ELECTRONIC CIRCUITS

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Course Code: 13EC1103

Pre requisites: Electronic Devices, Basic Network Analysis.

Course Outcomes :

At the end of the course the student will be able to

- CO 1 Illustrate various biasing techniques for a transistor and perform DC analysis.
- **CO 2** Comprehend design concepts of small signal, large signal models and high frequency hybrid-model circuits.
- **CO 3** Analyze multistage amplifiers and design for frequency response.
- **CO 4** Identify the various concepts of feedback amplifiers, oscillators and stability criteria.
- **CO 5** Design and analyze power and tuned amplifiers.

UNIT-I

BIASING AND STABILIZATION:

BJT biasing, DC equivalent model, Transistor as an amplifier, criteria for fixing operating point, methods of bias stabilization, Thermal runaway, Thermal stability, Compensation Techniques, Biasing of JFET and MOSFET.

UNIT-II

TRANSISTOR SMALL SIGNAL MODEL:

Hybrid parameter representation of BJT, Analysis of single stage amplifier using h-parameters: A_v , A_i , R_i , R_o (CB, CE & CC configurations), Small signal model of FET and MOSFET (CG, CD & CS configurations).

(10 lectures)

(15 lectures)

2014

Hybrid Common Emitter Transconductance Model, Determination of Hybrid-Conductances, Variation of h-Parameters with $|I_c|$, $|V_{ce}|$ and Temperature, Relation between the Parameters f_a , f_a and f_o , Current Gain with Resistance Load, CE Short Circuit Current Gain.

UNIT-III

MULTI STAGE AMPLIFIERS:

Concept of Multi Stage Amplifiers: Methods of Inter Stage Coupling, n–Stage Cascaded Amplifiers, Miller's Theorem, Frequency Effects, Cascode Configuration, Darlington pair, Frequency response of RC Coupled Amplifiers using BJT, Gain Bandwidth Product.

UNIT-IV

FEEDBACK AMPLIFIERS & OSCILLATORS:

Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of feedback on Amplifier characteristics, Analysis of negative feedback amplifiers. Barkhausen's criteria, Hartley and Colpitt's Oscillators, RC-phase shift and Wien-bridge oscillators, Frequency and Amplitude stability of oscillators, Crystal oscillators.

UNIT-V

POWER AMPLIFIERS & TUNED AMPLIFIERS:

Introduction to power amplifiers and its classification, Distortion in amplifiers, Class-A Power Amplifier, Transformer Coupled Audio Amplifier, Class B Push Pull Amplifiers, Complimentary Symmetry Circuits, Class AB power amplifier, Class C Power Amplifier, Heat Sinks.

Single Tuned Capacitive Coupled Amplifier, Single Tuned Transformer Coupled or Inductively Coupled Amplifier, CE Double Tuned Amplifier, Stagger Tuned amplifiers, Applications of tuned amplifiers.

TEXT BOOKS:

1. J.Millman and C.C.Halkias, "Electronic Devices and Circuits" 2nd Edition, Tata McGraw Hill, 2007.

(15 lectures)

(10 lectures)

(10 lectures)

2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson/Prentice Hall, 10th Edition, 2008.

REFERENCES:

- 1. T.F. Bogart Jr., J.S.Beasley and G.Rico, "Electronic Devices and Circuits", Pearson Education, 6th edition, 2004.
- 2. S.Salivahanan, N.Suresh Kumar, A.Vallavaraj "Electronic Devices and Circuits", 2nd Edition, TMH, 2007.
- 3. B. Visvesvara Rao, K. Raja Rajeswari, P.Chalam Raju Pantulu, K.Bhaskara Rama Murty, "Electronic circuit analysis", Pearson Education, 2012.

