

## G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY::KURNOOL

(Autonomous)

II B.Tech II SEM (R23) MID-I Examinations - Feb/March'2025

Department of Electronics and Communication Engineering

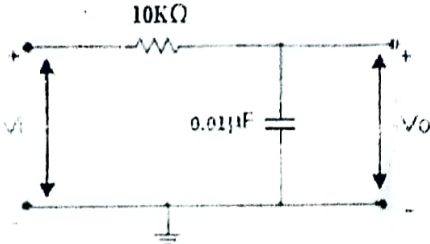
Sub: Electronic Circuits Analysis (A40409)

Date: 04-03-2025

Time: 90 min

Max. Marks: 30

Answer all the Questions (3X10=30M)

		Marks	Unit	CO	Cognitive Level
1	a) Analyze and draw the frequency response of BJT amplifier at low and high frequency. b) The input power to a device is 10,000 W at a voltage of 1000 V. The output power is 500 W and the output impedance is 20 $\Omega$ . Find the power gain in decibels.	7+3M	II	CO1	Remember & Apply
	(OR)				
2	a) Analyze and draw the frequency response of MOSFET amplifier at low and high frequency. b) For the network shown in figure below determine the break frequency. <div style="text-align: center;">  </div>	7+3M	I	CO1	Understand & Apply
3	a) Summarize the analysis of RC coupled amplifier with voltage and current gains at low, mid and high frequency ranges. b) A 3-stage amplifier has voltage gains of 300, 400 and 500 for first, second, and third stages. Find the overall voltage gain of the amplifier in normal and decibels.	7+3M	I	CO2	Analyze & Apply
	(OR)				
4	a) Describe with necessary equations the analysis of Transformer coupled amplifier with neat circuit diagram. b) Voltage gain of a single stage amplifier is 15. Bandwidth is 50 kHz. Two such stages are cascaded. Find the overall voltage gain and bandwidth.	7+3M	I	CO2	Understand & Apply
5	a) Draw the circuit diagram of Common Emitter Amplifier and explain the effect of $C_b$ , $C_e$ , $C_c$ capacitances in terms of necessary equations. b) An amplifier rated at 50W output is connected to a 20 $\Omega$ speaker. Calculate input voltage for rated output if amplifier voltage gain is 50dB.	7+3M	I	CO1	Understand & Apply
	(OR)				
6	a) Analyze with h-parameters the Cascode amplifier with neat circuit diagram. b) Explain with necessary equations, the effect of cascading amplifiers on the factors Gain and bandwidth.	7+3M	I	CO2	Analyze & Understand

Signature of faculty

Signature of HOD

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY: KURNOOL**  
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**II B. Tech II SEM (R23) II MID Examination - APR / MAY 2025**

**Department of Electronics and Communication Engineering**

**Sub: ECA (A40409)**

**Time: 90 min**

**Date: 01-05-2025**

**Max.Marks: 30**

**Answer all the Questions (3X10=30M)**

		Marks	Unit	CO	Cognitive Level
1	Explain about voltage shunt negative feedback topology and derive the expressions for $A_{vf}$ , $R_{if}$ and $R_{of}$ .	10M	III	CO3	Understand
	(OR)				
2	(a) With neat block diagram explain the concept of feedback of an amplifier.	5M	III	CO3	Understand
	(b) An RC coupled amplifier has a voltage gain of 1000, $f_L = 50$ Hz, $f_H = 200$ KHz and a distortion of 5% Without feedback. Find the amplifier voltage gain, $f_{Lb}$ , $f_{Hf}$ and distortion when a negative feedback is applied with feedback ratio of 0.01	5M			Apply
3	Show that the gain of the Wien bridge oscillator using BJT amplifier must be at least three for the oscillations to occur.	10M	IV	CO4	Analyze
	(OR)				
4	Explain and derive single tuned capacitive coupled amplifier.	10M	IV	CO4	Analyze
5	Draw the circuit of class C amplifier and explain its operation. Derive the efficiency of the amplifier is 100% making necessary assumptions.	10M	V	CO5	Create
	(OR)				
6	a) Distinguish between large signal and small signal amplifiers.	5M	V	CO5	Understand
	b) Compare the series fed and transformer coupled class – A power amplifiers.	5M			

*Thirupathi*  
Signature of faculty

*Thirupathi*  
Signature of HOD

**G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(AUTONOMOUS)

**B.Tech II Year II Semester Regular Examinations May 2025**

Subject Name: **Electronic Circuit Analysis**

Branch: **Electronics and Communications Engineering**

**Time: 3 Hours**

**SET-2**

**Max. Marks: 70****Instructions:**

1. Answer all 10 questions from Part-A. Each question carries two marks
2. Answer one full question from each unit in Part-B. Each full question carries 10marks

PART-A					
1	a	Define Logarithm.	2M	CO1	BTL2
	b	In the context of a BJT amplifier, what is the effect of emitter bypass capacitors on the amplifier's frequency response at low frequencies?	2M	CO1	BTL6
	c	List the distortions exists in amplifier circuits.	2M	CO2	BTL1
	d	Define multistage amplifier, and why are multiple amplifier stages used in communication systems?	2M	CO2	BTL1
	e	How does feedback influence the gain of the amplifier?	2M	CO3	BTL3
	f	What is the formula for closed-loop gain with negative feedback?	2M	CO3	BTL6
	g	Classify different types of tuned amplifiers.	2M	CO4	BTL1
	h	How does the tuned amplifier amplify signals at a particular frequency?	2M	CO4	BTL2
	i	In power amplifiers what is the role of a heat sink	2M	CO5	BTL1
	j	What is a power amplifier?	2M	CO5	BTL6
PART-B					
UNIT-I					
2		Analyze and draw the frequency response of BJT amplifier at low and high frequency.	10M	CO1	BTL2
OR					
3	a	Describe the concept of the gain-bandwidth product in the context of a BJT amplifier.	5M	CO1	BTL2
	b	How does the parasitic capacitance between the base and collector affect the high-frequency response of a BJT amplifier?	5M	CO1	BTL2
UNIT-II					
4	a	Describe the gain-bandwidth product in cascaded amplifiers. How does the gain in one stage influence the overall bandwidth	5M	CO2	BTL6
	b	Describe the role of a transformer in coupling between amplifier stages. How does transformer coupling affect the frequency response and impedance matching between stages?	5M	CO2	BTL2



**OR**

5		Discuss and derive overall voltage, current, input and output impedance of cascade RC coupled BJT amplifier	10M	CO2	BTL6
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**UNIT-III**

6	a	What are the main characteristics of negative feedback amplifiers? Discuss how negative feedback affects the gain, bandwidth, linearity, and distortion in an amplifier circuit.	5M	CO3	BTL2
	b	List the different feedback topologies. How does each topology affect the amplifier's gain, stability, and input/output impedance?	5M	CO3	BTL4

**OR**

7		Derive an expression for input impedance and output impedance for the current series and current shunt feedback amplifiers	10M	CO3	BTL2
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**UNIT-IV**

8	a	Describe the operation of a Colpitts oscillator. What are the key components that determine its frequency of oscillation, and how does the circuit achieve frequency stability?	5M	CO4	BTL2
	b	Explain the principle of operation of a Phase-Shift oscillator. How does the feedback network in this oscillator ensure the generation of sustained oscillations, and what factors determine the frequency of oscillation?	5M	CO4	BTL2

**OR**

9	a	Discuss the importance of Q-factor in tuned amplifiers. How does the quality factor impact the bandwidth, selectivity, and gain of a tuned amplifier,	5M	CO5	BTL3
	b	Explain the working principle of a staggered tuned amplifier. How does the staggered tuning of multiple stages improve the overall frequency response and extend the bandwidth of the amplifier?	5M	CO5	BTL2

**UNIT-V**

10		Explain transformer coupled class-A power amplifier and derive its efficiency.	10M	CO5	BTL2
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**OR**

11	a	What are the advantages and disadvantages of using power BJTs in amplifier circuits? Discuss their ability to handle high current and voltage,	5M	CO5	BTL6
	b	Explain the working principle of MOS (Metal-Oxide-Semiconductor) power transistors. How do power MOSFETs differ from regular MOSFETs.	5M	CO5	BTL1

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<b>Subject Code</b>	<b>:</b>	<b>A40409</b>	<b>Subject Name</b>	<b>:</b>	<b>ELECTRONIC CIRCUITS &amp; ANALYSIS</b>		
<b>Class/Section</b>	<b>:</b>	<b>ECE A, B &amp; C</b>	<b>Year</b>	<b>:</b>	<b>II</b>	<b>Semester</b>	<b>:</b> <b>II</b>

### QUESTIONBANK

**Name of Faculty: Dr T. Thirrupal & Dr N. Geetha Rani**

<b>BLOOMS LEVEL</b>					
<b>Remember</b>	<b>L1</b>	<b>Understand</b>	<b>L2</b>	<b>Apply</b>	<b>L3</b>
<b>Analyze</b>	<b>L4</b>	<b>Evaluate</b>	<b>L5</b>	<b>Create</b>	<b>L6</b>

### 2 Marks Questions

<b>Unit No</b>	<b>Q.No</b>	<b>Question</b>	<b>Appear In</b>	<b>CO Mapped</b>	<b>Bloom's Taxonomy Level</b>
Unit 1	1	Define Bandwidth.	Jntua 2017, 19,22 GPCET 2022	CO1	L1
	2	Draw the Hybrid equivalent circuit.	Jntua 2015, 2017, 2018 GPCET 2020, 2022, mid 2021	CO1	L1
	3	Define Logarithm.	Jntua 2018, GPCET 2022,	CO1	L1
	4	Draw the Common Emitter amplifier circuit at high frequency.	Jntua 2023 GPCET 2022	CO1	L1
	5	Draw the frequency response of RC coupled amplifier and indicate bandwidth, low, mid and high frequency ranges.	Jntua 2016 GPCET 2021	CO1	L1
	6	What component commonly affects the low frequency response in amplifiers?	Jntua 2015, 2017, 2018 GPCET 2020, 2022, mid 2021	CO1	L1
	7	What is the lower and upper cutoff frequency?	Jntua 2016, 22, mid 2023	CO1	L1
	8	Which components mainly affect high frequency response?	Jntua 2019, mid 2022	CO1	L1

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	9	Draw the Common Emitter amplifier circuit at mid band frequency.	Jntua 2017, GPCET 2022	CO1	L1
	10	What is meant by 3dB.	GPCET 2020	CO1	L2
Unit 2	1	Define amplifier.	mid 2021	CO2	L1
	2	Draw the Darlington pair circuit diagram.	Jntua 2018, mid 2022	CO2	L1
	3	Classify amplifiers based on Q-point.	Jntua 2019 GPCET 2020, 2022	CO2	L1
	4	What is the function of multistage amplifier?	mid 2018	CO2	L1
	5	A 5-stage amplifier has voltage gains of 100, 200, 300, 400 and 500 for first, second, third, fourth and fifth stages. Find the overall voltage gain of the amplifier in normal and decibels.	mid 2020	CO2	L1
	6	List the distortions exists in amplifier circuits.	Jntua 2016, mid 2022	CO2	L1
	7	List out the advantages and disadvantages of RC Coupled amplifier.	mid 2018	CO2	L1
	8	List out the applications of Transformer Coupled amplifier.	mid 2018	CO2	L2
	9	List out the advantages and disadvantages of Transformer Coupled amplifier.	Jntua 2015, 2017, 2018 GPCET 2022, mid 2023	CO2	L1
	10	List out the advantages and disadvantages of Direct Coupled amplifier.	GPCET 2022, 2022, mid 2021	CO2	L1
Unit 3	1	What are the differences between positive and negative feedback	GPCET 2022	CO3	L1
	2	An amplifier has a gain of 100, when a negative feedback is applied the gain is reduced to 340 find the feedback ratio?	GPCET 2021	CO3	L1
	3	What is the formula for closed-loop gain with negative feedback?	Jntua 2017, 20 mid 2023	CO3	L1
	4	An amplifier has a gain of 300, when a negative feedback 0.5 is applied the gain is reduced to find the feedback ratio?	Jntua 2015, 2019, 23, GPCET 2021, 2023, mid 2023	CO3	L1
	5	Explain the concept of feedback.	Jntua 2019,	CO3	L1

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			GPCET 2022		
	6	What is the feedback factor ( $\beta$ )?	Jntua 2015, 2019, 23, GPCET 2021	CO3	L1
	7	Define sensitivity and desensitivity of a negative feedback amplifier.	mid 2019	CO3	L1
	8	Define stability of a negative feedback amplifier.	mid 2018, 19	CO3	L1
	9	Characteristics of a Negative feed back amplifier.	Jntua 2015, mid 2022	CO3	L1
	10	Define bandwidth with of a negative feedback amplifier with feed back.	Jntua 2018 GPCET 2022	CO3	L1
Unit 4	1	Define Q-fatcor.	Jntua 2017, 2019 GPCET 2020, mid 2021	CO4	L1
	2	What is meant by Tank circuit.	Jntua 2015, 2018	CO4	L1
	3	Define resonant frequency.	Jntua 2015, 2017, 2018 GPCET 2020, 2022, mid 2021	CO4	L1
	4	Classify different types of tuned amplifiers.	Jntua 2016, GPCET 2021	CO4	L2
	5	Mention any two differences between single tuned and double tuned amplifiers.	Jntua 2015, 16, 19,21,23 GPCET 2021, 22, mid 2021, 23	CO4	L1
	6	The band width for a single tuned amplifier is 20KHz. calculate the bandwidth if such three stages are cascaded.	Jntua 2016, 2017, 2019 GPCET 2021, 2022, mid 2023	CO4	L1
	7	Define damped and undamped oscillations	Jntua 2020, 2023, GPCET 2022	CO4	L1
	8	What is Barkhausen criterion	Jntua 2016, 2017, GPCET 2020, mid 2021, 22	CO4	L1
	9	Draw circuit of a crystal oscillator.	Jntua 2021, 23 GPCET 2022, 2022, mid 2020	CO4	L1
	10	List various types of Oscillators.	Jntua 2015,18	CO4	L1

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			GPCET 2021, 2022, mid 2019, 2021		
Unit 5	1	Differentiate between power amplifier and voltage amplifier.	Jntua 2017, 21 GPCET 2022	CO5	L1
	2	What are the advantages of push-pull amplifier configuration?	GPCET 2022, mid 2019	CO5	L1
	3	What are the limitations of push-pull amplifier?	Jntua 2016,22 GPCET 2021, 2022, mid 2023	CO5	L1
	4	What is cross over distortion?	GPCET 2022	CO5	L1
	5	What is a power amplifier?	Jntua 2020, mid 2023	CO5	L1
	6	What is the efficiency of a Class A direct coupled and transformer coupled power amplifier?	Jntua 2020, mid 2021	CO5	L1
	7	What are the advantages of class A direct coupled over transformer coupled power amplifier?	GPCET 2021, mid 2023	CO5	L1
	8	What are the drawbacks of class A direct coupled over transformer coupled power amplifier?	Jntua 2015, GPCET 2020, 2022, mid 2021	CO5	L1
	9	Classify different types of power amplifiers.	Jntua 2018, mid 2021	CO5	L1
	10	Draw the input and output waveform using load line of class-A power amplifier.	Jntua 2019, GPCET 2021	CO5	L1

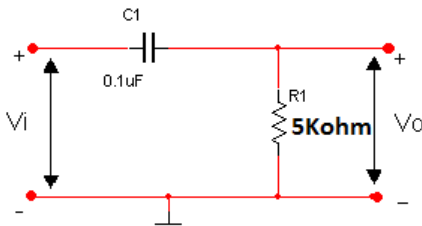
### 10 Marks Questions

Unit No	Q.No	Question	Appear In	COs	Bloom's Taxonomy Level
Unit 1	1	Draw the circuit diagram of Common Emitter Amplifier and explain the effect of $C_b$ , $C_e$ , $C_c$ capacitances in terms of necessary equations.	Jntua 2017, 19 GPCET 2023	CO1	L3



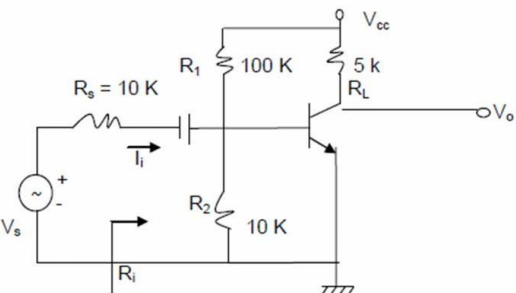
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2	Analyze and draw the frequency response of BJT amplifier at low and high frequency.	GPCET 2020, mid 2019	CO1	L2
3	Analyze and draw the frequency response of MOSFET amplifier at low and high frequency.	Jntua 2017 GPCET 2021, 2022, mid 2023	CO1	L2
4	<p>A) The input power to a device is 10,000 W at a voltage of 1000 V. The output power is 500 W and the output impedance is 20 <math>\Omega</math>.</p> <p>a. Find the power gain in decibels.</p> <p>b. Find the voltage gain in decibels.</p> <p>B) Discuss about logarithms and derive derivation for power, voltage and current in terms of Db.</p>	GPCET 2022	CO1	L2
5	<p>A) For the network shown in fig.</p> <p>a. Determine break frequency.</p> <p>b. Find voltage gain at <math>A_V \text{ (dB)} = -5\text{dB}</math></p>  <p>B) Draw hybrid – pi model for a transistor in the CE configuration and Explain the significance of every Component in this model.</p>	Jntua 2020, mid 2023	CO1	L2
6	Derive expression to find lower cutoff frequency for common emitter amplifier.	Jntua 2020, mid 2021	CO1	L2
7	Derive expression to find upper cutoff frequency for common emitter amplifier.	GPCET 2021, mid 2023	CO1	L2
8	Derive expression to find lower cutoff frequency for common source amplifier.	Jntua 2015, GPCET 2020, 2022, mid 2021	CO1	L2
9	Derive expression to find upper cutoff frequency for common source amplifier.	Jntua 2018, mid 2021	CO1	L2

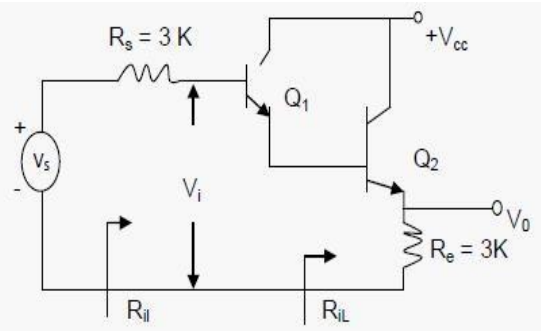
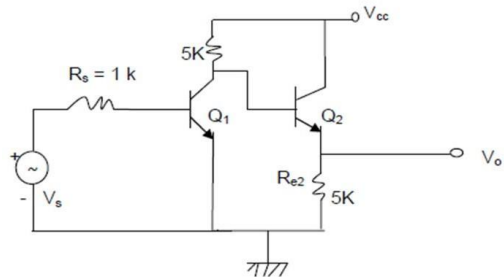
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	10	Derive expression to find upper cutoff frequency for common emitter follower amplifier.	Jntua 2019, GPCET 2021	CO1	L2
Unit 2	1	a) Explain the effect of cascaded of amplifiers on bandwidth b) Compare various Coupling schemes used in amplifiers	Jntua 2018, 2019 GPCET 2020, mid 2021	CO2	L2
	2	Discuss and derive overall voltage, current, input and output impedance of cascade RC coupled BJT amplifier	Jntua 2018, 2018, GPCET 2020, mid 2019	CO2	L2
	3	The h-parameters of a transistor are $h_{fe} = 50$ , $h_{ie} = 1.1 \text{ K}\Omega$ , $h_{re} = 2.5 \times 10^{-4}$ , $h_{oe} = 24 \text{ }\mu\text{A/V}$ . Calculate $A_i$ , $A_v$ , $R_i$ and $R_o$ shown in figure. <div style="text-align: center;">  </div>	Jntua 2015, GPCET 2020, 2022, mid 2018	CO2	L2
	4	Draw the circuit diagram for Darlington pair and derive the expressions for $A_i$ , $A_v$ , $R_i$ and $R_o$ .	Jntua 2016, GPCET 2021	CO2	L2
	5	For two CE-CC configuration the h-parameters values are $h_{fe} = 50$ , $h_{ie} = 2 \text{ k}\Omega$ , $h_{oe} = 25 \text{ }\mu\text{A/V}$ , $h_{re} = 6 \times 10^{-4}$ , $h_{fc} = -51$ , $h_{ic} = 2 \text{ k}\Omega$ , $h_{oc} = 25 \text{ }\mu\text{A/V}$ , $h_{rc} = 1$ . Find input and output impedance and individual and overall gain and current gain ( $R_s = 1 \text{ K}$ , $R_c = 5 \text{ K}$ , $R_e = 5 \text{ K}$ ).	Jntua 2015, 16, 19, 21, 23 GPCET 2021, 22, mid 2021, 23	CO2	L2

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6	<p>For the circuit shown in figure, calculate <math>R_i</math>, <math>A_i</math>, <math>A_v</math> and <math>R_o</math>. Assume <math>h_{ie} = 1.1 \text{ K}</math>,</p>  <p><math>h_{fe} = 50</math>, <math>h_{re} = 2.5 \times 10^{-4}</math>, <math>h_{oe} = 25 \mu\text{A/V}</math>.</p>	Jntua 2016, 2017, 2019 GPCET 2021, 2022, mid 2023	CO2	L2
7	<p>5. A two-stage amplifier circuit (CE – CC configuration) is shown in figure. The h-parameter values are <math>h_{fe} = 50</math>, <math>h_{ie} = 2 \text{ K}\Omega</math>, <math>h_{re} = 6 \times 10^{-4}</math>, <math>h_{oe} = 25 \mu\text{A/V}</math>. <math>h_{fe} = -51</math>, <math>h_{ic} = 2 \text{ K}\Omega</math>, <math>h_{rc} = 1</math>, <math>h_{oc} = 25 \mu\text{A/V}</math>. Find the input and output impedances and individual, as well as overall voltage and current gains.</p> 	Jntua 2020, 2023, GPCET 2022	CO2	L2
8	<p>Draw and explain the two stage direct coupled amplifier (Cascode amplifier) and derive the expression for overall <math>A_i</math>, <math>A_v</math>, <math>R_i</math> and <math>R_o</math>.</p>	Jntua 2016, 2017, GPCET 2020, mid 2021, 22	CO2	L2
9	<p>Describe with necessary equations the analysis of Transformer coupled amplifier with neat circuit diagram.</p>	Jntua 2021, 23 GPCET 2022, 2022, mid 2020	CO2	L2
10	<p>a) Classify Amplifiers b) A multistage amplifier is to be constructed using four identical</p>	Jntua 2015, 18 GPCET 2021, 2022, mid 2019, 2021	CO2	L2

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		stages, each of which has a lower cut off frequency 15Hz and upper cut-off frequency 30KHz. What will be the lower and upper cut-off frequency of the multistage amplifier?			
Unit 3	1	(a) Draw the practical circuit for voltage series feedback amplifier. (b) Find the voltage gain, current gain, input and output impedance of above amplifier?	Jntua 2019, 22, GPCET 2020	CO3	L2
	2	3 (a) A Voltage series negative feedback amplifier has a voltage gain without feedback of $A=500$ , input Impedance $R_i=3K$ and output resistance $R_o=20K$ and feedback ratio $=0.02$ . calculate the voltage gain, input resistance and output resistance of the amplifier with feedback (b) Explain the concept of feedback with block diagram	Jntua 2017, 2021	CO3	L2
	3	(a) What are characteristics of negative feedback amplifiers? Explain (b) An amplifier has voltage gain with feedback of 100. If the gain without feedback changes by 20% and gain with feedback should not vary more than 2%, determine the value of open loop gain $A$ and feedback ratio	Jntua 2017, 20 mid 2023	CO3	L2
	4	Derive an expression for input impedance and output impedance for the current series and current shunt feedback amplifiers	Jntua 2015, 2019, 23, GPCET 2021, 2023, mid 2023	CO3	L2
	5	Derive an expression for input impedance and output impedance for the current series and current series	Jntua 2019, GPCET 2022	CO3	L2



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		feedback amplifiers			
	6	Derive an expression for input impedance and output impedance for the current series and voltage shunt feedback amplifiers	Jntua 2015, 2019, 23, GPCET 2021, 2023, mid 2023	CO3	L2
	7	(a) Explain general characteristics of negative feedback amplifiers (b) An RC coupled amplifier has a voltage gain of 1000, $f_L = 50$ Hz, $f_H = 200$ KHz and a distortion of 5% Without feedback. Find the amplifier voltage gain, $f_{Lf}$ , $f_{Hf}$ and distortion when a negative feedback is applied with feedback ratio of 0.01	mid 2019	CO3	L2
	8	a) What are the differences between positive and negative feedback b) Define and derive sensitivity and desensitivity?	mid 2018, 19	CO3	L2
	9	(a) What are characteristics of negative feedback amplifiers? Explain (b) An amplifier has voltage gain with feedback of 100. If the gain without feedback changes by 20% and gain with feedback should not vary more than 2%, determine the value of open loop gain A and feedback ratio	Jntua 2015, mid 2022	CO3	L3
	10	Derive an expression for input impedance and output impedance for the current series and current shunt feedback amplifiers.	Jntua 2018 GPCET 2022	CO3	L2
Unit 4	1	Draw a practical circuit of a complimentary symmetry push pull amplifier circuit. Explain its Function and derive its efficiency.	Jntua 2016, 2018, mid 2022, mid 2022	CO4	L2
	2	a) Distinguish between large signal and	Jntua 2018, mid	CO4	L2

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		small signal amplifiers. b) Compare the series fed and transformer coupled class – A power amplifiers.	2022		
	3	a) Explain the terms impedance matching and cross over distortion. b) Explain why the complementary symmetry power amplifier has become more popular in modern circuits.	Jntua 2019 GPCET 2020, 2022	CO4	L2
	4	Explain transformer coupled class-A power amplifier and derive its efficiency.	Jntua 2018, mid 2018	CO4	L2
	5	Draw the circuit diagram of push pull class B amplifier. Explain its working and derive its efficiency	mid 2020	CO4	L3
	6	With neat circuit explain the operation of Single tuned amplifier.	Jntua 2016, mid 2022	CO4	L2
	7	Explain the operation of class B push pull amplifier and show that maximum conversion efficiency is 78.5%.	Jntua 2019, Mid 2018	CO4	L3
Unit 5	1	1) a) Explain the working principle of Hartley oscillator with help of circuit diagram  b) Find its frequency of oscillations and gain of the transistor.	GPCET 2022	CO5	L2
	2	1) a) Explain the working principle of colpitts oscillator with help of circuit diagram  b) Find its frequency of oscillations and gain of the transistor.	Jntua 2017, 2018 GPCET 2022, mid 2021	CO5	L2
	3	a) What is Barkhausen criterion. Explain.  b) Define and classify oscillators.	Jntua 2021, GPCET 2022	CO5	L2
	4	a) Draw the circuit diagram of a RC phases shift oscillator using BJT  b) Derive its frequency of	Jntua 2015, GPCET 2022	CO5	L2

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		oscillations and gain of the transistor.			
5		Show that the gain of the Wien bridge oscillator using BJT amplifier must be at least three for the oscillations to occur	Jntua 2016 GPCET 2021	CO5	L2
6		a) Draw the circuit diagram of crystal oscillator b) Explain its operation and derive its frequency of oscillations	Jntua 2015, 2017, GPCET 2022, mid 2023	CO5	L2
7		(a) Explain the effect of cascading single tuned amplifier on band width. (b) Explain about staggered tuned amplifiers.	Jntua 2019, mid 2023	CO5	L2
8		Explain and derive single tuned capacitive coupled amplifier.	Jntua 2016, 2022, mid 2022	CO5	L2
9		(a) Explain the effect of cascading single tuned amplifier on band width. (b) Explain about Doubled tuned amplifiers.	Jntua 2017, GPCET 2022	CO5	L2
10		With neat sketch explain the operation of RC phase shift oscillator using BJT and Show that the frequency of oscillator is $f = \frac{1}{2\pi RC \sqrt{6 + 4K}}$	GPCET 2020	CO5	L2