

Minnesota State College Southeast

ELEC 2260: Linear Integrated Circuits

A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 2

Lab Hours/Week: 4

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course covers linear integrated circuits. In this course a wide variety of amplifiers, oscillators and generators will be analyzed, which use the op amp. The op amp is one of the most versatile integrated circuits; it provides high gain and wideband width in a simple configuration. (Prerequisite: ELEC1218) (4 Credits: 2 lecture/2 lab)

B. COURSE EFFECTIVE DATES: 07/01/2010 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

D. LEARNING OUTCOMES (General)

1. Breadboard experiments
2. Interpret data sheets
3. Locate IC pin designations
4. Distinguish between analog and digital systems
5. Measure input offset voltage
6. Describe analog signal characteristics
7. Measure input bias current
8. Measure input impedance
9. Measure slew rate
10. Measure common-mode rejection ratio
11. Measure closed-loop response
12. Calculate voltage gain
13. Troubleshoot amplifier
14. Identify three stages of an op amp
15. Verify voltage follower operation
16. Verify noninverting amplifier operation
17. Analyze op-amp input current
18. Measure voltage gain
19. Verify inverting amplifier operation
20. Describe IC identifications
21. Measure summing amplifier operation
22. Analyze common-mode characteristics
23. Measure difference amplifier operation
24. Describe feedback characteristics
25. Identify input and feedback elements
26. Analyze inverting op amp circuit
27. Verify 3 terminal regulator operation
28. Analyze a noninverting op amp circuit
29. Measure oscillator frequency
30. Measure input offset voltage
31. Analyze a summing op amp circuit
32. Measure input impedance
33. Analyze a difference op amp circuit
34. Measure common-mode reflection ration
35. Analyze a comparator circuit
36. Distinguish between dual and single power supply circuits
37. Measure bandwidth
38. Describe troubleshooting techniques
39. Verify constant-current source operation
40. Verify summing amplifier operation
41. Analyze system manuals
42. Verify difference amplifier operation
43. Verify current to voltage converter operation
44. Describe troubleshooting precautions

45. Verify voltage to current converter operation
46. Select test equipment
47. Verify noninverting amplify operation
48. Verify voltage converter operation
49. Describe voltage regulators
50. Verify three terminal regul operation
51. Measure oscillator operating frequency
52. Measure ripple voltage
53. Describe current regulators
54. Measure response time
55. Analyze series regulators
56. Verify wein-bridge oscillator operation
57. Analyze shunt regulators
58. Verify sine-cosine oscillator operation
59. Analyze switching regulators
60. Describe monolithic regulator circuits
61. Analyze protection circuits
62. Analyze current to voltage converter
63. Analyze voltage to current converter
64. Verify wein-bridge operation
65. List oscillator characteristics
66. Verify square-wave generator operation
67. Describe oscillator operation
68. Verify Schmitt trigger operation
69. Verify triangle-wave generator operation
70. Calculate operating frequency
71. Verify timer circuit operation
72. Identify frequency determining components
73. Verify sine-cosine oscillate operation
74. Verify active filter circuit operation
75. Analyze RC oscillators
76. Analyze crystal oscillators
77. Describe multivibrator operation
78. Verify peak detector operation
79. Verify triangle-wave genera operation
80. Measure phase shift
81. Measure holding time
82. Analyze square-wave generator
83. Analyze triangle-wave generator
84. Verify window detector operation
85. Measure thresholds
86. Analyze staircase-wave generator
87. Verify instrumentation amplifier operation
88. Analyze timer circuit

89. Analyze active filter circuit
90. Verify astable timer operation
91. Analyze peak detector circuit
92. Verify sample-and-hold circuit operation
93. Analyze Schmitt trigger circuit
94. Verify square-wave oscillate operation
95. Analyze window detector circuit
96. Verify comparator ADC
97. Analyze instrumentation amplifier
98. Verify DAC operation
99. Describe conversion systems
- 10 0. Verify monostable timer operation
- 10 1. Verify S/H circuit operation
- 10 2. Describe DAC operation
- 10 3. Describe ADC operation
- 10 4. Analyze sample-and-hold circuits
- 10 5. Verify ADC operation

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted