

Code: 23EC3402

**II B.Tech - II Semester – Regular / Supplementary Examinations  
APRIL 2026**

**ELECTRONIC CIRCUIT ANALYSIS  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

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 Note: 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

4. All parts of Question paper must be answered in one place.

BL – Blooms Level

CO – Course Outcome

**PART – A**

		BL	CO
1.a)	Sketch the hybrid $\pi$ equivalent circuit of BJT.	L3	CO1
1.b)	State the validity conditions of the hybrid- $\pi$ model.	L1	CO1
1.c)	Define loading effect in cascaded amplifiers.	L1	CO1
1.d)	Discuss the effect of coupling capacitor on low-frequency response.	L2	CO1
1.e)	Write the advantages of negative feedback amplifier.	L1	CO1
1.f)	How does feedback affect bandwidth?	L2	CO1
1.g)	State Barkhausen criteria for sustained oscillations.	L1	CO1
1.h)	What is frequency stability?	L1	CO1
1.i)	Classify power amplifiers.	L1	CO1
1.j)	Define crossover distortion.	L1	CO1

## PART – B

			BL	CO	Max. Marks
<b>UNIT-I</b>					
2	a)	With the help of necessary circuit diagrams and approximations obtain the expression for CE Short circuit current gain.	L4	CO2	5 M
	b)	A BJT has the following parameters measured at $I_c=1\text{mA}$ , $h_{ie}=3\text{K}\Omega$ , $h_{fe}=100$ , $C_c=2\text{pF}$ and $C_e=18\text{pF}$ . Solve $g_m$ , $r_{b'e}$ and $r_{bb'}$ for $R_L=1\text{K}\Omega$ .	L3	CO2	5 M
<b>OR</b>					
3	a)	Derive the expression for high-frequency parameters in terms of low-frequency parameters.	L4	CO2	5 M
	b)	Derive the voltage gain equation for common source amplifier at high frequencies.	L4	CO2	5 M
<b>UNIT-II</b>					
4	a)	Explain three types of coupling methods used in multistage amplifiers.	L2	CO1	5 M
	b)	Derive the expression for voltage gain and current gain of cascade amplifier.	L4	CO2	5 M
<b>OR</b>					
5	a)	Derive expressions for overall voltage gain and overall current gain of a two stage RC coupled amplifier.	L4	CO2	5 M

	b)	If four identical amplifiers are cascaded each having $f_H = 100$ KHz, determine the overall upper 3dB frequency $f_h^*$ . Assume non interacting stages.	L3	CO3	5 M
<b>UNIT-III</b>					
6	a)	Draw the block schematic representations of the Four Feedback topologies and explain each briefly.	L2	CO1	5 M
	b)	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 $\beta$ and open loop gain.	L3	CO2	5 M
<b>OR</b>					
7	a)	Draw the circuit diagram of a current series feedback amplifier and derive expressions for input and output resistances.	L4	CO3	5 M
	b)	Draw the voltage series feedback amplifier and derive the expressions of input and output resistances.	L4	CO3	5 M
<b>UNIT-IV</b>					
8	a)	Derive the expression for frequency of oscillation and condition for sustained oscillations of a FET based RC Phase shift oscillator.	L4	CO4	5 M
	b)	A Colpitts oscillator has $C_1=100\text{pF}$ , $C_2=500\text{pF}$ and $L=20\ \mu\text{H}$ . Calculate the frequency of oscillation.	L3	CO4	5 M

<b>OR</b>					
9	a)	Explain the working of Hartley oscillator. Also derive the expression for its frequency of oscillations.	L4	CO4	5 M
	b)	The frequency sensitive arms of the Wien bridge oscillator uses $C_1 = C_2 = 0.001 \text{ pF}$ and $R_2 = 10 \text{ k}\Omega$ while $R_2$ is kept variable. The frequency is to be varied from 10 kHz to 50 kHz, by varying $R_2$ . Find the minimum and maximum values of $R_2$	L3	CO4	5 M
<b>UNIT-V</b>					
10	a)	With neat diagram explain series fed Class-A Power Amplifier and derive its maximum efficiency.	L4	CO3	5 M
	b)	A single transistor is acting as ideal Class-B amplifier with load of $1\text{K}\Omega$ , if DC collector current is $15\text{mA}$ , $V_{CC}=20\text{V}$ . Determine its efficiency.	L3	CO2	5 M
<b>OR</b>					
11	a)	Derive the expression for the harmonic distortion in a power amplifier if the relation between input and output currents is $n^{\text{th}}$ order.	L4	CO3	5 M
	b)	Compare series fed and transformer coupled class-A power amplifiers.	L4	CO3	5 M