

GRAPHIC ERA UNIVERSITY, DEHRADUN

Second Semester 2016-2017

Model Course Handout

Date: 1-01-2017

Course No.	:	TEC 201
Course Title	:	Basic Electronics Engineering
Instructor-in-Charge	:	Dr. Anamika Bhatia Jain
Instructor(s)	:	1. Mr. Bhasker Nautiyal 2. Mr. Sumit Tripathi

Course Description:

The course intends to provide an overview of the principles, operation and application of the analog building blocks like diodes, BJT, FET etc for performing various functions. This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved. It provides an overview of amplifiers, feedback amplifiers and oscillators. The course also introduces the concepts and techniques associated with the number systems and codes. To minimize the logical expressions using Boolean postulates, map method and tabular method. The Design of combinational logic circuits using conventional gates. It also gives a brief Understanding of the internal structure of measuring instruments that are used in measuring parameters related to electronics and also difference between analog meters and digital meters and their performance characteristics.

Scope & Objective:

After the completion of course the student must be able to identify schematic symbols and understand the working principles of electronic devices e.g. Diode, Zener Diode, BJT, JFET and MOSFET etc. and understand the working principles of electronic circuits e.g. Rectifiers, Clipper, Clamper, Filters, Amplifiers and Operational Amplifiers etc. also understand methods to analyze and characterize these circuits. The student should be able to apply this knowledge to the analysis and design of basic circuits. The present course aims at making the student learn the theory of bipolar transistor, operation, biasing effects and stabilization of factors in various configurations. It deals with the philosophy of number systems and codes, one should be able to Simplify the logic expressions using Boolean laws and postulates and design them by using logic gates ,minimize the logic expressions using map method and tabular method and design of combinational logic circuits using conventional gates. The student must understand the functioning and purposes of Power Supplies, Test and Measuring equipments such as Multimeters, CROs and Function generators etc. and should be able to rig up and test small electronics circuits.

Text Book(s):

TB1: Jacob Millmann & Halkias, '*Integrated Electronics*', TMH, 2nd Edition 2010

TB2: Boylestad and L. Robert and Nashelsky Louis, '*Electronics Devices and Circuits Theory*', PHI/Pearson Education, 9th Edition.

TB3: Mano M. Morris and Ciletti M. D., '*Digital Design*' Pearson Education 4th Edition.

Reference Books:

R1: Sedra A.S. & Smith K.C., '*Microelectronic Circuits*' (5/e), Oxford University Press, 2004

R2: Kalsi H.S., '*Electronics Instrumentation*', TMH Ed. 2004.

Course Plane:

Lecture No.	Learning Objectives	Topics to be covered	Reference Chap./Sec. (Book)
	UNIT - I		
1-2	Insulators, semiconductors and metals, Mobility and conductivity	Introduction of Semiconductor Physics	TB1 Chap2,5 TB2 Chap1
3-4	Intrinsic and extrinsic semiconductors and charge densities in semiconductors	Classification of semiconductors	TB1 Chap2,5 TB2 Chap1
5-6	Fermi Level, current components in semiconductors, continuity equation	Charge flow in Semiconductors	TB1 Chap2 TB2 Chap1
7-8	PN Junction diode – characteristic and analysis, Diode Models.	Understanding of PN Junction	TB1 Chap4 TB2 Chap1
	UNIT - II		
9-15	Half wave Rectifier, Half wave Rectifiers circuit analysis, full wave Bridge rectifier, full wave Bridge rectifier circuits analysis, L, C and Pi filters	AC to DC Conversion	TB1 Chap4 TB2 Chap2
16-18	Clipping circuits (Series and Parallel) clamping circuits	Wave shaping Circuits	TB1 Chap4 TB2 Chap2
19-20	Zener Diode, Basic regulator supply using zener diode.	Special purpose diode and its application	TB1 Chap4 TB2 Chap1
	UNIT - III		
21-25	Construction of bipolar junction, transistors (BJT's)-Comm. Base, characteristics of bipolar junction, transistors (BJT's) Comm. emitter, Comm. Collector configuration	Bipolar Junction Transistor and different configurations of BJT	TB1 Chap9 TB2 Chap3
26-30	Transistor biasing, bias stabilization, operating point, Analysis of fixed base bias, collector to base bias, Emitter resistance bias circuit, self	Types of BJT Biasing	TB1 Chap9,10 TB2 Chap4

	bias circuit, Bias compensation techniques, Thermal Runaway and heat sink.		
31-33	FET Construction, Characteristics of JFET, MOSFET construction and characteristics	Field Effect Transistor	TB1 Chap9 TB2 Chap5
	UNIT - IV		
34-37	Introduction to Op-amp, Inverting and non-inverting configuration, Applications – adder, subtractor, integrator, differentiator and comparator.	Op-Amp and its Applications	TB2 Chap14,15
38-39	Construction and working of CRO, measurement of frequency, phase and amplitude, Lissajous figures	Cathode Ray Oscilloscope	TB2 Chap22
	UNIT - V		
40-41	Number systems and their conversion, Addition & Subtraction of binary, octal and hexadecimal numbers , multiplication & division of binary numbers, fractional numbers	Number systems and conversion in different basis	TB3 chap1,2
42-46	Boolean algebra, logic gates , De-Morgan's theorem, implementation of basic gates using universal gates, implementation of logic functions using basic gates & universal gates NOR gate, implementation of logic functions using NAND gate, SOP & POS form of logic expression, canonical form, conversion from SOP & POS form to canonical form, Simplification of Boolean function: Algebraic method,	Boolean algebra and logic gates	TB3 chap1,2,3
46-48	Karnaugh map method(two, three & four variable K-map with don't care condition).	K-Map: An alternate approach of Boolean expression simplification	TB3 chap3

Evaluation Scheme:

No.	Component	Duration	Marks	Weightage (%)	Date & Time	Nature
1	Mid Term Test	2 hrs.	25	25		Closed Book
2	End Term Examination	3 hrs.	50	50		Closed Book
3	Class Participation		5	5		
4	Assignment(s)		5	5	See Note 1*	
5	Quiz(s)/Surprise Quiz(s)/Case Studies/Group Discussion/Group Task etc.		5	5	See Note 2*	
				10		

***Note1:** A total of three assignments will be given in the entire semester.

***Note2:** Two quizzes/surprise quizzes/case studies/group discussion/group task etc. will be conducted in the entire semester during the tutorial session.

Chamber Consultation Hour: To be announced in the class.

Notices: All notices concerning this course will be displayed on the ECE Notice Board and also made available online through B.Tech. first year website of GEU.

Instructor-in-charge

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