OR iii. What is peak detector? Draw its circuit diagram and explain its working with input output wave forms. **6**

Q.6 Attempt any two:
i. What is switching regulator? List major component of switching regulator and explain there working. **5**
ii. Write short note on SMPS. **5**
iii. What is fixed and adjustable voltage regulator list the advantage of adjustable voltage regulator over fixed voltage regulator. **5**

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Enrollment No..................................

Faculty of Engineering

End Sem (Even) Examination May-2022

EC3CO17 Linear Integrated Circuit

Programme: B.Tech. Branch/Specialisation: EC

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Which of the following electrical characteristics is not exhibited by an ideal op-amp? **1**
(a) Infinite voltage gain (b) Infinite bandwidth
(c) Infinite output resistance (d) Infinite slew rate

ii. Calculate the input offset current from the circuit shown below: **1**
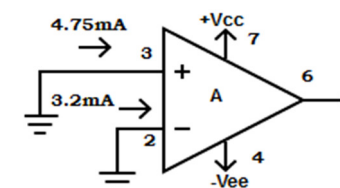
(a) +1.55mA (b) ±1.55mA (c) -1.55mA (d) None of these

iii. Define the input resistance with feedback for voltage series feedback amplifier. **1**
(a) $R_{IF} = R(1-AB)$ (b) $R_{IF} = R(AB-1)$
(c) $R_{IF} = R(1+AB)$ (d) None of these

iv. Find out the gain value by which each input of the averaging amplifier is amplified? (Assume there are four inputs) **1**
(a) 0.5 (b) 0.25 (c) 1 (d) 2

v. Match the gain of the filter with the frequencies in the low pass filter. **1**

	Frequency		Gain of the filter
A	$f < f_H$	A	$V_O/V_{in} \cong A_F/\sqrt{2}$
B	$f = f_H$	B	$V_O/V_{in} \leq A_F$
C	$f > f_H$	C	$V_O/V_{in} \cong AF$

(a) AA, BB, CC (b) AB, BC, CA
(c) AC, BB, CA (d) AC, BA, CB

P.T.O.

vi.   Find the roll-off rate for 8th order Low pass filter-   **1**
(a) -160 dB/decade   (b) -320 dB/decade
(c) -480 dB/decade   (d) -200 dB/decade

vii.   Determine the time period of a monostable 555 multivibrator.   **1**
(a) T = 0.33RC   (b) T = 1.1RC
(c) T = 3RC   (d) T = RC

viii.   Calculate the hysteresis voltage for the schmitt trigger from the   **1**
given specification: R_2 =56 kΩ, R_1= 100 Ω, V_{ref}= 0V & V_{sat}= ±14V.
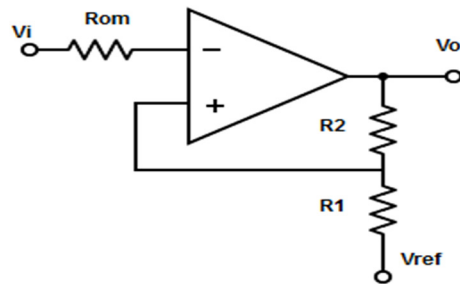
(a) 0 mV   (b) 25 mV
(c) 50 mV   (d) -25 mV

ix.   The 7812 regulator IC provides-   **1**
(a) 5 V   (b) -5 V   (c) 12 V   (d) -12 V

x.   Which is not considered as a linear voltage regulator?   **1**
(a) Fixed output voltage regulator
(b) Adjustable output voltage regulator
(c) Switching regulator
(d) Special regulator

Q.2 i.   What is Op-Amp?   **2**

    ii.   Design an inverting amplifier with gain of -5 and an input resistance   **3**
of 10 kΩ.

    iii.   Define following electrical parameters of Op-Amp: Input offset   **5**
voltage, CMRR, Output Voltage Swing, slew rate and SVRR.

OR iv.   List and explain the function of all the basic building block of an   **5**
Op-Amp.

Q.3 i.   What is feedback? List two types of feedback. Which type is used in   **2**
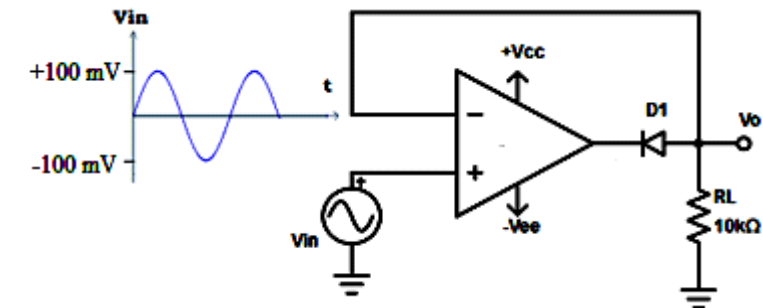linear application?

    ii.   Draw circuit diagram of an integrator, explain its working, drive the   **3**
expression of output and draw the output waveform for square wave
input.

    iii.   What is instrumentation amplifier? Draw its circuit diagram and   **5**
drive the expression of output also write its applications.

OR iv.   Draw and explain the circuit diagram of phase shift oscillator and   **5**
design it for output frequency of 200 Hz.

Q.4 i.   Define Filter. How are filter classified?   **2**

    ii.   What are the advantages of active filters over passive filters?   **3**

    iii.   Design a first order low pass butterworth filter so that it has a cut off   **5**
frequency of 1.6 kHz and a pass band gain of 2.

OR iv.   Consider the following filter circuit and calculate the low cut-off   **5**
frequency value
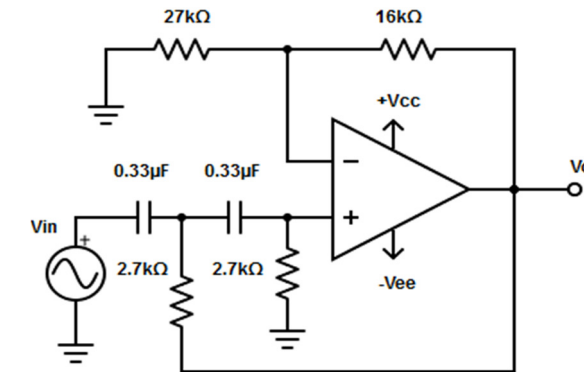
Q.5 i.   Draw and explain the functional diagram of a 555 timer.   **4**

    ii.   Identify the circuit given below, explain its working and determine   **6**
the output waveform for the given sinusoidal input.

Marking Scheme

EC3CO17 Linear Integrated Circuit

.Q.1   i.   Which of the following electrical characteristics is not exhibited by an ideal op-amp?   **1**
       (c) Infinite output resistance

     ii.   Calculate the input offset current from the circuit shown below: **1**
       (a) +1.55mA

     iii.   Define the input resistance with feedback for voltage series feedback amplifier.   **1**
       (c) $R_{IF} = R(1+AB)$

     iv.   Find out the gain value by which each input of the averaging amplifier is amplified? (Assume there are four inputs)   **1**
       (b) 0.25

     v.   Match the gain of the filter with the frequencies in the low pass filter.   **1**
       (d) AC, BA, CB

     vi.   Find the roll-off rate for 8th order Low pass filter-   **1**
       (a) -160 dB/decade

     vii.   Determine the time period of a monostable 555 multivibrator.   **1**
       (b) T = 1.1RC

     viii.   Calculate the hysteresis voltage for the schmitt trigger from the given specification: $R_2 = 56 k\Omega$, $R_1 = 100 \Omega$, $V_{ref} = 0V$ & $V_{sat} = \pm14V$.   **1**
       (c) 50 mV

     ix.   The 7812 regulator IC provides-   **1**
       (c) 12 V

     x.   Which is not considered as a linear voltage regulator?   **1**
       (c) Switching regulator

Q	No	Item	Marks	Total
Q.2	i.	Definition	2 Marks	**2**
	ii.	Circuit Diagram	1 Marks	**3**
		Calculation of feedback and input resistance	2 Marks	
	iii.	Each definition	(1 Mark*5)	**5**
OR	iv.	Block diagram	2 Marks	**5**
		Explanation of blocks	3 Marks	
Q.3	i.	Definition	1 Marks	**2**
		List type of feedback	0.5 Mark	
		Which is used for linear application	0.5 Mark	
	ii.	Circuit diagram	0.5 Mark	**3**
		Working	0.5 Mark	
		Output expression	1 Mark	
		Output Waveform	1 Mark	
	iii.	Definition	1 Mark	**5**
		Circuit diagram	1 Mark	
		Expression	2 Mark	
		Application	1 Mark	
OR	iv.	Circuit diagram	1 Mark	**5**
		Explanation	2 Marks	
		Design	2 Marks	
Q.4	i.	Definition	1 Mark	**2**
		Classification	1 Mark	
	ii.	Each with explanation	1 Mark*3	**3**
	iii.	Circuit diagram	1 Mark	**5**
		Parameter for Cut off Frequency	2 Marks	
		Parameter for Gain	2 Marks	
OR	iv.	Cutt off Frequency Calculation (As per explanation)		**5**
Q.5	i.	PIN Diagram	2 Marks	**4**
		Explanation	2 Marks	
	ii.	Identification of Circuit	1 Mark	**6**
		Working	3 Mark	
		Out Put Wave form	2 Mark	
OR	iii.	Definition	1 Mark	**6**
		Circuit Diagram	2 Marks	
		Working	2 Marks	
		Output Wave Form	1 Mark	
Q.6		Attempt any two:		
	i.	Definition	1 Mark	**5**
		List of major component	2 Marks	
		Working	2 Marks	
	ii.	Diagram	2 Marks	**5**
		Explanation	3 Marks	
	iii.	Definition	3 Marks	**5**
		Advantage	2 Marks	

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