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

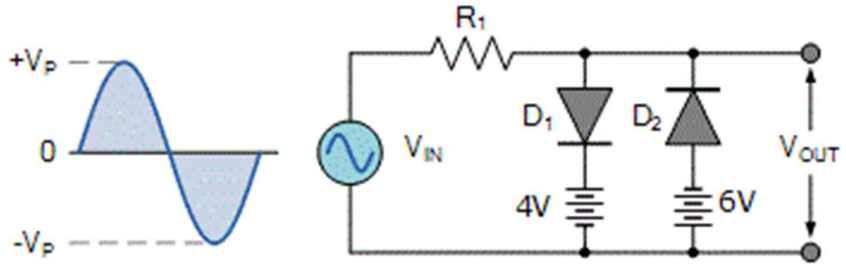
CLASS: BTECH **SEMESTER: III**
BRANCH: ECE **SESSION: MO/2023**

SUBJECT: EC211 – ANALOG CIRCUITS

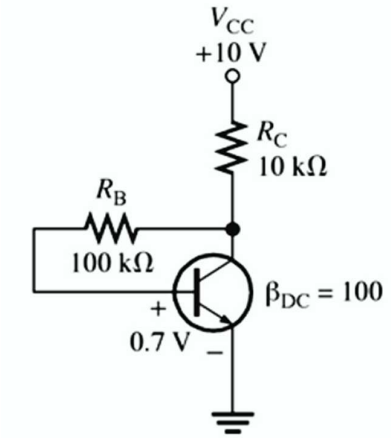
TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions. Show all the calculations clearly.
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 unbiased clamper circuits with example. Sketch the output waveform of the figure given below, with proper voltage labeling. Assume the diodes shown in figure are ideal with a forward voltage drop of 0.8 V. Show all the calculations for evaluating output voltages and waveform.	[5]	1	3&5



Q.1(b)	Which type of BJT biasing circuit provides maximum Q-point stability? Find the Q-Point of the given circuit and comment on its stability against temperature variation.	[5]	1	2&5



			CO	BL
Q.2(a)	Explain Darlington pair amplifier and its advantages. A Darlington pair amplifier has overall β of 12500. If driver BJT has β of 200 then find the β of main BJT.	[5]	2	3&5
Q.2(b)	Draw high frequency small-signal hybrid-π model of a CE amplifier using voltage divider bias and its complete frequency response curve. A three-stage amplifier has a first stage voltage gain of 100, second stage voltage gain of 200 and third stage voltage gain of 20dB. Find the overall voltage gain in db.	[5]	2	2&3
Q.3(a)	Derive voltage gain and input impedance for a voltage series feedback circuit. If open loop gain and output impedance of this feedback circuit are 50 and 10.5 KΩ respectively, evaluate the closed loop output impedance for feedback factor, **β** = 0.01.	[5]	3	2&5

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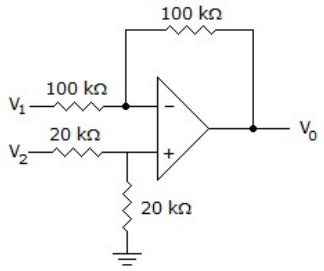
Q.3(b)	Explain Barkhausen's criteria for sustained oscillations. Illustrate the working of Wein bridge oscillator with neat circuit diagram. Find the frequency of oscillation for the circuit if R = 20 KΩ and C = 2 nF.	[5]	3	2&3
Q.4(a)	Draw the circuit of a logarithmic amplifier and derive its voltage gain. Determine the output voltage of given circuit when $V_1 = -V_2 = 1$ V.	[5]	4	1&5



Q.4(b)	Draw a high pass active filter circuit and Explain why active filters are preferred over passive filters? Demonstrate the physical significance of -3 dB frequency.	[5]	4	1
Q.5(a)	Define tunneling phenomenon. Give constructional details of a tunnel Diode. Demonstrate the working and I-V characteristics of a tunnel diode.	[5]	5	1
Q.5(b)	Explain the idealized input characteristic of the UJT. Is it a voltage controllable or current controllable negative resistance characteristic? Explain how it can be used for (i) bistable and (ii) astable operation.	[5]	5	2

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