resonant circuit. What is the need for tuned amplifiers?

b) Explain the operation of double-tuned amplifier with a neat circuit diagram.

4Q) Draw and explain the working principle of assailed multivibrator circuit . Derive the expression for frequency of oscillation of an astable multivibrator.

13. Sample And Answer Scripts

14. Material Collected from Internet/Wed sites

ECA.rar ECA Material.rar

24. Power Point Presentations

eca.rar

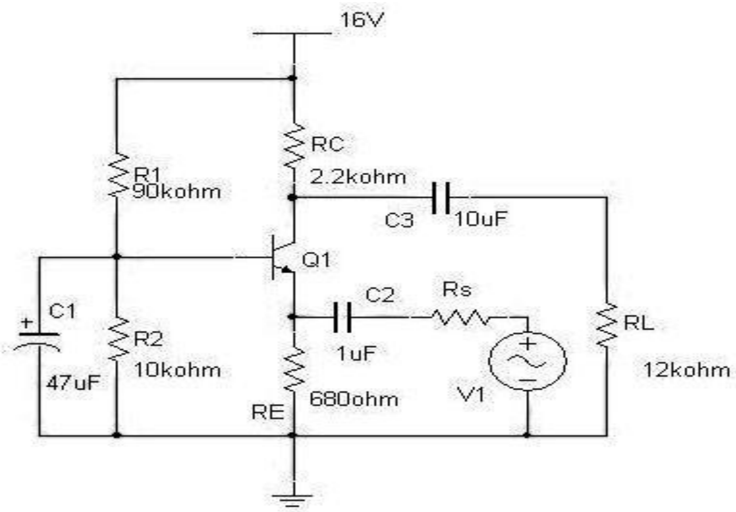
25. Previous Question paper model

JNTU PREVIOUS QUESTION PAPERS

QUESTION BANKS - JNTU

1.a) For the CB amplifier circuit shown, compute R_{IN} and R_{OUT} if C_1 is
i) Connected ii) Not connected

The h-parameters of the transistor in CE configuration are listed as: h_{ie} = 2.1KΩ, h_{fe} = 81, h_{oe} = 1.66 µMhos and h_{re} is negligibly small.



b) Reason out the causes and results of Phase & Frequency distortions in transistor amplifiers.

2.a) Differentiate between direct and capacitive coupling of multiple stages of amplifiers.

b) With the help of a neat circuit diagram, describe the working of a cascode amplifier.

c) What are the merits and demerits of a cascade amplifier over a simple Common Emitter amplifier?

3.a) Derive the expressions for hybrid Π conductance, $g_{ce,}$ and $g_{bb'}$ of a transistor.

b) Explain how hybrid Π parameters, g_m and g_{ce} vary with I_c, V_{ce} and temperature.

c) 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.

4.a) Discuss the effect of different type of loads to a common source MOS amplifier.

b) Differentiate between cascode and folded cascode configurations.

5.a) If negative feedback with a feedback factor, β of 0.01 is introduced into an amplifier with a gain of 200 and bandwidth of 6 MHz, obtain the resulting bandwidth of the feedback amplifier.

b) With the help of a suitable BJT based voltage series feedback amplifier diagram, explain the feature and benefits of negative feedback amplifiers.

6.a) Substantiate the requirement of positive feedback in amplifier for oscillations. Relate the requirement to Barkhausen Criterion.

b) With the help of neat circuit diagram, explain how sustained oscillations are obtained in RC phase shift BJT based oscillator. Derive the expression for frequency of oscillations.

7.a) A single stage class A amplifier V_{cc}=20V, V_{CEQ} =10V, I_{CQ} =600mA, R_L=16 Ω. The ac output current varies by ± 300mA, with the ac input signal. Find

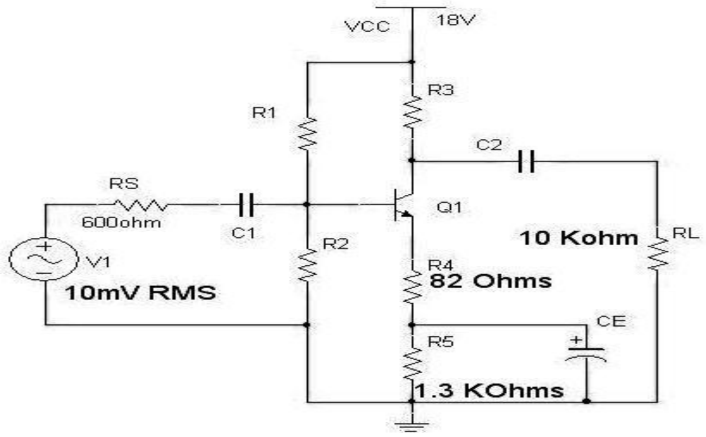
i) The power supplied by the dc source to the amplifier circuit.
ii) AC power consumed by the load resistor.
iii) AC power developed across the load resistor.
iv) DC power wasted in transistor collector.
v) Overall efficiency
vi) Collector efficiency.

b). List the advantages of complementary-symmetry configuration over push pull configuration.

8. Describe the following briefly:

a) Stagger Tuned Amplifiers – Operation and comparison with synchronous tuning
b) Heat Sinks for tuned power amplifiers.

9.For the amplifier circuit shown with partially unbypassed emitter resistance, calculate the voltage gain with R_4 in place and with R_4 shorted. Consider h_{ie} = 1.1KΩ, h_{fe} = 100, h_{re}& h_{oe} are negligibly small. Assume R_1 and R_2 to be 100KΩ and 22 KΩ respectively.



b) Analyse what the output voltage should be if the DC power supply given to a CE amplifier is shorted to ground.

10..a) With the help of circuit diagram and equivalent circuit of a Darlington amplifier generate the expression for the overall input impedance of the pair.

b) Develop a generalized expression for overall current gain(A_{IS}) when two transistor stages with $R_{OUT2}< R_L$, $R_{OUT1}> R_{IN2}$, $R_{IN1}> R_S$ and individual voltage gains are A_{V1}, A_{V2}.

11.a) A transistor amplifier in CE configuration is operated at high frequency with the following specifications. f_T=6MHz, g_m=0.04,h_{fe} =50, $r_{bb'}$ =100 Ω, R_s =500 Ω , $C_{b'c}$ =10pF, R_L=100 Ω. Compute the voltage gain, upper 3dB cut-off frequency, and gain bandwidth product (GBW).

b) Derive an expression for the overall higher cut-off frequency of a two stage amplifier with identical stages of individual higher cut-off frequency, f_H.

12.a) Discuss the effect of different type of loads to a common source MOS amplifier.

b) Differentiate between cascode and folded cascode configurations.

13.a). If the non-linear distortion in a negative feedback amplifier with an open loop gain of 100 is reduced from 40% to 10%with feedback, compute the feedback factor, β of the amplifier.

b) Draw the circuit diagram of a current series feedback amplifier, Derive expressions to show the effect of negative feedback on input & output impedances, bandwidth, distortion of the amplifier.

14.a) Differentiate between RC and LC type oscillators.

b) Derive the expression for frequency of oscillation in a Hartley Oscillator.

c) State Barkhausen Critterion for Oscillations

15.a) Derive the expression for maximum conversion efficiency for a simple series fed Class A power amplifier.

b) What are the drawbacks of transformer coupled power amplifiers?

c) A push pull amplifier utilizes a transformer whose primary has a total of 160 turns and whose secondary has 40 turns. It must be capable of delivering 40W to an 8 Ω load under maximum power conditions. What is the minimum possible value of V_{cc}?

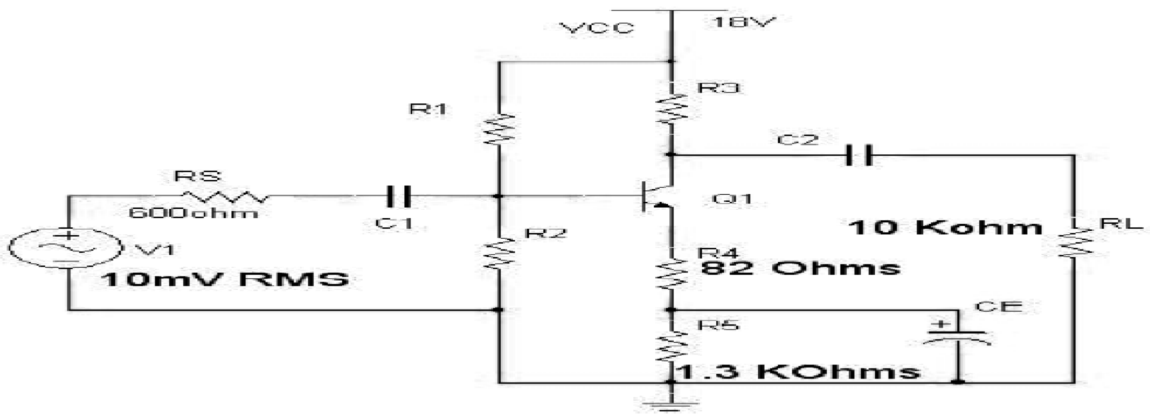
16.a) List possible configurations of tuned amplifiers.

b) Derive an expression for bandwidth of a capacitive coupled tuned amplifier in CE configuration. Make necessary assumptions and mention them.

17.a) For the common emitter amplifier shown, draw the AC and DC load lines. Determine the peak -to- peak output voltage for a sinusoidal input voltage of 30mV peak-to-peak. Assume C_1, C_2 and C_3 are large enough to act as short circuit at the input frequency. Consider $h_{ie} = 1.1K\Omega$, $h_{fe} = 100$, h_{re}& h_{oe} are negligibly small.

b) State Miller's theorem. Specify its relevance in the analysis of a BJT amplifier.

c) Write expressions for A_V and R_{IN} of a Common Emitter amplifier.



18.a) Derive expressions for overall voltage gain and overall current gain of a two-stage RC

coupled amplifier.

b) List out the special features of Darlington pair and cascode amplifiers.

19.a) Discuss the effect of emitter bypass capacitor and input & output coupling capacitors

on the lower cut-off frequency if number of amplifiers are cascaded.

b) Describe how an emitter follower behaves at high frequencies.

20.a) Discuss the effect of different types of loads to a common source MOS amplifier.

b) Differentiate between cascode and folded cascode configurations.

21.a) The β and the open loop gain of an amplifier are -10% and -80 respectively. By how

much % the closed loop gain changes if the open loop gain increases by 25%?

b) Compare the characteristics of feedback amplifiers in all the four configurations.

c) Reason out why 2 stages are required to implement current shunt feedback.

22.Starting from the description of a generalized oscillator, derive the expression forfrequency of oscillation in a colpitts oscillator.

23.a) With the help of a suitable circuit diagram, show that the maximum conversion efficiency of a class B power amplifier is 78.5%.

b) Explain how Total harmonic distortion can be reduced in a Class B push-pull configured amplifier.

24.a) Derive an expression for the bandwidth of a synchronous tuned circuit.

b) Discuss the necessity of stabilization circuits in tuned amplifiers.

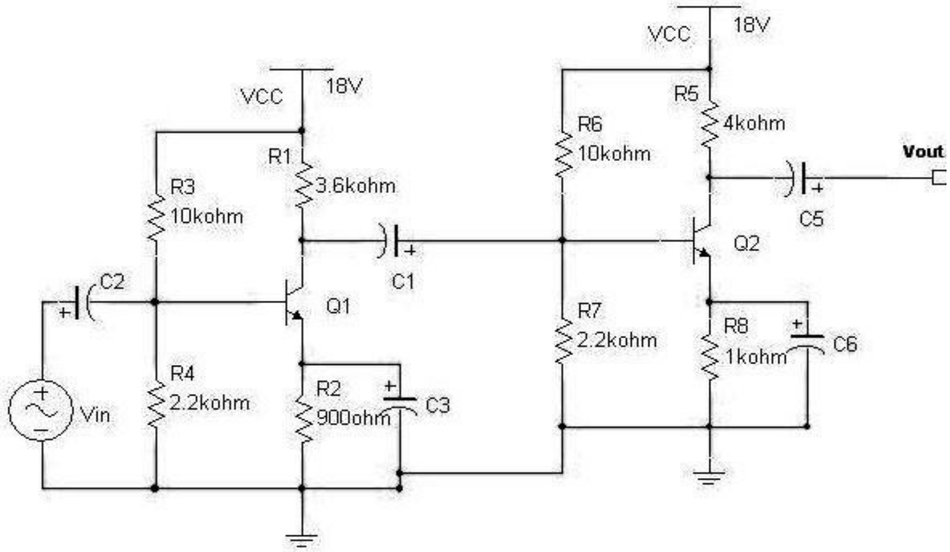
25.a) Draw the circuit diagram of a common collector amplifier along with its equivalent circuit. Derive expressions for A_V and R_I.

b) What is meant by small signal for analyzing a BJT based amplifier?

c) What is non-linear distortion? List the causes for this type of distortion in amplifiers.

26.a) Discuss various possibilities of inter-stage coupling of amplifiers.

b) For the two-stage RC coupled amplifier circuit shown, calculate the Individual stage voltage gains and the overall voltage gain. Input impedance of individual stages is given as 2.4 KΩ and β of individual transistors as 80.



27.a) A transistor has f_α = 8MHz, and β=80.when connected as an amplifier, it has stray capacitance of 100pF at the output terminal. Calculate its upper 3dB frequency when R_{load} is
i) 10KΩ ii) 100KΩ.

b) Discuss the effect of coupling capacitors of a CE amplifier on the overall frequency response of amplifier.

28.a) Discuss the effect of different type of loads to a common source MOS amplifier.

b) Differentiate between cascode and folded cascode configurations.

29.a) An amplifier has a gain of 50 with negative feedback. For a specified output voltage, if the input required is 0.1V without feedback and 0.8V with feedback, Compute β and open loop gain.

b) Through the block schematics, show four types of negative feedback in amplifiers.

c) List the advantages of negative feedback in amplifiers.

30.a) List out the merits × demerits of oscillators.

b) With the help of suitable schematic and description, show that both positive and negative feedback are used in a Wien Bridge oscillator. Establish the condition for oscillations.

31.a) State the merits of using push pull configuration? Describe the operation of class B push pull amplifier and show how even harmonics are eliminated.

b) A single ended class A amplifier has a transformer coupled load of 8 Ω. If the transformer turns ration is 10, find the maximum power output delivered to the load.
Take the zero signal collector current of 500mA.

32.a) Derive the expressions for Bandwidth and Q-factor of single tuned, capacitively

coupled amplifiers. List the assumptions made for the derivation.

b) What is stagger tuning? Suggest possible applications.

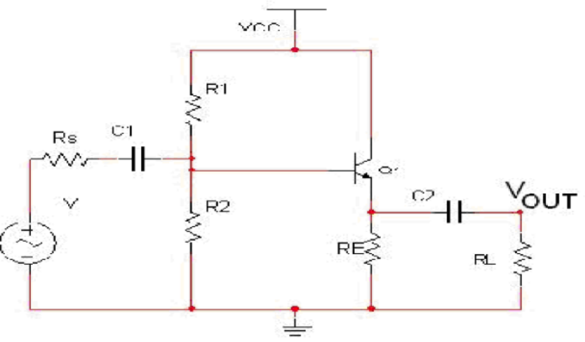
33.a) Draw the circuit diagram of Common Drain amplifier and derive an expression for its Voltage gain.
b) The h-parameters of the transistor used in CE amplifier are h_{fe} = 50, h_{ie}=1.1KΩ, h_{re} = $2.5x10^{-4}$, h_{oe} = 24μ A/V. Find out current gain and voltage gains with and without source resistance, input and output impedances, given that R_L= 10K and R_S= 1 K.

34.a) Discuss about different types of distortions that occur in amplifier circuits.
b) Three identical non interacting amplifier stages in cascade have an overall gain of 1 dB down at 30 Hz compared to mid band. Calculate the lower cutoff frequency of the individual stages.

35.a) Draw and explain the small signal equivalent circuit for an emitter follower stage at high frequencies.
b) Consider a CE stage with a resistive load R_L. Using Miller's theorem Find input capacitance at mid-band frequencies and high frequencies.

36. (a) For a single stage transistor amplifier, RS = 10K and RL= 10K. The h-parameter values are hfc = 51, hic =1.1K; hrc _ 1; hoc = 25 _A/V Find AI; AV; AV S, Ri, and Ro for the CC transistor configuration.
(b) For a single stage transistor amplifier, RS=1K; and RL= 10K the h-parameter values are hfe = 50, hie =1.1K; hre = 2.5x10□4, hoe = 25 _ A/V. Find AI; AV; AV S, Ri, and Ro for the CE transistor configuration.

37. (a) For the emitter follower circuit shown in _figure 1, calculate the quiescent voltage and current for VCC = 20Volts, hfc =120, hic = 1.1K, hoc = 2.5 x 10□6 mhos and hrc is negligibly Small. Reactance of capacitance need not be considered at the frequencies of interest.



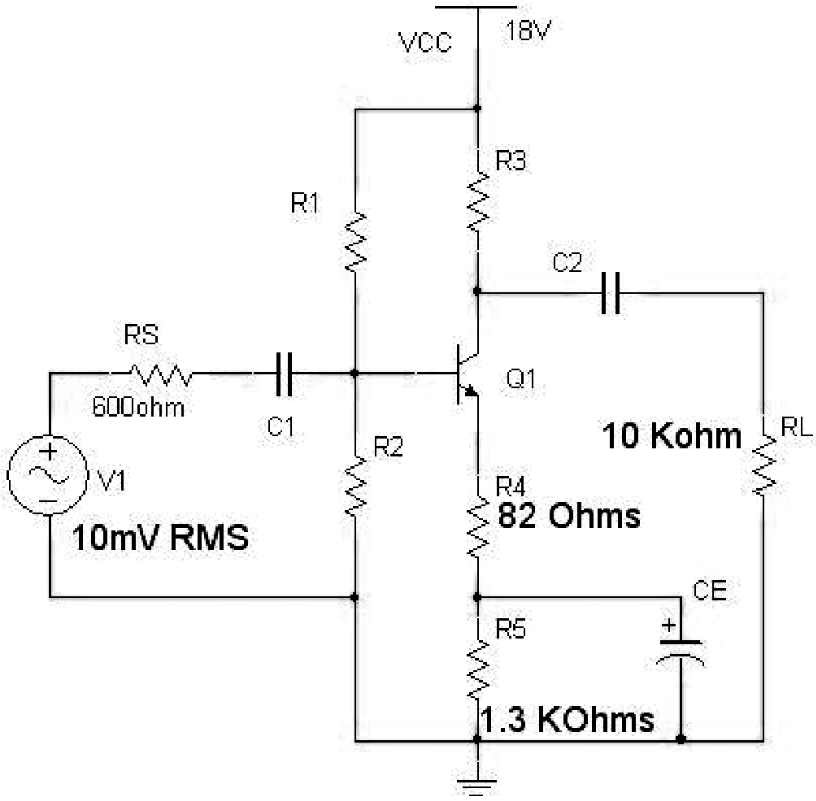
If R1 = 27K, R2 = 5.6K, RL = RE =220, RS = 0, Find the maximum undistorted peak-to-peak output voltage.
(b) Compare and contrast Common Emitter, Common Collector and Common Base amplifiers in all aspects.

38. (a) Derive the expression for the bandwidth of multistage amplifier.
(b) What are the problems of Direct coupled amplifiers?
(c) Why RC coupling is popular?
(d) Why transformer coupling is not used in the initial stage of a multistage amplifier?

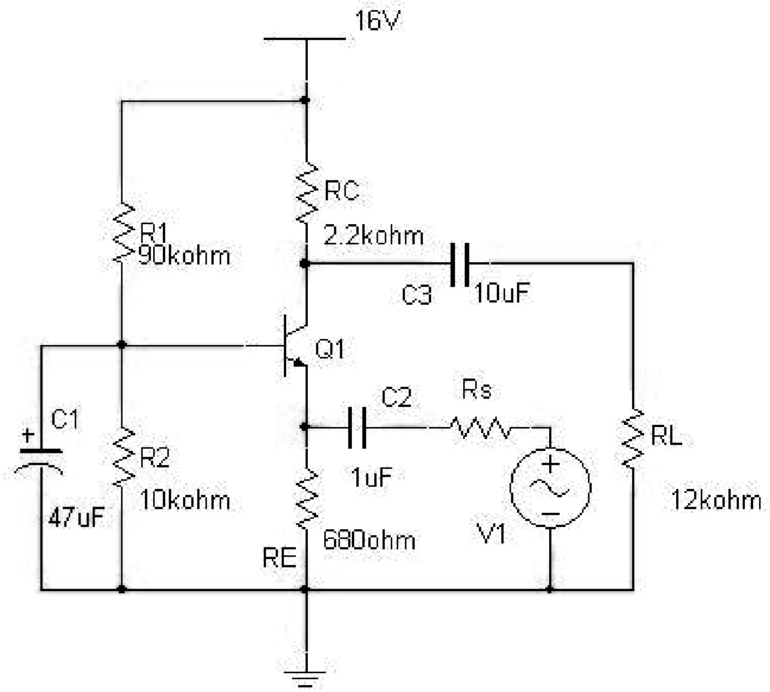
39. (a) Derive the expression for output conductance and diffusion capacitance of hybrid-_ CE amplifier.
(b) A single-stage CE ampli_er is to have a bandwidth fH of 5MHz with RL = 500. Assume hfe = 100, gm= 100mA/V, rbb0 = 100, Cc= 1PF, and fT =400 MHz
i. Find the value of the source resistance that will give the required band-width.
ii. with the value of Rs, determined in part (i), _nd the mid band voltage gain Vo / VS.

40.a) Differentiate between direct and capacitive coupling of multiple stages of amplifiers.
b) With the help of a neat circuit diagram, describe the working of a cascode amplifier.
c) What are the merits and demerits of a cascade amplifier over a simple Common Emitter amplifier?

41. For the amplifier circuit shown with partially unbypassed emitter resistance, calculate the voltage gain with R_4 in place and with R_4 shorted. Consider h_{ie} = 1.1KΩ, h_{fe} = 100, h_{re} & h_{oe} are negligibly small. Assume R_1 and R_2 to be 100KΩ and 22 KΩ respectively.



b) Analyse what the output voltage should be if the DC power supply given to a CE amplifier is shorted to ground.

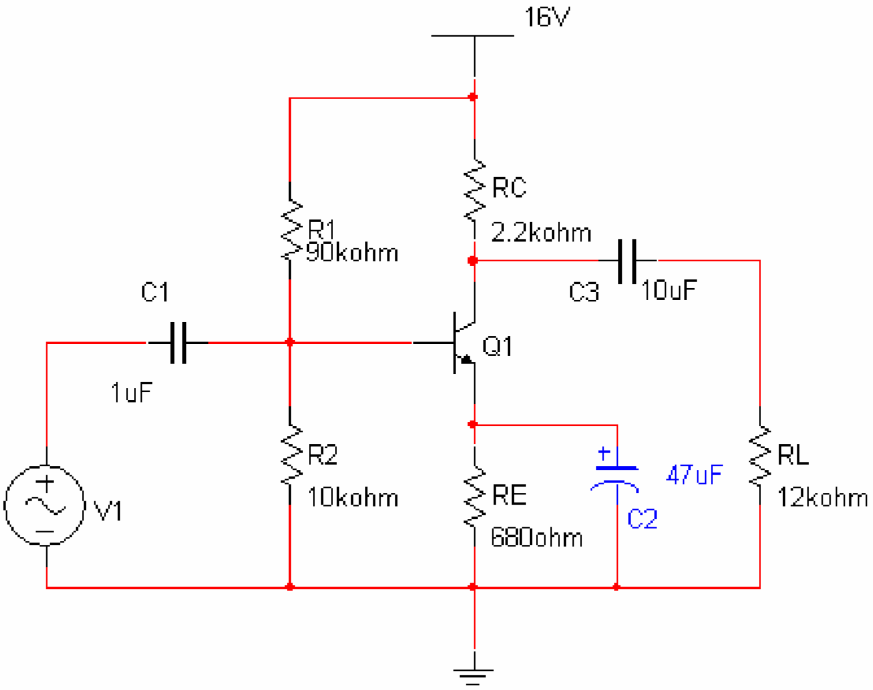


b) Reason out the causes and results of Phase & Frequency distortions in transistor amplifiers. [9+6] ha

b) State Miller's theorem. Specify its relevance in the analysis of a BJT amplifier.
c) Write expressions for A_V and R_{IN} of a Common Emitter amplifier.

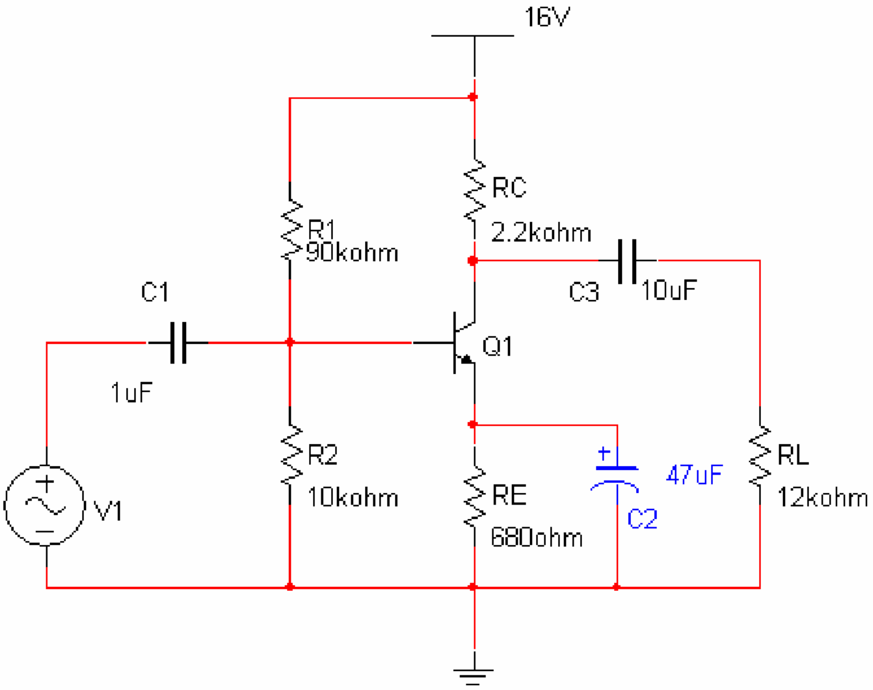
42. Derive expressions for overall voltage gain and overall current gain of a two-stage RC coupled amplifier.

43.a) For the common emitter amplifier shown in Figure.1, Draw the AC and DC load lines. Determine the peak-to-peak output voltage for a sinusoidal input voltage of 30mV peak-to-peak. Assume C_1, C_2 and C_3 are large enough to act as short circuit at the input frequency. Consider $h_{ie} = 1.1K\Omega$, $h_{fe} = 100$, h_{re} & h_{oe} are negligibly small.



b) List the merits and demerits of a JFET over a BJT.
c) Write the expressions for A_V and R_{in} of a CE amplifier.

44 a) for the common emitter amplifier shown in Figure.1, Draw the AC and DC load lines. Determine the peak-to-peak output voltage for a sinusoidal input voltage of 30mV peak-to-peak. Assume C_1, C_2 and C_3 are large enough to act as short circuit at the input frequency. Consider $h_{ie} = 1.1K\Omega$, $h_{fe} = 100$, h_{re} & h_{oe} are negligibly small.



b) List the merits and demerits of a JFET over a BJT.
c) Write the expressions for A_V and R_{in} of a CE amplifier.

45.(a) Derive the expression for the high 3-dB frequency f _h of n-identical non inter-acting stages in terms of fH for one stage.
(b) If four identical amplifiers are cascaded each having fH =100 KHz, determine the overall upper 3dB frequency f _h. Assume non interacting stages.
(c) Write a short note on Bootstrapped Darlington circuit.

47. (a) Show that in Hybrid - model, the diffusion capacitance is proportional to the emitter bias current.
(b) What is the frequency range to consider Giacolletto model of a transistor at high frequencies? What is the significance of fT in discussing the frequency range of a transistor at high frequencies?

48. For a given CE amplifier with _=100, Ic=5mA, Vce=10V, hie=800, ho e = 1 0□4 mhos hre= 10□4. Take fT =50MHz and Cob=3pF. Compute all hybrid Q parameters.

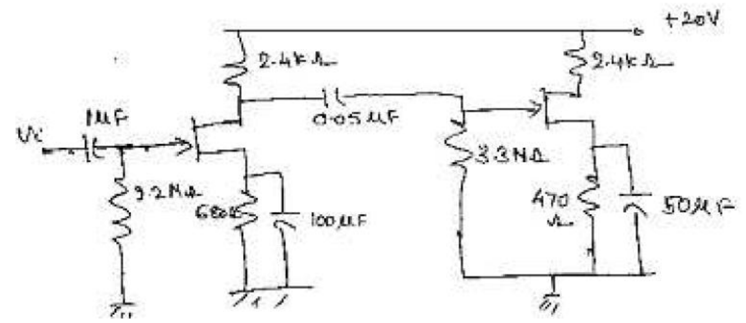
49. (a) Compare the inter-stage coupling methods in RC coupled amplifier and Darlington pair.

(b) Generate a generalized expression for overall current gain (AIS) when two transistor stages with ROUT2> RL, ROUT1 > RIN2 , RIN1> RS and individual voltage gains are AV 1 and AV 2 are cascaded.

50. (a) Draw the FET amplifier equivalent circuit looking into the drain and _nd its gain & o/p impedance?
(b) Starting with the definition of gm and rd, show that if two identical FETs are connected in parallel, gm is doubled and rd is halved since μ = rd gm, then remains unchanged.

51. (a) What is square law distortion? What is its effect in FET amplifiers? Compare important characteristics of CD, CS, CG FET amplifier.
(b) A self-biased CE amplifier circuit has R1 = 100K , R2 = 10K, Rc = 5K, RE= 1K, RS = 10K. Compute AI , AV , AV S and Ri. The h-parameters of the transistor are hie = 1.1k, hfe = 50, hre = 2.5 x 10□4 , hoe = 25_A/V.

52. For the circuit shown, calculate the dc bias, voltage gain, input impedance and output impedance for the cascade amplifier shown in Figure.



53.a) With the help of circuit diagram and equivalent circuit of a Darlington amplifier generate the expression for the overall input impedance of the pair.
b) Develop a generalized expression for overall current gain(A_{IS}) when two transistor stages with $R_{OUT2} < R_L$, $R_{OUT1} > R_{IN2}$, $R_{IN1} > R_S$ and individual voltage gains are A_{V1}, A_{V2}.

54.a) A transistor amplifier in CE configuration is operated at high frequency with the following specifications. f_T=6MHz, g_m=0.04,h_{fe}=50, $r_{bb'}$=100 Ω, R_s=500 Ω , $C_{b'c}$=10pF, R_L=100 Ω. Compute the voltage gain, upper 3dB cut-off frequency, and gain bandwidth product (GBW).
b) Derive an expression for the overall higher cut-off frequency of a two stage amplifier with identical stages of individual higher cut-off frequency, f_H.
55.a) Discuss the effect of different type of loads to a common source MOS amplifier.
b) Differentiate between cascode and folded cascode configurations.
b) List out the special features of Darlington pair and cascode amplifiers.

56.a) Discuss the effect of emitter bypass capacitor and input & output coupling capacitors on the lower cut-off frequency if number of amplifiers are cascaded.
b) Describe how an emitter follower behaves at high frequencies.

57.a) Discuss the effect of different types of loads to a common source MOS amplifier.
b) Differentiate between cascode and folded cascode configurations.

58.a) With the help of circuit diagram and equivalent circuit of a Darlington amplifier, generate the expression for the overall input impedance of the pair.
b) List out various types of distortions that occur in transistor amplifiers. Discuss the causes for each type listed.

59.a) With the help of circuit diagram and equivalent circuit of a Darlington amplifier, generate the expression for the overall input impedance of the pair.
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60. (a) Draw the circuit of a voltage series feedback circuit and explain it.
(b) What are the possible amplifiers circuits in any feedback system? Discuss.

61. Obtain the expressions for the voltage gain in the low frequency, medium frequency and high frequency ranges in the case of single stage amplifier.

62. (a) Give the two Barkhausen conditions required in order for sinusoidal oscillations to be sustained.
(b) Draw the circuit diagram of RC phase - shift oscillator and derive the expression for frequency of Oscillations & condition for sustained Oscillations.

63.a) If negative feedback with a feedback factor, β of 0.01 is introduced into an amplifier with a gain of 200 and bandwidth of 6 MHz, obtain the resulting bandwidth of the feedback amplifier.
b) With the help of a suitable BJT based voltage series feedback amplifier diagram, explain the features and benefits of negative feedback in amplifiers.

64.a). If the non-linear distortion in a negative feedback amplifier with an open loop gain of 100 is reduced from 40% to 10%with feedback, compute the feedback factor, β of the amplifier.
b) Draw the circuit diagram of a current series feedback amplifier, Derive expressions to show the effect of negative feedback on input & output impedances, bandwidth, distortion of the amplifier.

65.a) The β and the open loop gain of an amplifier are -10% and -80 respectively. By how much % the closed loop gain changes if the open loop gain increases by 25%?
b) Compare the characteristics of feedback amplifiers in all the four configurations.
c) Reason out why 2 stages are required to implement current shunt feedback.

66. Starting from the description of a generalized oscillator, derive the expression for frequency of oscillation in a colpitts oscillator.

67.a) What is Harmonic distortion in transistor amplifier circuits? Discuss on second harmonic distortion.
b) Draw and explain the operation of Class-AB power amplifier. How will it eliminate cross over distortion?

68.a) Draw and explain the circuit diagram of a single tuned Capacitance coupled amplifier. Also explain its operation.
b) Draw and explain the significance of Gain versus Frequency curve of tuned amplifiers when they are used in radio receivers.
c) Draw the Ideal and actual frequency response curves of a single tuned amplifier.

69. Explain in detail the effect of cascading tuned amplifiers and hence derive the expression for bandwidth of n-stage amplifier. Also draw the frequency response and explain what happens as the number of stages increases?

70. (a) Draw the circuit of class -A series fed power amplifier and derive the expression for output power Po. (b) Draw and discuss the operation of Class - C power amplifier.

71.(a) What is coefficient of coupling in a double tuned amplifier? Discuss its effect on the frequency response.
(b) Derive the expression for bandwidth of a double tuned amplifier.

72. (a) A transistor supplies 0.85W to a 5K load, the zero signal dc collector current is 30mA, and the dc collector current with signal is 36mA.Determine the percent harmonic distortion.
(b) Derive an expression for conversion efficiency of a class B power amplifier.

73. (a) Why two tuned circuits are used in double tuned amplifier?
(b) What are the advantages of stagger tuned amplifier?
(c) Why parallel resonance circuits are used in tuned amplifiers?

74. (a) A single ended class A power amplifier is coupled to an 8 load, using a transformer with a turn ratio of 5:1 with a 50V supply the transistor is biased to have a quiescent collector current of 250mA. When a sinusoidal signal is applied to the base, the collector voltage varies between a maximum of 5V and maximum of 90V. Estimate the efficiency, power output & second – harmonic distortion of this stage.
(b) Discuss how rectification may takes place in a power amplifier?

75. (a) Explain the differences between the function of a transformer used in a power amplifier and that used in a double tuned voltage amplifier.
(b) Explain the method of determination of total harmonic distortion in push pull power amplifiers using 5 - point analysis.

(c) Calculate the harmonic distortion components for an output signal, in push pull power amplifiers having fundamental amplitude of 2.5 Volts, second harmonic amplitude of 0.25 Volts, third harmonic amplitude of 0.1 Volts, fourth harmonic amplitude of 0.05V. Also calculate the total harmonic distortion.

76. (a) Determine the input power, output power and efficiency for a class B power amplifier circuit with Vcc=30 V , Im=1 Amp and RL=10 .
(b) Draw the circuit of transformer less pushpull amplifier circuit with loud speaker as the load resistance. Justify the circuit behavior with \emitter follower" circuit operation.

77.a) Substantiate the requirement of positive feedback in amplifier for oscillations. Relate the requirement to Barkhausen Criterion.

b) With the help of neat circuit diagram, explain how sustained oscillations are obtained in RC phase shift BJT based oscillator. Derive the expression for frequency of oscillation.

78.a) A single stage class A amplifier V_{cc}=20V, V_{CEQ} =10V, I_{CQ} =600mA, R_L=16 Ω. The ac output current varies by 300mA, with the ac input signal. Find ±

i) The power supplied by the dc source to the amplifier circuit.
ii) AC power consumed by the load resistor.
iii) AC power developed across the load resistor.
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b). List the advantages of complementary-symmetry configuration over push pull configuration

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b) Derive an expression for bandwidth of a capacitive coupled tuned amplifier in CE configuration. Make necessary assumptions and mention them.

83.a) With the help of a suitable circuit diagram, show that the maximum conversion efficiency of a class B power amplifier is 78.5%.
b) Explain how Total harmonic distortion can be reduced in a Class B push-pull configured amplifier.

84.a) Derive an expression for the bandwidth of a synchronous tuned circuit.
b) Discuss the necessity of stabilization circuits in tuned amplifiers.

85.a) Derive the expression for maximum conversion efficiency for a simple series fed Class A power amplifier. What are the drawbacks of transformer coupled power amplifiers?
b) A single stage class A amplifier V_{cc}=20V, V_{CEQ} =10V, I_{CQ} =600mA, R_L=16 Ω. The ac output current varies by ±300mA, with the ac input signal. Find
i) Power supplied by the dc source to the amplifier circuit.
ii) The AC power consumed by the load resistor.
iii) Conversion efficiency.

86. a)Derive an expression for 'bandwidth' and 'quality factor' of a capacitive coupled single tuned amplifier in CE configuration. Make necessary assumptions and mention them.

b). Substantiate the necessity of the following in tuned amplifiers.

a) Heat Sinks

b) Stabilization circuits

87.a) Derive the expression for maximum conversion efficiency for a simple series fed Class A power amplifier. What are the drawbacks of transformer coupled power amplifiers?

b) A single stage class A amplifier V_{cc}=20V, V_{CEQ} =10V, I_{CQ} =600mA, R_L=16 Ω. The ac output current varies by ±300mA, with the ac input signal. Find

i) Power supplied by the dc source to the amplifier circuit.

ii) The AC power consumed by the load resistor.

iii) Conversion efficiency.

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JOURNALS

INTERNATIONAL

1. The Journal of Non-Linear Analysis and Application
2. International Journal of Electronics (Taylor & Francis Group)
3. International Journal of Modeling and Simulation (ACTA Press)
4. IEEE Transactions on Circuits and systems
5. IEEE Transactions on Electronic Devices.

NATIONAL

1. Journal of the Institute of Engineers
2. Journal of the Indian Institute of Science
3. IETE Journal of Education
4. IETE Journal of Research
5. IETE Technical Review