KL UNIVERISTY
FIRST SEMESTER 2010-11
Course Handout
Academic Division

Dated: 07-07-2010

Course No. : **EC C202 / EEC 201 / EM C202**
Course Title : **Electronic Devices and Circuits**
Course Structure : **3-1-2**
Course coordinator : **Mr M Siva Ganga Prasad**
Instructors : **Dr. Lakshmi Narayana, J. Chandrasekara Rao, B.Bhavani, Naseem Shaik, I. Manohar, L Ravichandra, N. Durga Indira, M.Shivaganga Prasad, T.Sreelakshmi, J. Bhavani, P.Purnapriya, KVL Bhavani, N Venkatram, G.Subryamanya Sharma,**

1. Course Description:

Electronic Devices & Circuits is defined as the various electronic devices are connected as an appropriate circuitry and verify their characteristics. All the basic devices like semi conductor junction diodes, BJTs and FETs are responsible to build various communication circuits. The basic understanding of EDC is a pre-requisite for any student trying to establish a research or academic career in the field of ECE. Most of the research in ECE hovers around Communications, Signal Processing, Image Processing and VLSI. Thus, it is essential to know the basic and fundamental characteristics of various electronic devices. This paper describes the applications PN junction diodes, fundamental requirements for BJT to acts as an amplifier and characteristic of various unipolar devices.

2. Scope and Objective of the Course:

Based on the knowledge gained by the student at first year level about semi conductor diode characteristics and conduction capabilities, there is a scope to learn semi conductor diode applications like working of rectifiers with and without filters in unit1 , based on the knowledge of BJT characteristics, there is a scope to learn biasing techniques of BJT to operate it as an amplifier, small signal analysis of BJT in unit 2 , high frequency analysis of BJT in unit 3 ,Introduction of FET , its biasing techniques and its low frequency model in unit 4 and finally there is a scope to learn about UJT,SCR,DIAC and TRIAC characteristics.

3. Books:

(i) Textbook:

A. Jacob Millman and Christos.C Halkias, “Electronic Devices and circuits”, TMH 2002
b. 2.Robert L Boylested and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 8th Edition PHI 2002.

(ii) Reference Book:

a. G.S.N.Raju,” Electronic Devices and circuits”, IK International,2006.
b. Balbir Kumar & Shail B.Jain, “Electronic Devices And Circuits”,PHI-2007.
c. David A Bell, “Electronic Devices and circuits”, 4th Edition, PHI 2003.
d. Robert Diffenderfer, “Electronic Devices systems & Applications”, India Edition, CENGAGE Learning

4. Syllabus:

Unit – I

RECTIFIERS Diode as a Rectifier, Half wave, Full wave and Bridge Rectifiers without filter and with inductor filter, Capacitor filter, L section and π – section filters.

Unit – II

JUNCTION TRANSISTOR: Transistor DC bias and its stabilization, various stabilization and compensation circuits, thermal runaway and thermal stability, Hybrid parameter model of transistor. Hybrid Parameter model of a Transistors

Unit – III

Transistor at High Frequencies: Hybrid π model of transistor, CE short circuit gain, CE current gain with Resistive load, Single stage CE amplifier response, Gain Bandwidth product, Emitter follower at high frequencies

Unit - IV

UNI-POLAR DEVICES: JFET, depletion – MOSFET and enhancement – MOSFET: basic construction, operation, drain and transfer characteristics FET parameters - r_d , g_m, μ ; biasing methods, FET low frequency model.

Unit – V

UJT: Basic construction, electrical equivalent circuit and operation, emitter characteristics, SCR,DIAC, TRIAC Characteristics, Photo devices

5.Course Plan:

Course plan is meant as a guideline. There may probably be changes.

Lecture No	Learning Objectives	Topics to be covered	Reference	Page No
		UNIT- I		
1	Diode as a rectifier, Classification rectifiers	Basics description diode as a rectifier	T1	592
2	Half-Wave rectifier	Analysis of various parameters related with half-wave rectifier	T1	593-597
3	Full-Wave rectifier	Analysis of various parameters related with full-wave rectifier	T1	598-599
4	Bridge Rectifier	Basic construction and operation	T1	599-600
5	Rectifiers with capacitor filter	Analysis of various parameters	T1	603-605
6	Rectifiers with Inductor filter	Analysis of various parameters	T1	606-611
7	Rectifiers with L& π section filters	Analysis of various parameters	T1	612-614
8	performance comparison	Merits, demerits	T1	615-616
9	Introduction to biasing	DC load line analysis	T1	263
10	Fixed bias method	Analysis of operating point with fixed biasing	T1	263
11	Collector to base	Analysis of operating point	T1	264

	bias method	with collector to base biasing		
12	Self biasing method	Analysis of various parameters	T1	265-269
13	Self biasing method	Analysis of various parameters	T1	270-276
14	various stabilization methods	Analysis of operating point with stabilization	T1	278
15	Compensation techniques	Analysis of operating point with compensation	T1	278-280
16	Compensation techniques Thermal run away	Analysis of operating point with compensation, temperature effect	T1	281-283
17	Hybrid parameter model of a transistor	Hybrid parameter analysis	T1	288
18	Hybrid parameter model of a transistor	Low frequency analysis	T1	294
19	Hybrid parameter model of a transistor	Analysis of various parameters	T1	296
20	Introduction to high frequency analysis	Discussion on structure of the model	T1	363
21	Hybrid π model	Analysis of various parameters	T1	365
22	CE short circuit current gain	Analysis of common emitter amplifier with s/c current gain	T1	368
23	CE short circuit current gain with resistive load	Analysis with resistive load	T1	378
24	Single stage CE amplifier	Operation and its response	T1	379
25	Single stage CE amplifier	Gain Band width product	T1	380
26	Single stage CE amplifier	Gain Band width product	T1	381
27	Emitter follower at high frequencies	Operation and its response	T1	382
28	Emitter follower at high frequencies	Analysis and comparison	T1	382
29	Introduction Uni-polar devices	Nature and characteristics	T1	385
30	JFET	Construction and operation	T1	386-388

31	Types of JFETs(n & p channel)	Comparison, depletion regions	T1	389
32	Transfer & drain characteristics	Response of JFETs	T1	390
33	Introduction to MOSFET	Construction and operation	T1	396
34	Types(depletion & enhancement) of MOSFETs	Comparison of merits, demerits	T1	397-398
35	Parameters of FET	μ, r_d, g_m and their relation	T1	393
36	Biasing techniques for FET	Setting operating point	T1	407-408
37	Low frequency model of FET	Analysis of various parameters	T1	392
38	Low frequency model of FET	Analysis of various parameters	T1	393-394
39	Introduction to UJT	Basic construction of UJT	T1	412
40	Electrical equivalent model	Operation and its emitter characteristics	T1	413-415
41	Introduction to SCR	Basic construction and operation of SCR	T2	
42	Two transistor analogy	analysis	T2	
43	TRIAC	Construction and operation	T2	
44	DIAC	Construction and operation	T2	
45	Introduction to Photo devices	Basic construction & operation	T1	566

6.Self learning material:

Sl.No	TOPIC	SOURCE
1.	Quantitative theory of P-N junction diode	Text Book
2.	V-I characteristics of P-N junction diode	Text Book
3.	**Junction Transistor**	Text Book
4.	CB,CE and CC configurations of BJT and their characteristics	Text Book
5.	**Transistor as an amplifier**	Text Book

7.Evaluation Scheme:

Component	Duration (minutes)	% Weightage	Marks	Date & Time	Venue
Test-1	50 Min	8	10	14.08.10 9.00 to 10.20 A.M	CSE001, 002, 004, 005, 101, 102,104,105,106,201,204,205,301,302,509, NSH
Test-2	50 Min	8	10	18.09.10 09.00 to 10.20 AM	CSE001, 002, 004, 005, 101, 102,104,105,106,201,204,205,301,302,509, NSH
Assignement submission		4	5	Continuous	
Assignment Test	50 Min	4	5	30.10.10 09.30 to 10.20 AM	CSE001, 002, 004, 005, 101, 102,104,105,106,201,204,205,301,302,509, NSH
Quiz	30 Min	4	5	30.10.10 09.30 to 10.20 AM	CSE001, 002, 004, 005, 101, 102,104,105,106,201,204,205,301,302,509, NSH
Regular Lab Evaluation	Continuous	10	50		
Comprehensive Lab Exam	3 Hrs	8	40		
Comprehensive Exam	3 Hrs	48	60		
Attendance for Theory & Tutorial		4	5	Continuous	
Attendance for Lab		2	10	Continuous	

8. Chamber consultation hour: Informed in the class in first week.

9. Notices: All notices regarding the course will be put in E-learning website.

10.Tutorial: Tutorial will be conducted by the respective in charge faculty. The tutorials are planned to supplement the material taught in the lectures and clear doubts. Student must attend registered section for tutorial in the respective classroom. Class assignment, class tests and other evaluation components will also be conducted during tutorials. Students must actively participate in the tutorial and come prepared for it.

Course Coordinator