Sub Code: ECT-031 **ROLL NO……..……..**

ODD SEMESTER EXAMINATION, 2024 – 25

2nd Year (3rd Sem) B.Tech.: Electronics & Communication Engineering

ANALOG ELECTRONICS CIRCUITS

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	Answer any two parts of the following.	(10x2= 20)
	a) (i) Define Early effect or the base width modulation phenomenon.	(5 marks)
	(ii) Define Ebers-Moll model.	(5 marks)
	b) Why Darlington transistors are also referred to as superbeta transistors? Explain the concept Using the internal schematic of Darlington transistors.	(10 marks)
	c) Explain Direct coupled and Transformer Coupled amplifiers.	(10 marks)
Q 2.	Answer any two parts of the following.	(10x2= 20)
	a) (i) Explain why the 3dB frequency for the current gain is not the same as the 3 dB frequency for the voltage gain.	(5 marks)
	(ii) Define the conductance and capacitance of hybrid -π model.	(5 marks)
	b) Differentiate between:	(10 marks)
	(a) The α cut-off frequency and the β cut-off frequency.	
	(b) The high-frequency response of a common-collector amplifier and a common-emitter amplifier.	
	(c) Hybrid parameters for low-frequency analysis and hybrid-π parameters for high-frequency analysis.	(10 marks)
	c) Draw the hybrid- π model of a transistors, explaining each of the components used in the model.	(10 marks)
Q 3.	Answer any two parts of the following.	(10x2= 20)
	a) (i) Explain Precision rectifier.	(5 marks)
	(ii) Define Active Filters: Low pass, high pass, band pass and band stop.	(5 marks)
	b) Draw the basic circuit schematic of a classical three-op-amp instrumentation amplifier. Briefly describe its operational principle with particular reference to the role of the two op-amps constituting the input stage and the output op-amp wired as differential amplifier.	(10 marks)
	c) Design an opamp based non-inverting amplifier having a voltage gain of 11. Determine the input impedance of this amplifier if the chosen opamp has an open-loop gain of 100,000 and open-loop input impedance of 1 MΩ.	(10 marks)
Q 4.	Answer any two parts of the following.	(10x2= 20)
	a) (i) Define general characteristics of negative feedback amplifier.	(5 marks)
	(ii) Explain Wien-Bridge oscillator.	(5 marks)
	b) Design a phase shift oscillator using an FET having g_m = 5000μS, r_d = 40kΩ and feedback circuit value of R=10 kΩ. Select the value of C for oscillation operation at 1kHz and R_D for A>29 to ensure oscillator action.	(10 marks)

	c) Determine the voltage gain, input and output impedance with feedback for voltage series feedback having A = -100, R_i = 10 kΩ, R_o = 20 kΩ for feedback of (a) β = -0.1 and (b) β = -0.5. (10 marks)	
Q 5.	Answer any two parts of the following.	(10x2= 20)
	a) (i) Define Transformer – Coupled Push Pull amplifier.	(5 marks)
	(ii) Sketch the circuit diagram of a complementary-symmetry push pull amplifier, showing voltage wavefoms in the circuit.	(5 marks)
	b) Explain Class-B Amplifier operation. Also calculate its maximum efficiency.	(10 marks)
	c) Calculate the harmonic distortion components for an output signal having fundamental amplitude of 2.5 V, second harmonic amplitude of 0.25 V, third harmonic amplitude of 0.1 V and fourth harmonic amplitude of 0.05 V. Also calculate the total harmonic distortion.	(10 marks)

****