SARDAR RAJA COLLEGE OF ENGINEERING

ALANGULAM

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MICRO LESSON PLAN

SUBJECT NAME : ELECTRONIC CIRCUITS II

SUBJECT CODE : EC 2251

YEAR / SEM : II / IV

COURSE / BRANCH : B.E / E.C.E

Handled By

Ms.M.EBENEZER PRATHIBA

Asst.Prof / ECE

SUBJECT DESCRIPTION AND OBJECTIVES

SUBJECT DESCRIPTION

Analog electronic circuits are those in which current or voltage may vary continuously with time to correspond to the information being represented. Analog circuitry is constructed from two fundamental building blocks: series and parallel circuits. In a series circuit, the same current passes through a series of components. A string of Christmas lights is a good example of a series circuit: if one goes out, they all do. In a parallel circuit, all the components are connected to the same voltage, and the current divides between the various components according to their resistance.

The basic components of analog circuits are wires, resistors, capacitors, inductors, diodes, and transistors. (Recently, memristors have been added to the list of available components.) Analog circuits are very commonly represented in schematic diagrams, in which wires are shown as lines, and each component has a unique symbol. Analog circuit analysis employs Kirchhoff's circuit laws: all the currents at a node (a place where wires meet) must add to 0, and the voltage around a closed loop of wires is 0. Wires are usually treated as ideal zero-voltage interconnections; any resistance or reactance is captured by explicitly adding a parasitic element, such as a discrete resistor or inductor. Active components such as transistors are often treated as controlled current or voltage sources: for example, a field-effect transistor can be modeled as a current source from the source to the drain, with the current controlled by the gate-source voltage.

When the circuit size is comparable to a wavelength of the relevant signal frequency, a more sophisticated approach must be used. Wires are treated as transmission lines, with (hopefully) constant characteristic impedance, and the impedances at the start and end determine transmitted and reflected waves on the line. Such considerations typically become important for circuit boards at frequencies above a GHz; integrated circuits are smaller and can be treated as lumped elements for frequencies less than 10 GHz or so.

OBJECTIVES:

On completion of this course the student will understand

- The advantages and method of analysis of feedback amplifiers
- Analysis and design of LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time base generators.

EC 2251 ELECTRONIC CIRCUITS II L T P C 3 1 0 4

UNIT I FEEDBACK AMPLIFIERS 9

Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS 9

Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, General form of an Oscillator, Analysis of LC oscillators - Hartley, Colpitts, Clapp, Franklin, Armstrong, Tuned collector oscillators, RC oscillators - phase shift – Wienbridge - Twin-T Oscillators, Frequency range of RC and LC Oscillators, Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal oscillators, frequency stability of oscillators.

UNIT III TUNED AMPLIFIERS 9

Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers - Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers – large signal tuned amplifiers – Class C tuned amplifier – Efficiency and applications of Class C tuned amplifier - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of Transistor Switching Times – Speed-up Capaitor - Diode clippers, Diode comparator - Clampers. Collector coupled and Emitter coupled Astable multivibrator – Monostable multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators - Schmitt trigger circuit.

UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS 9

UJT sawtooth waveform generator, Pulse transformers – equivalent circuit – response - applications, Blocking Oscillator – Free running blocking oscillator - Astable Blocking Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing, Frequency control using core saturation, Triggered blocking oscillator – Monostable blocking oscillator with base timing – Monostable blocking oscillator with emitter timing, Time base circuits - Voltage-Time base circuit, Current-Time base circuit – Linearization through adjustment of driving waveform.

TUTORIAL= 15 TOTAL: 60 PERIODS

TEXT BOOKS:

1. Sedra / Smith, Micro Electronic Circuits Oxford University Press, 2004.

2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007.

REFERENCES:

1. Millman J. and Taub H., Pulse Digital and Switching Waveforms, TMH, 2000.

2. Schilling and Belove, Electronic Circuits, 3rd Edition, TMH, 2002.

3 Robert L. Boylestad and Louis Nasheresky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2002.

4. David A. Bell, Solid State Pulse Circuits, Prentice Hall of India, 1992.

5. Millman and Halkias. C., Integrated Electronics, TMH, 1991.

MICRO LESSON PLAN

Hours	Lecture Topic	Reading
	UNIT I FEEDBACK AMPLIFIERS	
1	Block diagram, Loop gain, Gain with feedback	T1
2	Effects of negative feedback –sensitivity and de sensitivity of gain	T1
3	Cut-off frequencies, distortion, noise	T1
4	Problems	T1
5	Input impedance and output impedance with feedback	T1
6	Four types of negative feedback connections	T1
7	voltage series feedback	T1
8	voltage shunt feedback	T1
9	Problems.	T1
10	current series feedback	T1
11	current shunt feedback	T1
12	Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.	T1
13	Problems.	T1
	UNIT II OSCILLATORS	
14	Classification, Barkhausen Criterion	R2
15	Mechanism for start of oscillation and stabilization of amplitude	R2
16	Problems.	T2
17	General form of an Oscillator,	R2
18	Analysis of LC oscillators Hartley, Colpitts, clapp	R2
19	Problems.	T2
20	Franklin, Armstrong ascillators,Tuned collector oscillators	R2
21	RC oscillators - phase shift	R2

22	Wienbridge, Twin-T oscillators, frequency range of RC and LC oscillators.	R2
23,24	Quartz Crystal Construction, Electrical equivalent circuit of Crystal, Miller and Pierce Crystal	R2
25	Problems	T2
UNIT III TUNED AMPLIFIERS		
26	Coil losses, unloaded and loaded Q of tank circuits	T1
27	small signal tuned amplifiers	T1
28	Analysis of capacitor coupled single tuned amplifier	T1
29	Problems	T2
30	Double tuned amplifier	R2
31	effect of cascading single tuned and double tuned amplifiers on bandwidth	T1
32	Stagger tuned amplifiers, Large signal tuned amplifiers	T1
33	Problems	T2
34	Class C tuned amplifiers, Efficiency and applications of Class C tuned amplifier	R2
35	Stability of tuned amplifiers	R2
36	Neutralization-Hazeltine neutralization method	R2
37	Problems	T2
UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS		
38	RC & RL Integrator, Differentiator circuits	T1
39	Problems	T2
40	Calculation of Transistor Switching Times	R2
41	Speed-up Capacitor	R2
42	Diode clippers, Diode comparator Clampers	R2
43	Problems	T2
44	Collector coupled and Emitter coupled Astable multivibrator	R2
45	Monostable, Bistable multivibrator	T1
46	Problems.	
47	Triggering methods for Bistable multivibrators	R2

48	Schmitt trigger circuit, Storage, Delay	R2
49	Problems	T1
UNIT V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS		
50	UJT saw tooth waveform generator	R2
51	Pulse transformers – equivalent circuit-response,applications.	R2
52	Blocking Oscillator- Astable Blocking Oscillators with base timing	T2
53	Problems	T1
54	Push-pull Astable blocking oscillator with emitter timing	T1
55	Frequency control using core saturation	T1
56	Monostable blocking oscillator with base timing	T2
57	Problems	T1
58	Monostable blocking oscillator with emitter timing, Time base circuits	T2
59	Voltage-Time base circuit	T1
60,61	Triggered blocking oscillator	T1
62	Linearization through adjustment of driving waveform.	T1
63	Free running blocking oscillator	T2
65	Problems	T1

TEXT BOOKS

T1. Sedra / Smith, Micro Electronic Circuits Oxford University Press, 2004.

T2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007.

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