Basavarajeswar	ri Group	of Institutions
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## **BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

Third Semester B.E. Degree Examinations, April/May 2023

Analog Electronic Circuits & Op-Amps

## **Duration: 3 hrs**

Max. Marks: 100

*Note:* 1. Answer any FIVE full questions, choosing ONE full question from each module. 2. Missing data, if any, may be suitably assumed

<u>Q. No</u>		Question		(RBTL:CO:PI)
		<u>MODULE – 1</u>		
1.	a.	Draw a double diode clipper, which limits at two independent levels and explain its operation. Also draw the input and output waveforms.	08	(3:1:1.4.1)
	b.	Draw a positive clamper circuit and explain its operation. Also draw the input and output waveforms.	08	(3:1:1.4.1)
	c.	Design the clamper circuit for the given input and output waveforms as shown in Fig.Q1(c).	04	(3:1:1.4.1)



OR

2.	a.	Derive an expression for $E_{th}$ , $I_B$ and $V_{CE}$ for voltage divider bias circuit	06	(3:1:1.4.1)
	b.	Derive the expression for current gain, voltage gain, input impedance and	07	(3:1:1.4.1)
	c	output impedance for an emitter follower circuit. Design a voltage divider bias circuit for the specified condition $V_{CC} = 12V$ , $V_{CT} = 6V$ , $I_{C} = 1mA$ , $S(I_{CC}) = 20$ , $\beta = 100$ , $V_{T} = 1V$ .	07	(3:1:1.4.1)
		$12v, v_{CE} = 0v, I_C = 111A, S(I_{CO}) = 20, p = 100, v_E = 1v.$		

Fig.Q1(c)

## MODULE – 2

3.	a.	Explain with the help of circuit, what is a cascade connection. Mention its advantages	04	(2:2:1.4.1)
	b.	For a current series feedback amplifier, derive an expression for $Z_{if}$ and $Z_{if}$	08	(3:2:1.4.1)
	c.	Prove that how band width of an amplifier increases with negative feedback?	08	(3:2:1.4.1)

## OR

4.	a.	With neat block diagram,	explain Barkhansen	criteria to	obtain sustain	06	(2:2:1.4.1)
		oscillations.					

**b.** With basic circuit, derive the expression for the frequency of oscillations **08** (3 :2 : 1.4.1) of a Wien Bridge Oscillator.

	c.	A crystal has the follower parameters $L = 0.3344H$ , $C = 0.065pF$ , $C_M = 1pF$ and $R = 5.5K\Omega$ . Calculate (i) Series Resonance frequency (ii) Parallel Resonance frequency.	06	(3:2:1.4.1)
		MODULE – 3		
5.	a.	Explain the operation of class B push-pull amplifier. Prove that the maximum efficiency of class B configuration is 78.5 %?	10	(2:3:1.4.1)
	b.	Explain the operation of transformer coupled class A amplifier and prove that the maximum efficiency of class A amplifier is 50 %?	10	(2:3:1.4.1)
		OR		
6.	a.	Explain the construction, working and characteristics of an n-channel JFET?	10	(2:3:1.4.1)
	b.	With neat sketch, explain the basic construction, operation and characteristics of n-channel depletion type MOSFET?	10	(2:3:1.4.1)
		MODULE – 4		
7.	a.	Mention the important characteristics of an Op-amp.	04	(2:4:1.4.1)
	b.	With a neat diagram design an inverting and non-inverting summing amplifier and explain its operation.	08	(3:4:1.4.1)
	c.	What is ZCD? Explain the design aspect of non-inverting ZCD using op- amp?	08	(3:4:1.4.1)
		OR		
8.	a.	With a neat circuit diagram and waveforms, explain the operation of non- inverting Schmitt trigger circuit with different UTP and LTP?	07	(3:4:2.1.2)
	b.	Explain R-2R ladder digital to analog converter circuit?	07	(2:4:1.4.1)
	c.	Using a bipolar op-amp with $\pm 18V$ supply, design an inverting Schmitt trigger circuit to have UTP=1.5V and LTP = -3V.	06	(3:4:2.1.2)
		MODULE 5		
9.	a.	With a neat circuit diagram explain the working and design procedure of RC phase shift oscillator?	06	(3:5:1.4.1)
	b.	With a neat circuit diagram explain Saw tooth wave Generator.	06	(2:5:1.4.1)
	c.	Explain with neat circuit diagram triangular/rectangular wave generator?	08	(2:5:1.4.1)
		OR		
10.	а.	Explain the following performance parameters of voltage regulator	06	(2:5:1.4.1)
		(i) Line regulation (ii) Load regulation (iii) Ripple rejection		· · · · · · · · · · · · · · · · · · ·
	b.	With neat circuit diagram explain the operation of a voltage follower regulator using op-amp?	08	(2:5:1.4.1)
	c.	Calculate the resistances $R_1$ and $R_2$ for the LM317 voltage regulator to produce an output voltage of 9V. Draw the circuit diagram?	06	(3:5:2.1.2)

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