

Scheme –I
Sample Question Paper

Program Name : Diploma in Medical Electronics
Program Code : MU
Semester : Fourth
Course Title : Analog Circuits
Marks : 70

22433

Time: 3 Hrs.

Instructions:

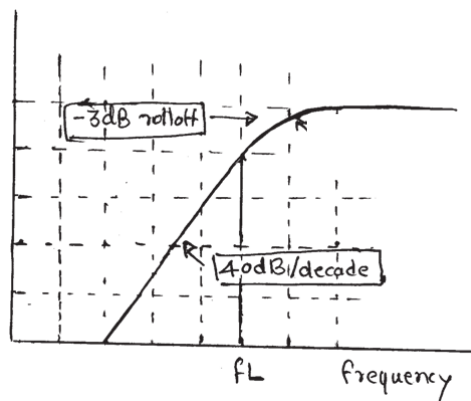
- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following.

10 Marks

- a) Classify configuration of differential amplifier.
- b) Draw equivalent circuit of an OPAMP
- c) Suggest and draw op - amp based circuit using Butterworth filter to fulfill following frequency response.

Gain in dB



- d) Draw monostable multivibrator circuit using IC 555.
- e) Draw circuit diagram of Butterworth Band reject filter using OP AMP.
- f) Draw circuit diagram of Precision rectifier using OP AMP.
- g) Draw circuit diagram of I to V convertor using OP AMP.

Q.2) Attempt any THREE of the following.

12 Marks

- Draw the circuit diagram of Schmitt trigger using OP AMP. Describe its working with input and output waveforms.
- With neat sketch, derive the expression for output voltage of non-inverting amplifier.
- For a first order Butterworth high pass filter, calculate cut off frequency, f_c if the component values are $R=15\text{ K}\Omega$, $C=0.01\mu\text{F}$. Calculate the passband gain if $R_f=10\text{ K}\Omega$ and $R_1=5\text{ K}\Omega$
- Draw and describe V to I convertor using OP AMP with grounded load.

Q.3) Attempt any THREE of the following.

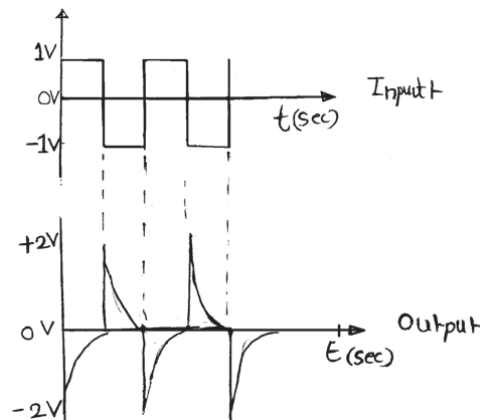
12 Marks

- Draw block diagram of OPAMP . List function of each block.
- Design and draw the circuit for following operation using op - amp.
$$V_0 = V_1 + V_2 - 2V_3$$
- For RC phase shift oscillator using OPAMP , the components used are $R=8.2\text{ K}\Omega$, $C=0.01\mu\text{F}$, $R_1=1.2\text{ K}\Omega$, $R_f=39\text{ K}\Omega$. Determine the frequency of oscillations. Can it get sustained oscillations.
- Draw the circuit diagram of Butterworth band pass filter using combination of Butterworth high pass filter and Butterworth low pass filter. Give the condition of cut off frequency of both. Sketch the frequency response.

Q.4) Attempt any THREE of the following.

12 Marks

- Draw circuit diagram and write output equation of Logarithmic and Antilogarithmic amplifier using OPAMP
- If $R_1=2\text{K}\Omega$, $R_f=100\text{ K}\Omega$, $V_{cc}=\pm 15\text{V}$ and rms input voltage $V_i=50\text{mV}$. Calculate output voltage in inverting and non inverting mode using OP AMP.
- Suggest the op - amp based circuit to perform below operation.



d) Define :

- (i) Roll of rate of filter
- (ii) Cut off frequency of filter
- (iii) Q factor of filter
- (iv) Bandwidth of filter

e) Draw and describe the circuit diagram of Wien bridge oscillator using IC 741.

Q.5) Attempt any TWO of the following.

12 Marks

- a) Define differential amplifier. Draw single input balanced output differential amplifier. Describe its operation.
- b) Draw block diagram at IC 555. Write function of pin Trigger, Reset, Discharge, Threshold.
- c) Draw comparator circuit using OPAMP to detect + 2 v dc signal.

Q.6) Attempt any TWO of the following.

12 Marks

- a) For an Instrumentation amplifier ,calculate the output voltage for $V_1=2$ mV and $V_2=1$ mV if $R_1=10$ K Ω , $R_g=1$ K Ω , $R_3=10$ K Ω , $R_1=10$ K Ω ,
- b) Compare Open loop and Closed loop configuration of OP AMP.(6 points)
- c) Compare Active and Passive filters.(6 points)

Scheme –I
Sample Test Paper - I

Program Name : Diploma in Medical Electronics
Program Code : MU
Semester : Fourth
Course Title : Analog Circuits
Marks : 20

22433

Time: 1 Hour

Instructions:

- (1) All questions are compulsory.
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Q.1 Attempt any FOUR.

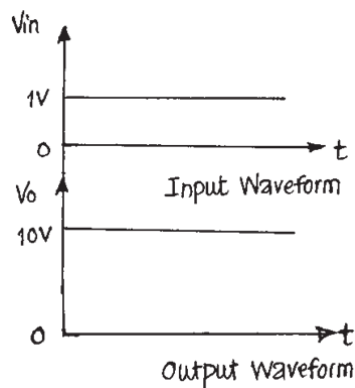
08 Marks

- a) Describe ideal differential amplifier.
- b) Draw Single input unbalanced output differential amplifier.
- c) Define
 - (i) CMRR
 - (ii) Slew rate
- d) Draw transfer characteristics of ideal and practical OP AMP
- e) Draw subtractor circuit using OPAMP
- f) List two applications of Instrumentation amplifier.

Q.2 Attempt any THREE.

12 Marks

- a) Describe Dual input balanced output differential amplifier with a neat diagram.
- b) List steps to troubleshoot voltage follower using OP AMP.
- c) Draw a circuit of OP-AMP for the following input and output waveforms



- d) Draw and describe V to I converter using OP AMP with floating load.
- e) Using OP-AMP, draw the circuit to show the output $V_0 = 3(V_1 - 2V_2)$ where V_1 and V_2 are input voltages.
- f) Design an inverting amplifier to work as a sign changer.

Scheme –I
Sample Test Paper - II

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Program Code : MU
Semester : Fourth
Course Title : Analog Circuits
Marks : 20

22433

Time: 1 Hour

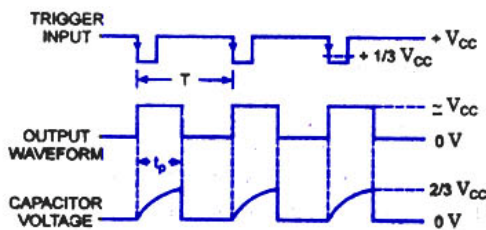
Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
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- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

08 Marks

- a) Compare Linear and Non linear Configuration OP AMP
- b) Draw OP AMP based Schmitt trigger circuit.
- c) Compare comparator and Schmitt trigger.
- d) Define Q factor of filter. Classify Band pass filter based on Q factor.
- e) Draw ideal and practical frequency responses of second order Butterworth High pass filter and low pass filter
- f) Draw a circuit using IC 555 for the following waveforms.



Q.2 Attempt any THREE.

12 Marks

- a) Draw circuit diagram and describe working of OP AMP based inverting zero crossing detector with input output waveforms
- b) Describe Analog multiplier using op AMP.
- c) Design Butterworth first order low pass filter to get passband voltage gain=2, at cut of frequency 10KHz.
- d) Describe Notch filter with the help of neat diagram.
- e) Draw circuit diagram and describe working of OP AMP based Biastable Multivibrator with input output waveforms
- f) List steps to troubleshoot Astable multivibrator using IC 555