BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : I**
BRANCH: CS/AI&ML/ECE/EEE **SESSION : MO/2022**

SUBJECT: EC101 BASICS OF ELECTRONICS AND COMMUNICATION ENGG.

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

			CO	BL
Q.1(a)	Explain the V – I Characteristics curve of Zener Diode. Compare the avalanche breakdown mechanism with the Zener breakdown mechanism for a Zener Diode.	[5]	CO1	BL2
Q.1(b)	With neat sketch, explain the working principle of a full wave center tapped type rectifier with a capacitor filter. State the formula for ripple factor of a capacitive filter.	[5]	CO1	BL2
Q.2(a)	Draw the input and output characteristics of common-emitter configuration of NPN transistor. Derive the relation between α, ß and γ. Deduce the dc bias voltage V_{CE} and the current I_C for voltage divider configuration shown in figure 1.	[5]	CO2	BL4

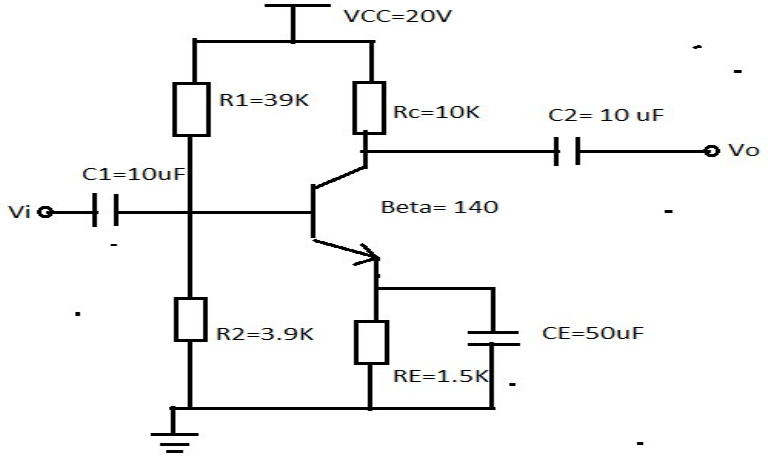

FIGURE 1

Q.2(b)	Derive the Shockley's equation for drain current for JFET and show the Pinch off Region (Vp) in a JFET Characteristics curve.	[5]	CO2	BL2
Q.3(a)	Explain the working of the RC phase shift oscillator. Derive its frequency of oscillation.	[5]	CO2	BL2
Q.3(b)	In the circuit shown in figure 2, R_1 = 100 K Ohm, R_2 = 150 K Ohm and R_f = 300K Ohm. If V_1 = 1V and the op-amp saturates at ± 15V then examine the range of V_2 for linear operation.	[5]	CO3	BL4

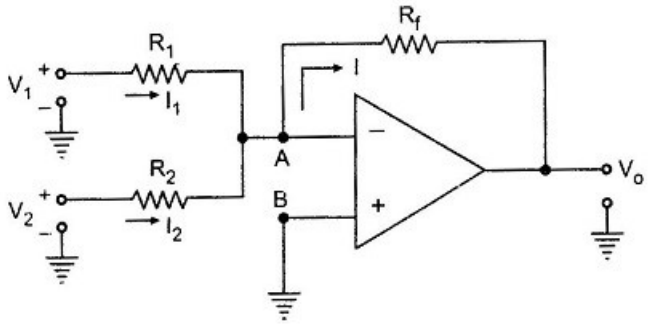

Fig. 2.25 Inverting summer

FIGURE 2

PTO

Q.4(a)	Explain Half adder, full adder circuits. How an XOR gate can be used as selective inverter?	[5]	CO4	BL2
Q.4(b)	Design a 4-bit adder/subtractor circuit using full adders and X-OR gates as selective inverter.	[5]	CO4	BL5
Q.5(a)	Explain amplitude modulation. Derive the relationship between total transmitted power and carrier power of AM signal. Calculate its transmission power efficiency.	[5]	CO5	BL2
Q.5(b)	An AM signal has a peak unmodulated carrier voltage, V_C = 100 V, a load resistance, R_L = 50 Ω, and a modulation index, m_a = 1. Determine the carrier power, total sideband power, and total power of the modulated AM signal. Also sketch the AM power spectrum.	[5]	CO5	BL4

::::::20/03/2023::::::M