



PRESIDENCY UNIVERSITY

BENGALURU

Roll No.													
----------	--	--	--	--	--	--	--	--	--	--	--	--	--

End - Term Examinations – May / June 2026

Date: 26 – 05- 2026

Time: 09:30am – 12:30pm

School: SOE	Program: B.Tech	
Course Code: ECE2507	Course Name: Micro Electronics	
Semester: IV	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05	C06
Marks	24	24	10	14	12	16

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.

10Q x 2M=20M

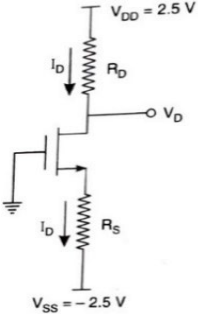
1.	A MOSFET semiconductor device used for switching or amplifying signals due to its low power consumption, high speed, and small size. Define a MOSFET. Give reason for the use as voltage-controlled device.	2 Marks	L1	C01
2.	MOSFET is a type of FET, most commonly fabricated by the controlled oxidation of silicon. Define the threshold voltage in enhancement type MOSFET with its significance.	2 Marks	L1	C01
3.	MOSFET is an insulated gate semiconductor device, widely utilized in digital circuits, power supplies and inverters. If an NMOS device has $\mu_n C_{ox} = 100 \mu A/V^2$, $W=100 \mu m$ and $L=10 \mu m$, $V_{GS} = 1.5V$ $V_t = 1V$ Calculate the value of drain in triode region current when $V_{DS} = 0.9V$.	2 Marks	L3	C01
4.	When an operational amplifier is combined with an amplification circuit, it can amplify weak signals to strong signals. Define slew rate and CMRR.	2 Marks	L1	C02
5.	Op-AMPs are linear devices that have all the properties required for nearly ideal DC amplification and are therefore used extensively in signal	2 Marks	L3	C02

	conditioning and filtering. Determine the output of an open-loop differential amplifier if $V_{in1} = 3.2 \text{ mV}$, $V_{in2} = 3.0 \text{ mV}$, and $A = 2 \times 10^4$.			
6.	Sketch the ideal and practical characteristics of low pass and high pass filter.	2 Marks	L3	C04
7.	An A/D converter is an electronic system that converts a continuous analog signal into a discrete digital signal. Define Resolution and Accuracy for D/A converters.	2 Marks	L1	C05
8.	A feedback amplifier is an electronic circuit where a portion of the output signal is returned to the input to improve performance. List the four basic types of negative feedback.	2 Marks	L1	C06
9.	An oscillator in analog electronics is a circuit that converts DC power from a supply into a continuous, alternating (AC) output signal. Define damped and undamped Oscillation in oscillator?	2 Marks	L1	C06
10.	Oscillators are used to generate repetitive waveforms employing an amplifier and a frequency-determining feedback network. Explain the role of RC phase shift in RC phase shift Oscillator	2 Marks	L2	C06

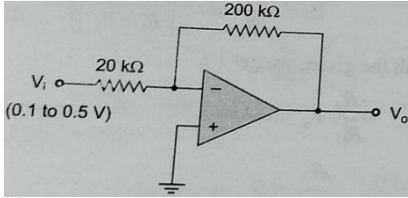
Part B

Answer the Questions.

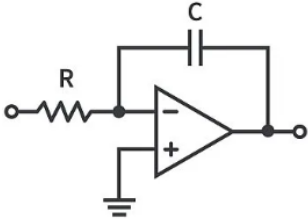
Total Marks 80M

11.	a.	A MOSFET is a voltage-controlled semiconductor device widely used for switching and amplification in electronic circuits. Compare MOSFET and BJT in detail. Explain the device structure and physical operation of an n-channel Enhancement type MOSFET with neat diagrams. Why Enhancement type MOSFET are called as Normally OFF MOSFET.	10 Marks	L2	C01
	b.	MOSFET circuits is based on three possible operating modes: cutoff, triode saturation. The MOSFET current equation varies depending on the operating region. Design the circuit as shown in figure (1) such that the transistor operates at $I_D = 0.4 \text{ mA}$ and $V_D = +0.5 \text{ V}$. The NMOS transistor has $V_t = 0.7 \text{ V}$, $\mu_n \cdot C_{ox} = 100 \mu\text{A/V}^2$, $L = 1 \mu\text{m}$ and $W = 32 \mu\text{m}$. $V_{DD} = \pm 2.5 \text{ V}$. 	5 Marks	L3	C01
	c.	MOSFETs pass electric current through a conductive region or path called channel. Determine V_{GS} , V_G , V_S for the circuit shown in figure (1)	5 Marks	L2	C01
Or					
12.	a.	MOSFETs pass electric current through a conductive region or path called channel. We can make this conductive channel wider	10 Marks	L3	C01

		or smaller by applying a suitable gate potential. Determine the expression for channel length modulation for MOSFET.			
	b.	MOSFET is an excellent choice for small signal linear amplifiers as their input impedance is extremely high making them easy to bias. Determine the expression for Input Resistance (R_i), Output Resistance (R_o), Voltage gain(A_v) for Common source Amplifier.	5 Marks	L3	CO1
	c.	Determine the expression for Open Circuit Voltage gain(A_{vo}) and Overall Voltage Gain(A_{vs}) for Common source Amplifier.	5 Marks	L3	CO1

13.	a.	An operational amplifier is a voltage amplifying device designed to be used with external feedback components such as resistors and capacitors between its output and input terminals to perform various operations. Determine the expression for Average amplifier using OPAMP.	10 Marks	L1	CO2
	b.	Op amps can be used as inverting amplifiers to provide a stable, linear relationship between input and output. Find the output voltage of the following OPAMP circuit shown in figure (2). 	5 Marks	L2	CO2
	c.	A voltage-to-current (V-I) converter is an electronic circuit, often utilizing op-amps, that transforms an input voltage signal into a proportional output current. Explain the working of a voltage to current converter with floating load.	5 Marks	L2	CO2

Or

14.	a.	An OP-AMP is derived from the fact that it is intended for use in a feedback loop whose feedback properties determine the feed-forward characteristics of the amplifier and loop combination. Design an adder circuit using op-AMP for $V_o = -(0.25V_1 + 1.5V_2 + 2.2V_3)$	10 Marks	L3	CO2
	b.	Op amps can be used as inverting amplifiers to provide a stable, linear relationship between input and output. Derived the expression for the circuit diagram shown in figure (3). 	5 Marks	L2	CO2

	c.	Draw the output waveform when sinusoidal and square wave input is applied to the circuit in figure (3).	5 Marks	L2	CO2
--	-----------	---	---------	----	-----

15.	a.	A multivibrator is a switching circuit that is a two-stage resistance-coupled amplifier with positive feedback from the output of one amplifier to the input of the other. Explain the working of Mono-stable Multivibrator with waveform.	10 Marks	L2	CO3
	b.	A high-pass filter is a filter that passes signals with a frequency higher than a selected cutoff frequency and attenuates signals with frequencies higher than the cutoff frequency. Determine the expression for First order high pass filter.	5 Marks	L3	CO4
	c.	A filter is an AC circuit that separates some frequencies from others within mixed-frequency signals. Design a 1 st order high pass filter of 3KHz with pass band gain 2.	5 Marks	L3	CO4

Or

16.	a.	A multivibrator is a switching circuit that is a two-stage resistance-coupled amplifier with positive feedback from the output of one amplifier to the input of the other. Explain the working of Inverting Schmitt Trigger circuit with waveform.	10 Marks	L2	CO3
	b.	A low-pass filter is a filter that passes signals with a frequency higher than a selected cutoff frequency and attenuates signals with frequencies higher than the cutoff frequency. Determine the expression for First order low pass filter.	5 Marks	L3	CO4
	c.	A filter is an AC circuit that separates some frequencies from others within mixed-frequency signals. Design a 1 st order high pass filter of 1.5KHz with pass band gain 2.	5 Marks	L3	CO4

17.	a.	An ADC converts a continuous-time and continuous-amplitude analog signal to a discrete-time and discrete-amplitude digital signal. Explain the operation of flash type A/D converter with neat diagram.	10 Marks	L3	CO5
	b.	The voltage gain, input resistance and output resistance of an amplifier without feedback are 3000, $R_i = 2M\Omega$ and $R_o = 75\Omega$. Calculate A_f , R_{if} , R_{of} for the trans-conductance amplifier if negative voltage feedback is introduced in the circuit. Given feed-back factor $\beta = 0.01$.	5 Marks	L4	CO6
	c.	An oscillator is a circuit that produces a periodic waveform on its output with only the dc supply voltage as an input. Calculate the operating frequency and feedback factor for Hartley	5 Marks	L4	CO6

		oscillator. Given $L_1 = 1000 \mu\text{H}$, $L_2 = 100 \mu\text{H}$ and mutual inductance $M = 20 \mu\text{H}$.			
Or					
18.	a.	A digital-to-analog converter is an electronic device that converts a digital signal (0s and 1s) into a continuous analog signal, such as a voltage or current. Analyze the working of R- 2R ladder type DAC. What are the advantages and disadvantages of R-2R ladder DAC.	10 Marks	L4	C05
	b.	A linear electronic circuit that generates a stable sinusoidal output using regenerative feedback from a three-stage network. In the phase shift oscillator, $R_1 = R_2 = R_3 = 1\text{M}\Omega$ and $C_1 = C_2 = C_3 = 68\text{pF}$. Calculate the frequency of oscillation. Also mention the advantages and disadvantages of phase shift oscillator.	5 Marks	L4	C06
	c.	Feedback amplifiers are the type of amplifiers in which a part of the output is given back to the input. Calculate the closed loop parameters: A_F , R_{iF} , R_{oF} for transresistance amplifier. Give, $A = 400000$; $R_i = 4.7\text{k}\Omega$; $R_o = 60\Omega$. $\beta = 0.05$.	5 Marks	L4	C06