Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – March 2026

Date: 12- 03-2026 **Time:** 02:00pm – 03:30pm

School: SOE	**Program:** B.Tech	
Course Code : ECE3177	**Course Name:** RF Integrated Circuits & Systems	
Semester: VI	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	26	24				

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	Briefly state the concept of resonance in the context of a series RLC circuit configuration. Identify the criterion that must be met for the circuit to achieve resonance, and remark on the circuit's impedance at the resonant frequency.	**2 Marks**	**L1**	**CO1**
2	A series RLC circuit has R = 20 Ω, L = 0.1 H, and C = 0.5 μF. Calculate the resonant frequency and the Q-factor of the circuit.	**2 Marks**	**L1**	**CO1**
3	Distinguish between lumped and distributed parameter circuits. When is lumped parameter analysis valid for transmission lines?	**2 Marks**	**L1**	**CO1**
4	A transmission line has the following primary constants: R = 4 Ω/km, L = 3 mH/km, G = 0.5 μS/km, and C = 0.03 μF/km. Calculate the characteristic impedance Z_0 of the transmission line at high frequencies where R and G can be neglected.	**2 Marks**	**L1**	**CO2**
5	What is noise figure (NF)? Express its mathematical relationship to noise factor (F).	**2 Marks**	**L1**	**CO2**

Part B

Answer the Questions. **Total Marks 40M**

6.	Distinguish between superheterodyne and direct conversion receiver architectures in RFIC, comparing their block diagrams, operational principles, selectivity, sensitivity, and noise performance.	**20 Marks**	**L2**	**CO1**
	Or			
7.	A Class-A power amplifier is designed for an RF transmitter operating at 1.8 GHz. The amplifier uses a single transistor with the following specifications and operating conditions: • Supply voltage: V_{DD} = 10 V • DC bias current: I_{DC} = 100 mA • Load resistance: R_L = 100 Ω • Output power at 1-dB compression point: P_1 dB = 20 dBm • The amplifier delivers a sinusoidal RF output signal with peak voltage swing of 3 V Calculate: (a) The DC power consumed by the amplifier (P_{DC}). (b) The output RF power delivered to the load (P_{out}). (c) The power-added efficiency (PAE) of the amplifier, assuming input power P_{in} = 10 mW. (d) The drain efficiency (η) of the amplifier.	**20 Marks**	**L2**	**CO1**

8.	**a.**	What is the typical noise figure range for a low-noise amplifier (LNA) in RF applications, and why is minimizing noise figure important in receiver design?	**10 Marks**	**L2**	**CO2**
	b.	Express the noise figure formula for a cascaded system of two stages using Friis formula.	**10 Marks**	**L3**	**CO2**
		Or			
9.	**a.**	How does the noise figure of an amplifier change with temperature? State the standard reference temperature used for noise figure measurements.	**10 Marks**	**L2**	**CO2**
	b.	What is phase noise in RF circuits? Discuss its impact on receiver sensitivity and specify the key performance metric used to quantify phase noise in local oscillators.	**10 Marks**	**L3**	**CO2**