

# Operation Amplifiers and Linear IC's VTU CBCS Question Paper Set 2018

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# CBCS Scheme

USN

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15EE46

## Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Operational Amplifiers and Linear IC's

Time: 3 hrs.

Max. Marks: 80

- Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Standard resistance and capacitance data table may be used.  
3. 741 Datasheet allowed.

### Module-1

- 1 a. Draw the block diagram of Op-Amp and explain. (08 Marks)  
b. In the circuit of AC inverting amplifier  $R_{in} = 50\Omega$ ,  $C_i = 0.1\mu F$ ,  $R_i = 100\Omega$ ,  $R_F = 1k$ ,  $R_L = 10k$  and supply voltages =  $\pm 15V$ . Determine the bandwidth of the amplifier. ( $uGB = 10^6$ ,  $K = 0.909$  for 741 IC). (08 Marks)

OR

- 2 a. Derive the closed loop voltage gain equation for the voltage series feedback amplifier. (08 Marks)  
b. The circuit of peaking amplifier is to provide a gain of 10 at a peak frequency of 16KHz. Determine the values of all components. (08 Marks)

### Module-2

- 3 a. Derive the gain equation for first order low pass Butterworth filter. (08 Marks)  
b. With diagram, explain the adjustable output regulator. (08 Marks)

OR

- 4 a. Explain in detail the all pass filter. (08 Marks)  
b. Design an adjustable positive voltage regulator using LM317 for output voltage varying from 4 to 12V and output current of 1A. (08 Marks)

### Module-3

- 5 a. Design a RC phase shift oscillator for an output frequency of 5 KHz. Use LM741 with  $\pm 15V$  power supply. (08 Marks)  
b. With circuit diagram and necessary derivation for load current, explain voltage – to – current converter with grounded load. (08 Marks)

OR

- 6 a. Explain the oscillator amplitude stabilization with necessary figures. (08 Marks)  
b. Design a non inverting Schmitt trigger circuit to have  $uTP = +3V$  and  $LTP = -5V$ . Use 741 Op-Amp with  $V_{CC} = \pm 15V$ . (08 Marks)

**Module-4**

- 7 a. Explain the precision full wave rectifier circuit as a combination of half wave rectifier and summing circuit. (08 Marks)
- b. With neat circuit explain three bit R – 2R DAC. (08 Marks)

**OR**

- 8 a. With diagram explain the working of Op-Amp sample and hold circuit. (08 Marks)
- b. Explain the dual slope ADC with the necessary figure. (08 Marks)

**Module-5**

- 9 a. With block diagram, explain phase locked loop in detail. (08 Marks)
- b. Sketch the circuit diagram of an Op-Amp monostable multivibrator, draw the circuit waveforms and explain its operation. (08 Marks)

**OR**

- 10 a. Write a note on applications of PLL IC 565. (08 Marks)
- b. Explain the Astable multivibrator circuit operation using Op-Amp. (08 Marks)

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# CBCS Scheme

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15EE46

## Fourth Semester B.E. Degree Examination, June/July 2017 Operational Amplifiers and Linear Integrated Circuits

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Define and explain the following terms : input offset voltage, input offset current and input bias current. (06 Marks)
- b. For the noninverting amplifier configuration, obtain expressions for closed loop gain.  $A_f$  from basic concepts, show that difference input voltage is zero ideally and hence gain  $A_f$  from this concept and input resistance  $R_{if}$  with feedback. (10 Marks)

OR

- 2 a. For the noninverting ac amplifier using single supply  $R_{ia} = 50\Omega = R_0$ ,  $C_i = C_1 = 0.1\mu F$ ,  $R_1 = R_2 = R_3 = 100k\Omega$ ,  $R_F = 1M\Omega$ ,  $V_{cc} = +15V$ , gain  $A_f = 11$ ,  $uGB = 1MHz$ . Calculate bandwidth of amplifier and maximum output voltage swing. Draw the circuit diagram. (06 Marks)
- b. What is an instrumentation amplifier? For instrumentation amplifier using transducer bridge obtain an expression for output voltage  $V_o$  in terms of change in resistance  $\Delta R$  of the transducer. Draw the circuit diagram. (10 Marks)

### Module-2

- 3 a. For the II order lowpass filter, show that the pass band voltage gain is equal to 1.586 and also obtain an expression for high cut off frequency  $f_H$ . Draw the circuit diagram. (10 Marks)
- b. Explain the working and design of opamp voltage follower regulator. (06 Marks)

OR

- 4 a. Design a wide band pass filter with  $f_\alpha = 200Hz$ ,  $f_H = 1KHz$  and pass band gain = 4. Assume capacitor value for high pass section =  $0.05\mu F$  and for low pass section =  $0.01\mu F$ . Also calculate the value of Q-factor for the filter and center frequency. Draw the circuit diagram. (06 Marks)
- b. An LM 317 regulator is to provide a 6V output from 15V supply. The load current is 200mA. Design the circuit, calculate the power dissipation. Draw the circuit diagram. Select  $I_1 = 1mA$ ,  $V_{ref} = 1.25V$ . (05 Marks)
- c. Explain the working of notch filter. Draw its frequency response. State its common application. (05 Marks)

### Module-3

- 5 a. Explain the working of Schmitt trigger in inverting mode. Draw its hysteresis curve. (06 Marks)
- b. Draw and explain triangular wave generator using square wave generator and integrator method. Draw the required waveforms. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any remaining or unutilized space, should be evaluated and for evaluation purposes, it should be treated as unutilized space.

OR

- 6 a. Explain the circuit of noninverting comparator. Draw the different waveforms when  $V_{REF}$  is positive and negative. (06 Marks)
- b. Design a RC phase shift oscillator using opamp. Assume  $C = 0.1\mu F$  frequency of oscillations = 200 Hz. Draw the circuit diagram. (06 Marks)
- c. Explain the working of voltage to converter with grounded load. (04 Marks)

Module-4

- 7 a. What is the major limitation of conventional rectifier? Explain working of precision positive and negative half wave rectifier using noninverting type. (10 Marks)
- b. Draw and explain working of dual slope ADC. (06 Marks)

OR

- 8 a. Explain the working of R – 2R ladder DAC. Assume that binary input is 001. (05 Marks)
- b. Draw and explain the circuit of peak detector. Draw the waveforms. (06 Marks)
- c. An 8-bit DAC has an output voltage range of 0 – 2.55 V. Define the resolution in at least 2 ways. (05 Marks)

Module-5

- 9 a. Explain operating principle of PLL. Hence define lock range, capture range, and pull in time. (08 Marks)
- b. An astable multivibrator is to be designed for getting rectangular waveform for  $t_{ON} = 0.6ms$ . Total time period = 1ms. Assume  $C = 0.1\mu F$  Draw the circuit diagram. (08 Marks)

OR

- 10 a. Explain the function of various pins of IC 555 timer. (08 Marks)
- b. Explain PLL IC565 application as frequency multiplier and frequency synthesizer. (08 Marks)

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