U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

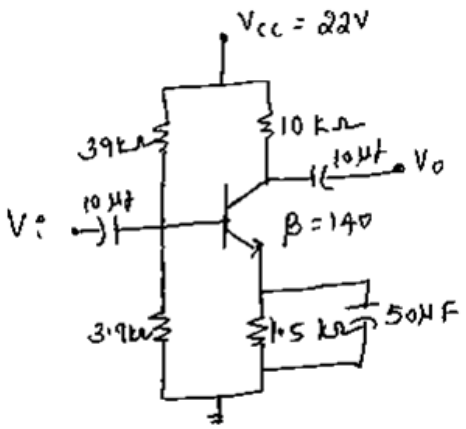
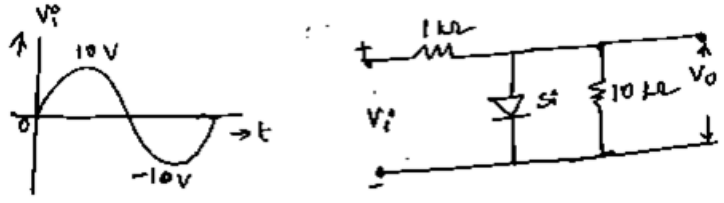
Programme: B.E. **Semester: III**

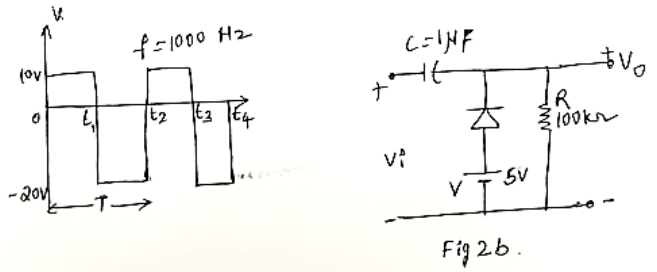
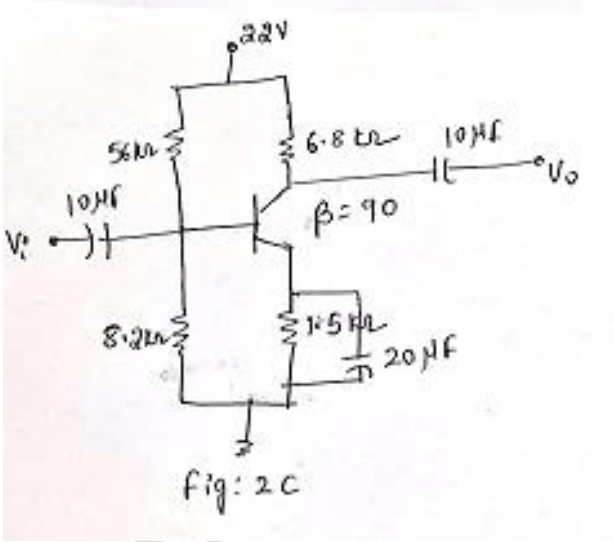
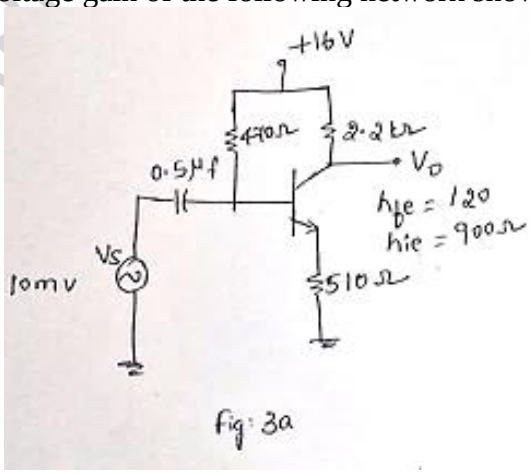
Branch: Electronics & Telecommunication Engineering **Duration: 3 hrs.**

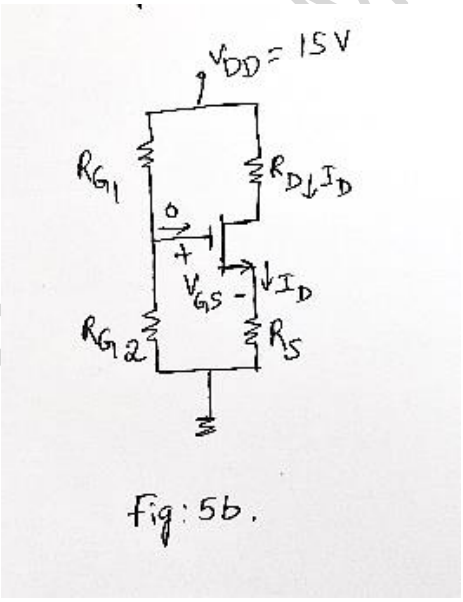
Course Code: 23ET3PCALC **Max Marks: 100**

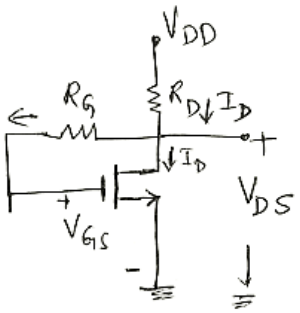
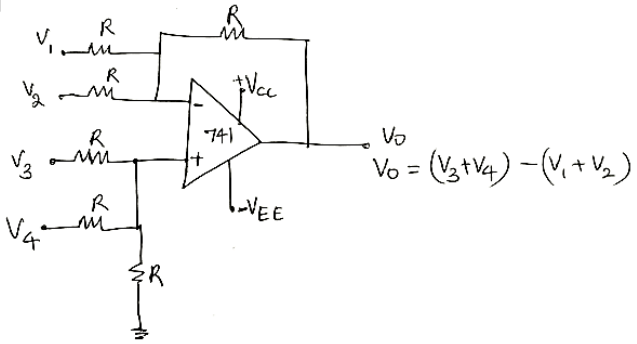
Course: Analog and Linear Circuits

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Determine the bias voltage V_{CE} and the current I_c for the voltage divider bias shown below in Fig.1a.  Fig 1a.	CO1		06
	b)		For the network of Fig.1b below, sketch v_o , explain the circuit operation  Fig: 1b.	CO1		06
	c)		Draw the low frequency small signal r_e model of a transistor in CE configuration. Derive the equation for voltage gain , current gain, input impedance and output impedance for a BJT in CE configuration using r_e model.	CO1		08
			OR			

	2	a)	Describe any two series clipper, along with circuit diagram and appropriate reference voltage levels	*CO1*		**06**
		b)	Determine the V_o for the following circuit in Fig.2b.  Fig 2b.	*CO2*	*PO1*	**06**
		c)	For the following network shown in Fig.2c, determine; a) r_e b) Z_i c) $Z_o(r_o=\infty\ \Omega)$ d) $Av(r_o=\infty\ \Omega)$ e) $Ai(r_o=\infty\ \Omega)$ f) The parameters of part (b) through (e) if r_o=50kΩ and compare results.  Fig: 2C	*CO2*	*PO1*	**08**
			UNIT - II			
	3	a)	Calculate voltage gain of the following network shown in Fig.3a  Fig: 3a	*CO3*	*PO2*	**06**
		b)	Determine the voltage gain, input and output impedance with feedback for voltage series feedback having A= -100, R_i =10kΩ, Ro= 20 kΩ for feedback of a) β=-0.1 and b) β= -0.5	*CO3*	*PO2*	**06**
		c)	Write the block diagram of the following indicating A, A_f and β i) Voltage series feedback amplifier	*CO1*		**08**

			ii) Voltage shunt feedback amplifier iii) Current series feedback amplifier iv) Current shunt feedback amplifier			
			OR			
	4	a)	Derive an expression for conversation efficiency for Series fed class A power amplifier	*CO2*	*PO1*	**06**
		b)	Calculate the efficiency of a transformer coupled amplifier for a supply of 12 V and outputs of: i) V(p)= 12V ii) V(p)= 6V iii) V(p)= 2V	*CO2*	*PO1*	**06**
		c)	For a class B amplifier providing a 30 V peak signal to a 16Ω load(speaker) and a power supply of Vcc=20 V, determine the input power, output power, circuit efficiency, and power dissipation.	*CO2*	*PO1*	**08**
			UNIT - III			
	5	a)	Explain biasing of MOS amplifier by Fixing V_{GS} along with circuit diagram and equations.	*CO1*		**06**
		b)	Design the circuit shown in Fig.5b to establish I_D=0.5mA. MOSFET parameters are Vt=1v, k_n' w/L=1mA/v^2 V_{DD}=15V and λ=0.  Fig: 5b.	*CO2*	*PO1*	**06**
		c)	Derive the equation for input resistance, output voltage, voltage gain of common source amplifier with a source resistance.	*CO2*	*PO1*	**08**
			OR			
	6	a)	Explain the concept of biasing of MOSFET using a constant current source with circuit diagram and equations.	*CO1*		**06**
		b)	Design the circuit which is shown in Fig 6b where I_D=0.5mA,V_t=1v, k_n' w/L=1mA/v^2 , V_{DD}=5 V	*CO2*	*PO1*	**06**

			 Fig 6b			
		c)	Write the small signal analysis of an amplifier with the MOSFET along with equivalent circuit of the amplifier and derivation.	*CO1*		**08**
			UNIT - IV			
	7	a)	With circuit diagram explain precision full wave rectifier along with equation for output voltage signal.	*CO1*		**06**
		b)	Derive the V_{out} expression of instrumentation amplifier whose gain is controlled by an adjustable resistance.	*CO2*	*PO1*	**08**
		c)	With a neat circuit diagram, Explain working of inverting Schmitt along with input-output waveforms , transfer characteristics, when UTP=+2 V, LTP=-2V	*CO2*	*PO1*	**06**
			OR			
	8	a)	Explain voltage to current converter with float load and grounded load with relevant circuit diagram and equations.	*CO1*		**06**
		b)	What is an analog comparator? Assume an input of V_{in}=6Sinωt and explain the working of Inverting comparator with V_{ref}=+3V ,V_{ref}=-3V, V_{ref}=0V. (b)Non inverting comparator with V_{ref}=+3V ,V_{ref}=-3V, V_{ref}=0V	*CO2*	*PO1*	**08**
		c)	Analyze the circuit shown in Fig 8b and arrive at the equation for output voltage considering all resistors are same.  Fig.8b	*CO2*	*PO2*	**06**

			UNIT - V			
	9	a)	With a neat functional diagram and pin diagram explain the working of 555 monostable multivibrator. Draw the relevant waveforms	*CO1*		**08**
		b)	A dual slope ADC uses a 16-bit counter and a 4 MHz clock rate. The maximum input voltage is +10V. The maximum integrator output voltage should be -8V when the counter has cycled through 2^n counts. The capacitor used in the integrator is 0.1μF. Find the value of the resistor R of the integrator.	*CO2*	*PO1*	**06**
		c)	What output voltage would be produced by a D/A converter whose output is 0 to 10V and whose input binary number is (i)10 (for a 2-bit D/A converter) (ii) 0110 (for a 4-bit DAC) (iii) 10111100 (for a 8-bit DAC)	*CO2*	*PO1*	**06**
			OR			
	10	a)	With a neat diagram explain theworking of 555 astable multivibrator. Draw the relevant waveforms.	*CO1*		**08**
		b)	With a neat circuit diagram and truth table, explain the working of bit weighted resistor DAC	*CO1*		**06**
		c)	With block diagram and an example Explain the working of Successive approximation ADC.	*CO1*		**06**

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