ELECTRONIC CIRCUIT ANALYSIS

IV Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEC004	**Core**	3	1	-	3	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

OBJECTIVES:

The course should enable the students to:

I.   Design and analyse single stage and multi stage Amplifiers.
II. Analyse the frequency response of different types of Amplifiers.
III. Interpret the concept of feedback and classify various types of feedback amplifiers.
IV. Understand the principle of oscillation and design different types of oscillators.

COURSE LEARNING OUTCOMES (CLOs):

1. Design various amplifier circuits using Bipolar Junction Transistors in Common Emitter, Common Base and Common Collector configurations.
2. Understand the effect of coupling and bypass capacitances on frequency response of single stage amplifiers.
3. Analyse various BJT amplifier circuits and their frequency responses at low, mid and High frequencies.
4. Apply the usefulness of amplifiers using semiconductor devices in various real time circuit making.
5. Understand and Remember the concept of Bipolar Junction Transistor amplifiers at high frequencies.
6. Analyse various high frequency parameters like Conductance's, resistances and Capacitances in Hybrid-π model.
7. Design RC, Transformer and Direct coupling techniques used in multi stage amplifiers and also Remember the differences between them.
8. Analyze various multistage amplifiers such as Darlington, Cascode (Common Emitter- Common Base) etc.
9. Design the tuned circuits used in single tuned amplifier, double tuned amplifiers and stagger tuned amplifiers.
10. Understand and Remember the conditions required by an electronic circuit using Bipolar Junction Transistor to act like an Oscillator.
11. Design various sinusoidal Oscillators like RC Phase shift, Wien bridge, Hartley and Colpitts oscillator for various frequency ranges.
12. Analyse the importance of positive feedback and negative feedback in connection in electronic circuits.
13. Analyze various types of feedback amplifiers like voltage series, current series, current shunt and voltage shunt.
14. Interpret the difference between small signal amplifiers and large signal amplifiers using Bipolar Junction Transistors.
15. Understand types of power amplifiers based on position of Quiescent or operating point on load lines and also understand its parameters.
16. Design different types of power amplifiers for practical applications of desired specifications like efficiency, output power, distortion etc.
17. Acquire experience in building and troubleshooting simple electronic analog circuits using Bipolar Junction Transistor.
18. Acquire the knowledge and develop capability to succeed national and international level competitive examinations.

Unit-I	**SINGLE STAGE AMPLIFIERS AND FREQUENCY RESPONSE**	**Classes: 10**

Classification of amplifiers, overview of analysis of a transistor amplifier circuit using h-parameter, Millers theorem and its dual, design of Single stage RC coupled amplifier using bipolar junction transistor, low frequency response of bipolar junction transistor amplifier, analysis at low frequency, effect of coupling and bypass capacitor.

Unit -II	HIGH FREQUENCY RESPONSE OF AMPLIFIER	Classes: 08

The hybrid-π common emitter transistor model, hybrid π conductance and capacitance, effect of coupling and bypass capacitors, common emitter short circuit current gain, current gain with resistive load, alpha, beta cut-off frequencies, gain bandwidth product ,emitter follower at high frequencies.

Unit -III	MULTI STAGE AMPLIFIERS AND TUNED AMPLIFIERS	Classes: 10

Multistage amplifier: Different coupling schemes used in amplifiers, RC coupled amplifiers, transformer coupled amplifiers and direct coupled amplifiers, analysis of cascaded RC coupled bipolar junction transistor amplifiers, cascode amplifiers, Darlington pair.

Tuned amplifiers: introduction, Q - factor, small signal tuned amplifier, effect of cascading single tuned amplifiers on bandwidth, stagger tuned amplifiers, stability of tuned amplifiers..

Unit -IV	FEEDBACK AMPLIFIERS AND OSCILLATORS	Classes: 09

Feedback amplifiers: Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, analysis of voltage series, voltage shunt, current series and current shunt feedback configurations, problems;
Oscillators: Classification of oscillator, conditions for oscillations, RC phase shift oscillator, generalized analysis of LC oscillations, Hartley and Colpitts oscillators, Wien - bridge and crystal oscillators, stability of oscillators.

Unit -V	LARGE SIGNAL AMPLIFIERS	Classes: 08

Classification, class A large signal amplifiers, transformer coupled class A audio power amplifiers, efficiency of class A amplifier, class B amplifier, efficiency of class B amplifier,
class B push-pull amplifier, complementary symmetry class B push-pull amplifier, distortion in power amplifiers, thermal stability and heat sinks.

Text Books:

1. Jacob Millman , Christor C Halkias, ―Integrated Electronics‖, Tata McGraw Hill, 1st Edition, 2008.B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.
2. Sedra A.S., K.C. Smith, ―Micro Electronic Circuits‖, Oxford University Press, 6th Edition, 2013.
3. Donald A Neamen, ― Electronic Circuits Analysis and Design‖ , Tata McGraw Hill , 3 rd Edition, 2007.

Reference Books:

1. David A. Bell ―Electronic Devices & Circuits‖ 5th Edition,. Oxford university press, 7 th Edition, 2009.
2. S.Salivahna, N. Suresh kumar, ―Electronic circuit analysis‖, McGraw-Hill Education, 1 st Edition, 2011.
3. Robert L. Boylestad, Louis Nashelsky, ―Electronic Devices and Circuits Theory‖, Pearson education, 9 th Edition, 2008.
4. K. Lal Kishore, ―Electronic Circuit Analysis‖, BS Publications,1st Edition, 2004.

Web References:

1. http://www.igniteengineers.com
2. http://www.ocw.nthu.edu.tw
3. http://www.uotechnology.edu.iq

E-Text Books:

1. https://www.jntubook.com/electronic-circuit-analysis-textbook
2. http://tradownload.com/results/neamen-electronic-circuit-analysis-and-design-.html
3. http://www.allaboutcircuits.com