UPES

End Semester Examination, December, 2023

Programme Name: B Tech –Electronics and Computer Engineering   **Semester : III**

Course Name : Analog Electronics   **Time : 3 hr**

Course Code : ECEG-2048   **Max. Marks: 100**

Nos. of page(s) : 02

Instructions: Attempt all the sections.

SECTION A (5Qx4M=20Marks)

S. No.	Attempt all the questions.	Marks	CO
Q 1	What are the hybrid-parameters (h-parameters)? Explain.	4	CO1
Q2	Draw and analyze the I-V characteristics of Junction field effect transistor (JFET). Why the channel of JFET is never completely closed at the drain end?	4	CO1
Q3	A certain Junction field effect transistor (JFET) has a g_m of 4 mS. With an external drain resistance of 1.5kohm. Determine the value of ideal voltage gain.	4	CO2
Q4	Differentiate between positive and negative feedback amplifiers and explain their importance in electronic circuits	4	CO3
Q5	Discuss the key features and applications of a 555 timer IC in electronic circuits. Provide examples of where they are commonly used.	4	CO4
	SECTION-B (4Qx10M= 40 Marks)		
Q 6	A bipolar junction transistor had the following h-parameters: $h_{ie} = 2000\Omega$; $h_{re} = 1.6 \times 10^{-4}, h_{fe} = 49$; $h_{oe} = 50\mu A/V$ Determine the current gain, voltage gain, input resistance and output resistance of the CE amplifier if the load resistance is 30 kΩ and source resistance is 600 Ω.	10	CO1
Q7	The pinch-down voltage of a P-channel junction FET is $V_P = 5V$ and the drain-to-source saturation current $I_{DSS} = -40mA$. The value of drain source voltage V_{DS} is such that the transistor is operating in the saturated region. The drain current is given as $I_D = -15mA$. Determine the gate-source voltage V_{GS}.	10	CO2

Q8	**Attempt both the parts:**
	    (a) Tuned collector oscillator uses an L-C tuned circuit having L=29.3μH and C=450pF. Obtain the frequency of oscillation.
	
	    (b) Analyze the Colpitt's oscillator circuit with suitable applications.
		3+7	**CO3**

Q9	Show the connection of three op-amp stages using an LM-348 IC to provide outputs that are 10, 20, and 50 times larger than the input and 180° out of phase with respect to input. Use a feedback resistor of $R_f = 500k\Omega$ in all stages.	**10**	**CO4**
<td colspan="4" align="center">**SECTION-C** **(2Qx20M=40 Marks)**</td>

Q 10	**Attempt both the parts**
	    (a) A negative feedback of β= 0.002 is applied to an amplifier of gain 1000. Calculate the change in overall gain of the feedback amplifier if the internal amplifier is subjected to gain reduction of 15%.
	
	    (b) Describe the ideal characteristics of an op-amp and compare with the practical op-amp.
		10+10	**CO3**

Q11	**Attempt both the parts:**
	    (a) Describe the various operating modes of a 555 timer IC, including mono-stable, and bi-stable operation modes. Discuss the typical applications of a 555 timer IC in electronics and provide examples of projects where it can be used.
	
	    (b) What is the purpose of an ADC in the context of electronics and signal processing? Design successive approximation ADC architectures, and provide examples of where each might be used.
		10+10	**CO4**