M. Sc. (Electronics) (Sem. III) (CBCS) Examination

November / December – 2017

Paper - XI : OP-Amp & Its Applications

Faculty Code : 003
Subject Code : 1153003

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

1 Answer the following questions in brief : (any **seven**)   **14**

(1) Explain input bias and input offset currents.

(2) Draw and explain equivalent circuit of an operational amplifier.

(3) Define oscillator and multivibrator.

(4) Design a narrow-band bandpass filter with $F_C = 1$ kHz, Q=5 and A_F=10.

(5) Draw the block diagram of a typical operational amplifier and explain working of each in not more than 3 lines.

(6) Mention advantages and disadvantages of active filters.

(7) For an inverting amplifier designed using IC 741, with $R_1 = 1 \, k\Omega$ and RF = $4.7 k\Omega$; calculate values of AF, RiF, RoF, fF and VooT. (AOL = 200000, Ri = $2 M\Omega$, Ro = 75Ω, fo = 5Hz)

(8) Explain working of an op-amp integrator in brief.

(9) Draw the circuit diagram of a closed loop differential amplifier. Also derive expression for its voltage gain.

(10) Enlist characteristics of an ideal operational amplifier.

2 Attempt any two of the following questions : (Each 7 Marks)   **14**

(1) With appropriate circuit diagram, explain any one application of instrumentation amplifier.

(2) With necessary diagrams explain working of summing, scaling and averaging amplifier in inverting mode.

(3) Write a detailed note on various open-loop configurations of an op-amp.

3   Answer the following questions :

(1)   Write a detailed note on RC-phase shift oscillator.   **5**

(2)   Explain use of instrumentation amplifier in temperature indicator and controller.   **5**

(3)   Explain AC amplifier with single power supply with help of necessary diagrams.   **4**

OR

3   Answer the following questions :

(1)   Write a short note on floating load type voltage to current converter.   **5**

(2)   Write a detailed note on Schmitt Trigger.   **5**

(3)   Explain working principle of an oscillator. Also explain frequency stability.   **4**

4   Answer the following questions :

(1)   What is slew rate? What are the causes? Explain effect of slew rate in real applications of op-amp.   **5**

(2)   Explain working of a square wave generator using op-amp.   **5**

(3)   Write a short note on peaking amplifier using op-amp.   **4**

5   Answer any two of the following questions : (Each 7 Marks)   **14**

(1)   Write a detailed note on variation in offset voltage due to change in power supply and temperature.

(2)   For voltage series feedback derive expressions for closedloop voltage gain, input resistance, output resistance, bandwidth and total output offset voltage.

(3)   Draw high frequency op-amp equivalent circuit and with help of necessary expressions, explain how open-loop gain varies with frequency.

(4)   What is a filter? Explain design and working of first and second order low-pass filter. Design first and second order low-pass filter with Fc = 1000Hz.

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