NMAM INSTITUTE OF TECHNOLOGY, NITTE

Off-Campus Centre of Nitte (Deemed to be University)

I Sem B.Tech. (CBCS) Mid Semester Examinations - II, November 2022

EC1001-1 – BASIC ELECTRONICS

Duration: 1 Hour | Max. Marks: 20

*Note: Answer any **One** full question from **each Unit.***

			Marks	BT*	CO*	PO*
		Unit – I				
1.	a)	With the help of a neat circuit diagram and waveforms, derive the expression for the output voltage of an Non-inverting amplifier circuit using Op-Amp.	6	L*2	3	1
	b)	Design a summer circuit using Op-Amp for the output voltage $V_o = -2\,[0.1\,V_1 + 0.5V_2 + 2\,V_3\,]$. Given the feedback resistor as $10\ k\Omega$. Draw the circuit diagram for the same.	4	L3	3	1
2.	a)	With neat circuit diagram and relevant waveforms, explain the operation of inverting comparator with negative reference voltage.	6	L2	3	1
	b)	For an IC timer based astable multivibrator, the duty cycle is D = 75% with f =1 kHz, R_2 = 3.6 kΩ and C = 0.1 μF. Calculate the ON period T_{ON} and the value of R_1.	4	L3	3	1
		Unit – II				
3.	a)	With the block diagram of a voltage series feedback system, derive an expression for closed loop voltage gain.	6	L2	4	1
	b)	In a Hartley oscillator, the frequency of oscillation is 25 kHz. If $C = 0.02\mu F$, calculate L_1 and L_2 for 20% feedback.	4	L3	4	1
4.	a)	With a neat circuit diagram explain the operation of Op- Amp RC phase shift oscillator.	6	L2	4	1
	b)	In a Colpitts oscillator, $L = 5\,mH$. Find C_1 and C_2 if the frequency of oscillation is $f = 50\,kHz$. Assume a feedback factor of 10%.	4	L3	4	1

BT* Bloom's Taxonomy, L* Level; CO* Course Outcome; PO* Program Outcome

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*Note: Answer any **One** full question from **each Unit.***

			Marks	BT*	CO*	PO*
		Unit – I				
1.	a)	Draw the circuit diagram of a Bridge rectifier. Explain the operation and sketch the input/output waveforms. Derive the expressions for average value of load current and RMS value of load current.	6	L*2	1	1
	b)	For the given circuit in Fig 1. (b), find the current I and output voltage V_o.				

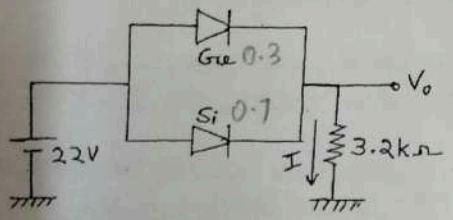

Fig. 1.(b) | 4 | L3 | 1 | 1

2.	a)	Draw the V-I characteristics of Silicon diode, mark the salient points on the graph and explain. Also draw the three types of diode equivalent circuits.	6	L2	1	1
	b)	A Zener voltage regulator has a source voltage of V_s = 28 V and a load resistance of R_L = 1 kΩ. The current through the series resistance is 78 mA and the reverse breakdown voltage of the Zener diode is V_z = 10 V. What is the value of (i) The series resistance Rs that has to be connected in the circuit (ii) The value of the current through the Zener diode. Draw the circuit diagram for the given specifications.	4	L3	1	1
		Unit – II				
3.	a)	With a neat circuit diagram of a CE-RC coupled amplifier, explain the phase reversal concept with input/output waveforms. Briefly explain the significance of coupling and bypass capacitors.	6	L2	2	1
	b)	Find I_E, α and β of a transistor with I_C = 5.25 mA and I_B = 100 μA. Find the new value of I_B for an I_C of 15 mA.	4	L3	2	1
4.	a)	With neat connection diagrams, explain the operation of a n-channel JFET. Draw the drain and transfer characteristics.	6	L2	2	1
	b)	For an n-channel JFET, the drain current I_D is 2 mA when V_{GS} = - 4V and V_P = - 8V. Calculate the current I_{DSS} at saturation level. What is the drain current when V_{GS} = - 2V for the same V_P?	4	L3	2	1

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