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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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   Attempt any FIVE of the following: **10**

a) Draw block diagram of an ideal differential amplifier.

b) Draw practical transfer characteristics of op-amp.

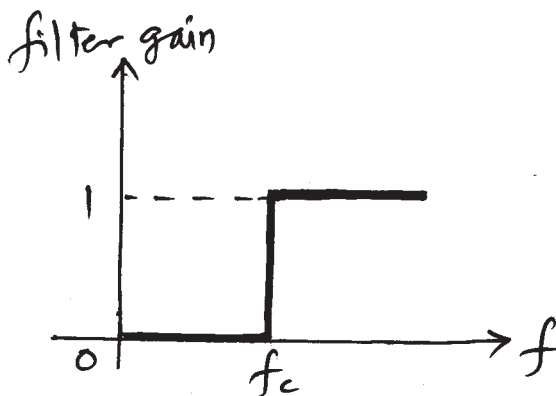c) Identify the type of filter for given frequency response characteristics shown in Fig. No.1

Fig. No. 1

Marks

   d) Draw pin diagram of IC 555.

   e) Define:

      i)   Pass band

      ii)   Stop band

   f) Draw instrumentation amplifier using two opamp.

   g) List linear and non-linear opamp circuits. (two each)

2.   **Attempt any <u>THREE</u> of the following:**   **12**

   a) Draw inverting and non-inverting adder using opamp.

   b) Explain virtual ground and virtual short concepts.

   c) Draw the circuit diagram of second order high pass butterworth filter with frequency response. Give expression for cut off frequency and gain.

   d) Observe the circuit shown in Fig. No.2 and give the output of the circuit. Assume $R_1 = 1K\Omega$, $R_f = 10K\Omega$.
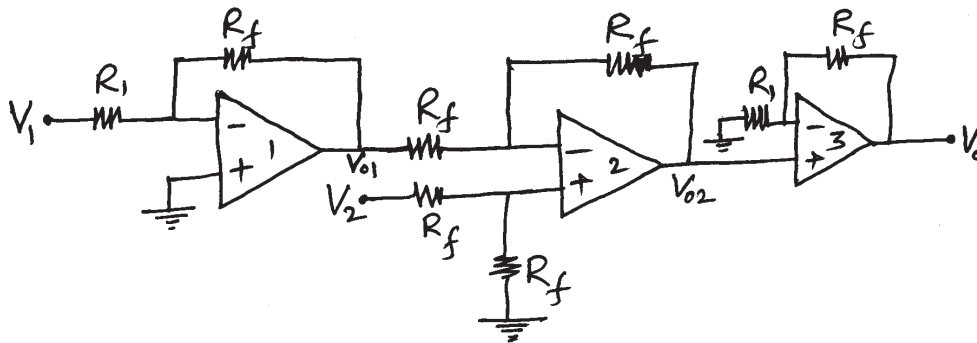

<u>Fig. No. 2</u>

Marks

3. **Attempt any THREE of the following:** **12**

a) List any four parameters of opamp with the help of practical and ideal values.

b) Draw and explain basic antilog amplifier using diode.

c) Draw the circuit diagram of wein bridge oscillator using IC741 and give expression for frequency of oscillation.

d) Design a first order low-pass buttterworth filter with a pass band gain of two and cut off frequency of 2KHz.
Draw the designed circuit.

4. **Attempt any THREE of the following:** **12**

a) Draw schmitt trigger circuit using opamp.

b) Draw closed loop inverting amplifier using opamp and derive expression for its gain.

c) Draw the circuit of basic differentiator. Draw output waveforms for sine and square wave input.

d) Name the different types of filters. Draw their ideal frequency response.

e) Draw the circuit diagram of astable multivibrator using IC741 and describe its working.

5. **Attempt any TWO of the following:** **12**

a) Define :

i) Differential input signal

ii) Differential gain

iii) Common mode gain

iv) Common mode rejection ratio

b) Compare monostable, astable and bistable multibrator.
(any three points)

c) In analog multipliers using log-antilog amplifier if $V_x=3$ V_{rms} and scaling factor = $1.5/V_{rms}$. Calculate the output voltage.
Also draw the block diagram.

Marks

6. **Attempt any TWO of the following:** 12

a) Design a practical integrator circuit to integrate a square wave of frequency 10 KHz. The dc gain of the integrator should be adjusted to 12.

b) In Fig. No.3, if $V_1 = 1V$, $V_2 = 3V$, $V_3 = 2V$, with $R_1=R_2=R_3=2K\Omega$ and $R_f = 3K\Omega$ and $R_{om} = 270\Omega$, determine the output voltage.
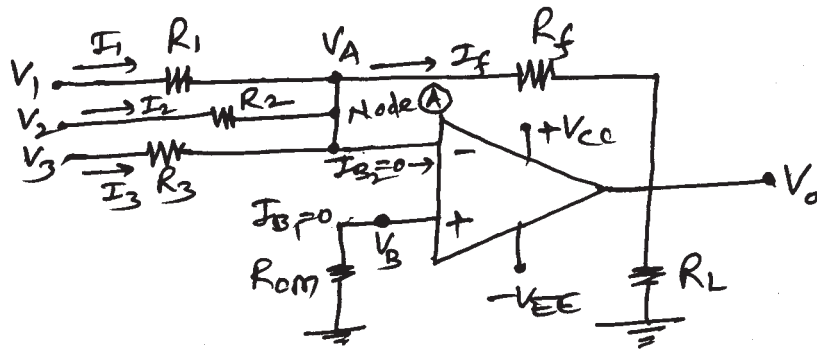
Fig. No. 3

c) Describe design procedure for first order and second order high pass filter.

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