

Course Title: Electronics Engineering II

Course Code: EEG 214

Credit Hours: 3

Course Description:

This course extends the treatment of electronics engineering covered in the earlier courses.

Course Contents:

Unit 1: Feedback and Oscillator Circuit

Derivation of general expression; Effects of negative feedback; Methods of deriving and feeding; Typical circuits; Positive feedback; The condition for oscillation; The Barkhausen criterion; Sine wave oscillators; Practical consideration towards realization of sine wave oscillators; The phase shift oscillator; Wien bridge oscillator; General form of oscillator configuration; Amplitude stabilization; LC tuned oscillator-Colpitts and Hartley oscillator, Crystal oscillator; Unijunction oscillator.

Unit 2: Waveform Generators and Wave Shaping Circuit

Waveform generators- square wave generator, Schmitt trigger, Triangular wave generator, Saw tooth wave generator. Monostable, Bistable, and astable multivibrators; the 555 timer integrated circuits; Derivation of delay and frequency components; Real world Applications

Unit 3 : Nonlinear Analog Circuits

Logarithmic and exponential amplifier; Logarithmic multiplier; Two and four quadrant multipliers; Phase locked loop; Precision rectification and precision clamp; Voltage to frequency and frequency to voltage conversion.

Unit 4: Active Filter

Overview of active electronic devices; Characteristic of active filter; Advantage of active filter, Active filter design categories; First order active filter design- High pass and low pass, Significance of higher order active filter in practical application; Notch filter; All pass filter- phase lag and phase lead; State variable filter; Switched capacitor filter.

Unit 5: Logic Families and Circuits

Evolution of logic families; Characteristics of logic families; Classification of logic families; Simple circuits for logic gates, DTL, RTL, TTL; Characteristics of TTL and CMOS integrated circuit logic families; Typical circuits; Pull up/pull down resistors; Fan in and fan out, noise margin, speed of response.

Unit 6: Integrated Circuit Fabrication

Monolithic integrated circuit technology; The planar process; BJT, FET, CMOS, Diode, Resistor and capacitor fabrication; Characteristics of IC components, IC packaging; Microelectronic circuit layout

Unit 7: Optoelectronic devices

Photodiode- Types, operation, characteristic, application; Phototransistor- Types, operation, characteristic, application; Optocouplers- Types, operation, characteristic, application.

References:

1. J. Millman and A. Grabel, *Microelectronics*, McGraw Hill
2. R. Boylestad, L. Naskelski, *Electronic Devices & Circuit Theory 6th Ed*, PHI
3. M. N. Horenstein, *Microelectroinc Circuits & Devices 2nd Ed*, PHI
4. R. Gayakwad, *OP Amp and Linear Integrated Circuits*, TMH
5. D. L. Schilling, C. Belove, *Electronic Circuits*, McGraw Hill Book Company

Evaluation:

In-Semester Evaluation: 50%

End-Semester Evaluation: 50%