Code No: R2022041 **R20** **SET - 1**

II B. Tech II Semester Regular/Supplementary Examinations, July- 2023

ELECTRONIC CIRCUIT ANALYSIS

(Common to ECE, EIE, & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions, each Question from each unit
All Questions carry **Equal** Marks

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UNIT-I

1 a) Draw the High frequency model of a Transistor. Derive the relationship between high frequency and low frequency parameters. [7M]

b) Compare, CS, CH, and CD amplifier circuits at high frequencies. [7M]

Or

2 a) Draw the equivalent diagram of a single stage CE amplifier at high frequencies. Derive the expression for gain under short circuited load conditions. [7M]

b) When a Ge PNP transistor is biased at 2mA, 15V, it has a base width of 1 micron. Find C_e and f_T if DB=47cm^2 /sec. [7M]

UNIT-II

3 a) Draw the circuit diagram of cascade amplifier circuit and analyze its performance. [7M]

b) Draw the equivalent circuits of RC coupled amplifier for Mid-band, Low frequency range, high frequency range and derive the expressions for current gain, voltage gain. [7M]

Or

4 a) What is Darlington Transistor? What are its silent features? [7M]

b) A multi stage amplifier employs five stages, each of which has a power gain of 30. what is total gain of the amplifier in dB? [7M]

UNIT-III

5 a) How does negative feedback reduce distortion in an amplifier? [7M]

b) The distortion in an amplifier is found to be 3%, when the feedback ratio of a negative feedback amplifier is 0.04, when the feedback is removed, the distortion becomes 15%. Find the open loop gain and closed loop gain. [7M]

Or

6 a) Compare negative feedback with the positive feedback. [7M]

b) A voltage-series negative feedback amplifier has a voltage gain without feedback of A-500, input resistance Ri=3KΩ, output resistance of Ro=20KΩ and feedback ratio β=0.01, calculate the voltage gain A_f, input resistance R_{if} and output resistance R_{of} the amplifier with feedback. [7M]
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UNIT-IV

7 a) Draw the circuit of Hartley oscillator and explain its working. Derive the expressions for frequency of oscillation and condition for starting of oscillation. [7M]

b) In an Hartley oscillator, if L1=0.2mH,L2=0.3mH and C=0.003 μF, calculate the frequency of its oscillation. [7M]

Or

8 a) What are factors which affects the frequency stability of an oscillator? [7M]

b) A Colpitts Oscillator is designed with C2=100pF and C1=7500pF.The inductance is variable, determine the range of inductance values, if the frequency of oscillation is to vary between 950 and 2050 KHz [7M]

UNIT-V

9 a) What is meant by distortion in power amplifiers, explain the given different types of distortions. [7M]

b) If the ideal push-pull amplifier operates at maximum dissipation, show that its efficiency is 50%. [7M]

Or

10 a) Draw the equivalent circuit of capacitance coupled single tuned amplifier and derive the equation for voltage gain. [7M]

b) Explain about the stability of Tuned amplifiers. [7M]

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ELECTRONIC CIRCUIT ANALYSIS

(Common to ECE, EIE, & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

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UNIT-I

1 a) Explain how f_β and f_T of a BJT can be determined? Obtain the expression for the Gain Bandwidth product of a transistor. [7M]

b) A single stage Common Emitter amplifier is measured to have a voltage-gain bandwidth f_H of 5 MHz with RL = 500 ohm. Assume hfe=100, gm = 100 mA/V, rbb = 1000, Cc = 1pf, and f_T = 400 MHz. Find the value of the source resistance that will give the required bandwidth. [7M]

Or

2 a) Derive the expressions for voltage gain, current gain, input and output resistances of a Common Drain amplifier at high frequencies. [7M]

b) Derive the expressions for the CE current gain and voltage gain including source resistance Rs. [7M]

UNIT-II

3 a) Draw the circuit diagram of Darlington pair circuit and derive its important characteristics. [7M]

b) Perform the analysis of boot – strapped emitter follower circuit. [7M]

Or

4 a) Draw the circuit diagram of a cascade amplifier and derive its overall voltage gain and impedance from its equivalent circuit. [7M]

b) Derive the expression for voltage gain and input impedance of bootstrap emitter follower amplifier. [7M]

UNIT-III

5 a) What are the different types of feedback amplifiers? Give their equivalent circuits. [7M]

b) Draw the circuit diagram of current shunt feedback and derive expressions for input and output resistance. [7M]

Or

6 a) With a neat sketch explain a negative feedback amplifier and obtain expression for its closed loop gain. [7M]

b) An amplifier requires an input signal of 60mV to produce a certain output. With a negative feedback to get the same output the required signal is 0.5V.The voltage gain with feedback is 90. Find the open loop gain and feedback factor. [7M]
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UNIT-IV

7 a) Draw the circuit diagram of Wein-bridge oscillator and explain its operation. [7M]

b) In the Wein-bridge oscillator, if the RC network consists of resistors of 200KΩ and the capacitors of 300pF, find its frequency of oscillation. [7M]

Or

8 a) Perform the generalized analysis of LC oscillators with suitable block diagram and obtain the condition for Hartley and colpitt's oscillators. [7M]

b) A phase shift oscillator is to be designed with FET having gm =5000μs, rd=4kΩ while the resistance in the feedback circuit is 9.7kΩ. Select the proper value of c and RD to have the frequency of oscillations as 5KHz. [7M]

UNIT-V

9 a) Derive the expression for efficiency of a direct coupled Class A power amplifier. [7M]

b) A single transistor operates as an ideal class B amplifier. If d.c current drawn from the supply is 25mA, calculate the a.c power delivered to load for load of 2KΩ. [7M]

Or

10 a) Derive the expression for the gain of a single-tuned capacitance coupled amplifier, Discuss about its Selectivity. [7M]

b) What is the effect of cascading single tuned amplifier on bandwidth? Derive the expression for it. [7M]

Code No: R2022041 **R20** **SET - 3**

II B. Tech II Semester Regular/Supplementary Examinations, July- 2023
ELECTRONIC CIRCUIT ANALYSIS
(Common to ECE, EIE, & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1 a) Derive the expression for fH and input admittance for emitter follower amplifier at high frequencies. [7M]
b) Write about Gain-Bandwidth product? Explain. [7M]

Or

2 a) Write the elements of the Hybrid-π mode. [7M]
b) Draw and Explain about the small signal high frequency equivalent circuit of a Transistor. [7M]

UNIT-II

3 a) Derive an expression for the lower 3dB frequency of an RC coupled amplifier by taking the effect emitter bypass capacitor into account. [7M]
b) What is fidelity of an Amplifier? Explain about Frequency response of an amplifier by considering different frequency regions. [7M]

Or

4 a) Compare the three types of coupling methods used in multistage amplifiers. [7M]
b) Compute the value of overall current gain and input impedance of a Darlington pair with 1KΩ emitter resistance connected to the emitter of a second transistor if hfc , hic, hoc and hrc of both the transistor are given as - 51,1.1kΩ,0 and 1 respectively. [7M]

UNIT-III

5 a) Discuss the effect of negative feedback with respect to closed loop gain, bandwidth and distortion. [7M]
b) Calculate the voltage gain, input impedance and output impedance of a voltage series feedback amplifier having an open loop gain A=300, Ri=1.5KΩ, R0=50KΩ and β=1/20. [7M]

Or

6 a) Explain the method of analysis of feedback amplifier. [7M]
b) An amplifier with negative feedback gives an output of 12.5 with an output of 1.5V. When feedback is removed, it requires 0.25V input for the same output. Find [7M]
i) values of voltage gain without feedback
ii) Value of β, if the input and output are in phase and β is real.
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UNIT-IV

7 a) Draw the diagram of Colpitt's oscillator and explain its working. [7M]
b) What are the factors that affect the frequency stability of an oscillator? How frequency stability can be improved in oscillators? [7M]

Or

8 a) Draw the circuit diagram of a FET based RC phase shift oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations. [7M]
b) Discuss about frequency and amplitude stability of oscillators. [7M]

UNIT-V

9 a) Draw the circuit and explain the working principle of a complementary symmetry push-pull power amplifier and state its disadvantages. [7M]
b) Design a class B power amplifier to deliver 30W to a load resistor RL = 40 Ω using a transformer Coupling. Vm = 30V = Vcc. Assume reasonable data wherever necessary. [7M]

Or

10 a) What is a tuned amplifier? Explain how tuned amplifiers are classified. [7M]
b) Discuss about the effect of cascading the tuned amplifiers on Bandwidth. [7M]

Code No: R2022041 **R20** **SET - 4**

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ELECTRONIC CIRCUIT ANALYSIS

(Common to ECE, EIE, & ECT)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

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UNIT-I

1	a)	Derive the expression for output conductance of Hybrid –π model.	[7M]
	b)	If a Transistor has a value of β=50 and Collector current of 10mA, determine the value of Emitter Current and Calculate the value of α of the Transistor.	[7M]

Or

2	a)	Explain various parameters of FET high frequency model.	[7M]
	b)	Explain different Hybrid-π Capacitances and derive necessary expressions.	[7M]

UNIT-II

3	a)	Derive an expression for the lower 3dB frequency of an RC coupled amplifier (using BJT and FET) by taking the effect Coupling capacitor into account.	[7M]
	b)	Draw the circuit for Cascode Amplifier. Explain its working, obtaining overall values of the circuit in terms of h-parameters.	[7M]

Or

4	a)	With the help of necessary waveforms, explain about the step response of amplifiers.	[7M]
	b)	What are the advantages of common collector amplifier? Explain how the input resistance of the CC amplifier can be enhanced further.	[7M]

UNIT-III

5	a)	Give the block diagram of a general feedback amplifier. State the function of each block.	[7M]
	b)	If an input of 0.028V peak to peak given to an open loop amplifier, it gives fundamental frequency output of 36V peak to peak, but it is associated with 7% distortion. i) If the distortion is to be reduced to 1%, how much feedback is to be introduced and what will be required input voltage? ii) If 1.2% of output is feedback and the input is maintained at the same level, what is the output voltage?	[7M]

Or

6	a)	Perform the linear analysis of the common collector amplifier using feedback concept.	[7M]
	b)	Write advantages of negative feedback in amplifier.	[7M]
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UNIT-IV

7	a)	Draw the circuit diagram of a BJT based RC phase shift oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations.	[7M]
	b)	What is a Colpitt's oscillator and derive an expression for frequency of oscillations.	[7M]

Or

8	a)	What are the differences between an oscillator and an amplifier? Explain the operating principle of an oscillator.	[7M]
	b)	Raw the circuit diagram of a Wien bridge oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations.	[7M]

UNIT-V

9	a)	Derive the expression for maximum conversion efficiency for a simple series fed Class A power amplifier.	[7M]
	b)	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 Vcc?	[7M]

Or

10	a)	Draw the circuit diagram of a double tuned amplifier and derive the expression for 3 dB bandwidth.	[7M]
	b)	Describe the heat sinks for tuned power amplifiers.	[7M]