Scheme – I

Sample Question Paper

Program Name	**: Electronics Engineering Programme Group**
Program Code	**: DE/EJ/ET/EN/EX/EQ/IE/IS/IC**
Semester	**: Fourth**
Course Title	**: Linear Integrated Circuits**
Marks	**: 70**

22423

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) State ideal and practical value of given parameters for Op-Amp IC 741.

        1) Input offset voltage

        2) CMRR

    (b) Draw circuit diagram Op-Amp based basic integrator.

    (c) List four specifications of LM 324.

    (d) Define following terms related with filter.

        i.   Cut - off frequency

        ii.   Stop band

    (e) State the use of Schmitt trigger.

    (f) Draw labeled pin diagram of IC - 555.

    (g) State the classification of filters based on frequency response.

Q.2) Attempt any THREE of the following: -   **12 Marks**

    (a) Draw the block diagram of OP-AMP and state the functions of each block.

    (b) Draw the input output waveform of inverting zero crossing detector with sine wave input of amplitude 3V$_{PP}$.

    (c) Describe the operation of multiplier using PLL with the help of block diagram.

(d) Obtain the output voltage for the open loop differential amplifier for V_{in1}=10mV rms, V_{in2}=20mV rms. Assume Op-Amp is 741, voltage swing=±14v. Sketch the output waveform.

Q.3) Attempt any THREE of the following.   **12 Marks**

    (a) Explain the concept of frequency compensation of Op-Amp and offset nulling?

    (b) Draw the circuit diagram of Op-Amp based log amplifier and obtain the expression for its output voltage.

    (c) Sketch first order Butterworth low pass filter with appropriate component value at a cut-off frequency 10 KHz with pass band gain 2.

    (d) Describe the procedure to vary output frequency of IC-555 based voltage controlled oscillator with appropriate sketch

Q.4) Attempt any THREE of the following.   **12 Marks**

    (a) Identify and draw the Op-Amp based circuit to perform below operation. (refer fig1)
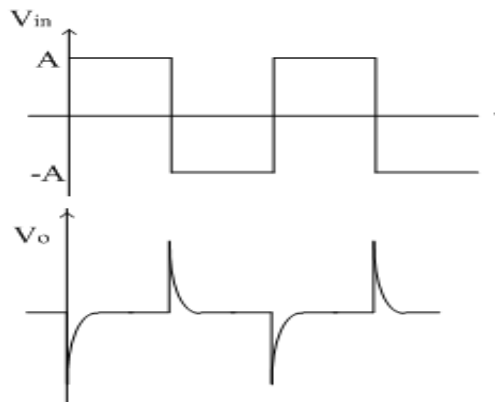

Fig. 1

    (b) Explain the procedure to null the offset voltage with appropriate sketch.

    (c) For the following equation, sketch the circuit diagram and output waveform for square wave input.

$$V_0 = -\frac{1}{RC} \int_0^t V_{in}\, dt + C$$

    (d) Explain the operation of instrumentation amplifier using three Op-Amps with neat sketch.

    (e) Sketch IC-555 based monostable multivibrator for pulse width $t_p = 10$ ms.

Q.5) Attempt any TWO of the following.   **12 Marks**

(a) If R2 = 150KΩ, R1 = 100KΩ, Vin = 500mV Sine wave, saturation voltage = ±15V, for a Op-Amp based Schmitt trigger. Find Threshold Voltage VUTP, VLTP and hysteresis voltage.

(b) Identify and draw the Op-Amp based filter circuit to fulfill following frequency response(refer fig2)
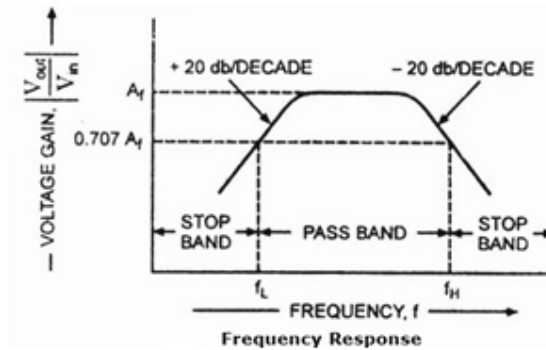

Fig. 2

(c) Sketch output signal along with input signal as sine wave of 2V peak to peak for following Op-Amp based circuits with ideal conditions.

    i.   Inverting amplifier with gain 5.

    ii.   Positive peak detector

    iii.   Active integrator.

    iv.   Non inverting zero crossing detectors.

    v.   Non inverting unity gain amplifier.

    vi.   Active differentiator.

Q.6) Attempt any TWO of the following.   **12 Marks**

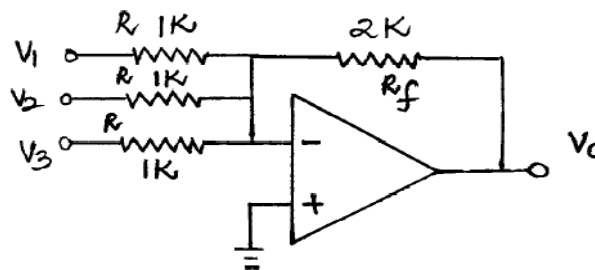(a) For the given circuit, obtain the output voltage expression.(refer fig3)

Fig. 3

(b) Explain the operation of sample and hold circuit with neat sketch and its input, output waveform?

(c) Sketch second order Butterworth high pass filter with appropriate component value at a cut-off frequency 10 KHz.

Scheme – I

Sample Test Paper - I

Program Name	**: Electronics Engineering Programme Group**
Program Code	**: DE/EJ/ET/EN/EX/EQ/IE/IS/IC**
Semester	**: Fourth**
Course Title	**: Linear Integrated Circuits**
Marks	**: 20**

22423

Time: 1 Hour

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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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.   **08 Marks**

(a) Draw equivalent circuit of Op-Amp

(b) Draw labeled pin diagram of IC 741.

(c) Draw circuit diagram of non-inverting adder with 3 inputs.

(d) Draw input and output waveform, when the sine input signal is applied to the inverting input terminal of Op-Amp.

(e) Draw the circuit diagram of voltage to current converter with grounded load.

Q.2 Attempt any THREE.   **12 Marks**

(a) Draw block diagram of Op-Amp. Describe the function of each block in brief.

(b) Draw the circuit diagram of inverting amplifier and obtained its output voltage expression.

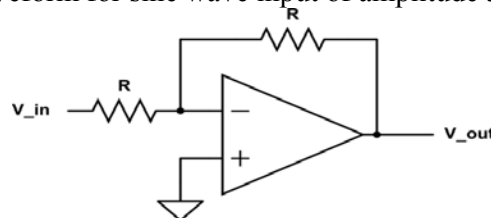(c) Draw the output waveform for sine wave input of amplitude 3Vp-p. (Refer Fig1)

Fig. 1

(d) Explain the working of window detector with neat sketch.

Scheme – I

Sample Test Paper - II

Program Name   : **Electronics Engineering Programme Group**

Program Code   : **DE/EJ/ET/EN/EX/EQ/IE/IS/IC**

Semester   : **Fourth**

Course Title   : **Linear Integrated Circuits**

Marks   : **20**

| **22423** |

Time: 1 Hour

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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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.   **08 Marks**

    (a) State the importance of hysteresis.

    (b) Define following terms related with filter.

        i. Cut - off frequency

        ii.Stop band

    (c) Draw ideal and practical response of band reject filter with proper labeling.

    (d) Define lock range and capture range of PLL.

    (e) Draw labeled pin diagram of IC - 565.

Q.2 Attempt any THREE.   **12 Marks**

    (a) Draw the diagram of log amplifier using op - amp and obtain expression for its output voltage.

    (b) Explain the circuit diagram of Op-Amp based phase shift oscillator with neat sketch.

    (c) Sketch Op-Amp based Wein Bridge Oscillator with appropriate value for frequency 1 kHz.

    (d) Obtain pulse width of output of IC-555 based monostable multivibrator for c = $0.047\mu F$ and R = 56K.