

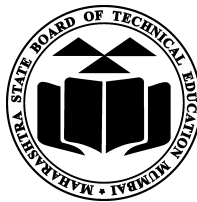
A Laboratory Manual for

Basic Electronics

(9034)

Semester - III (EE Group)

Diploma in Engineering and Technology Courses



Maharashtra State
Board of Technical Education, Mumbai

CURRICULUM DEVELOPMENT CELL, MSBTE, MUMBAI.

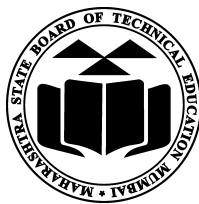
LABORATORY MANUAL DEVELOPMENT PROJECT

Designations	Team for design
Project Institution	Government Polytechnic, Nanded Veer Savarkar Marg , Nanded - 431602. ☎ (02462) 254210, 252520.
Project Period	November 2006 - February 2007
Chief Project Coordinator	Mr. S.R. Thute Principal Government Polytechnic, Veer Savarkar Marg , Nanded - 431602.
Project Coordinator	Mr. S.S. Ashtputre Government Polytechnic, Nanded Veer Savarkar Marg , Nanded - 431602.
Subject Experts	1. Mr. B.P. Deosarkar Government Polytechnic, Nanded - 431602 2. Mr. K.M. Bakwad P.L.Government Polytechnic, Latur - 413512

© 2006, Maharashtra State Board of Technical Education,

49, Kherwadi, Aliyaware Jung Marg, Bandra (East), Mumbai - 400 051,
Maharashtra State, India.

Any part of this Laboratory Manual may not be reproduced in any form or by any
means without permission in writing from MSBTE Mumbai.



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

Certificate

This is to certify that Mr. / Ms.
Roll No., of Third Semester of Diploma in
.....has satisfactorily completed
the term work in **Basic Electronics (9034)** for the academic
year 20..... - 20..... as prescribed in the curriculum.

Place :

Enrolment No.:

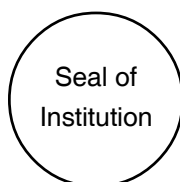
Date :

Exam. Seat No.:

Subject Teacher

Head of the Department

Principal



LEARNING OVERVIEW

Importance of the subject:

The field of Electronics Engineering is characterized by rapid and continuous evolution both in philosophy and technology. Training and development of skilled technicians in this sector is a matter of serious and thoughtful planning.

Among the tools needed for manpower development, the lab manual plays a vital role. Textbooks written on analytical themes in electronics engineering provide theoretical foundation, but lab manuals presenting the techniques in practical systems are required to develop intellectual and motor skills in young diploma engineers.

Low voltage requirements of electronic devices and their ability to control high power electrical equipment made the use of electronic devices in electrical industries more prominent. With the evolution of integrated circuits the space requirement is also reduced. The electronic control is more superior to other control methods with respect to cost, reliability, maintenance and controlling power. Therefore study of basic electronic components will provide the supporting tools for electrical control industry.

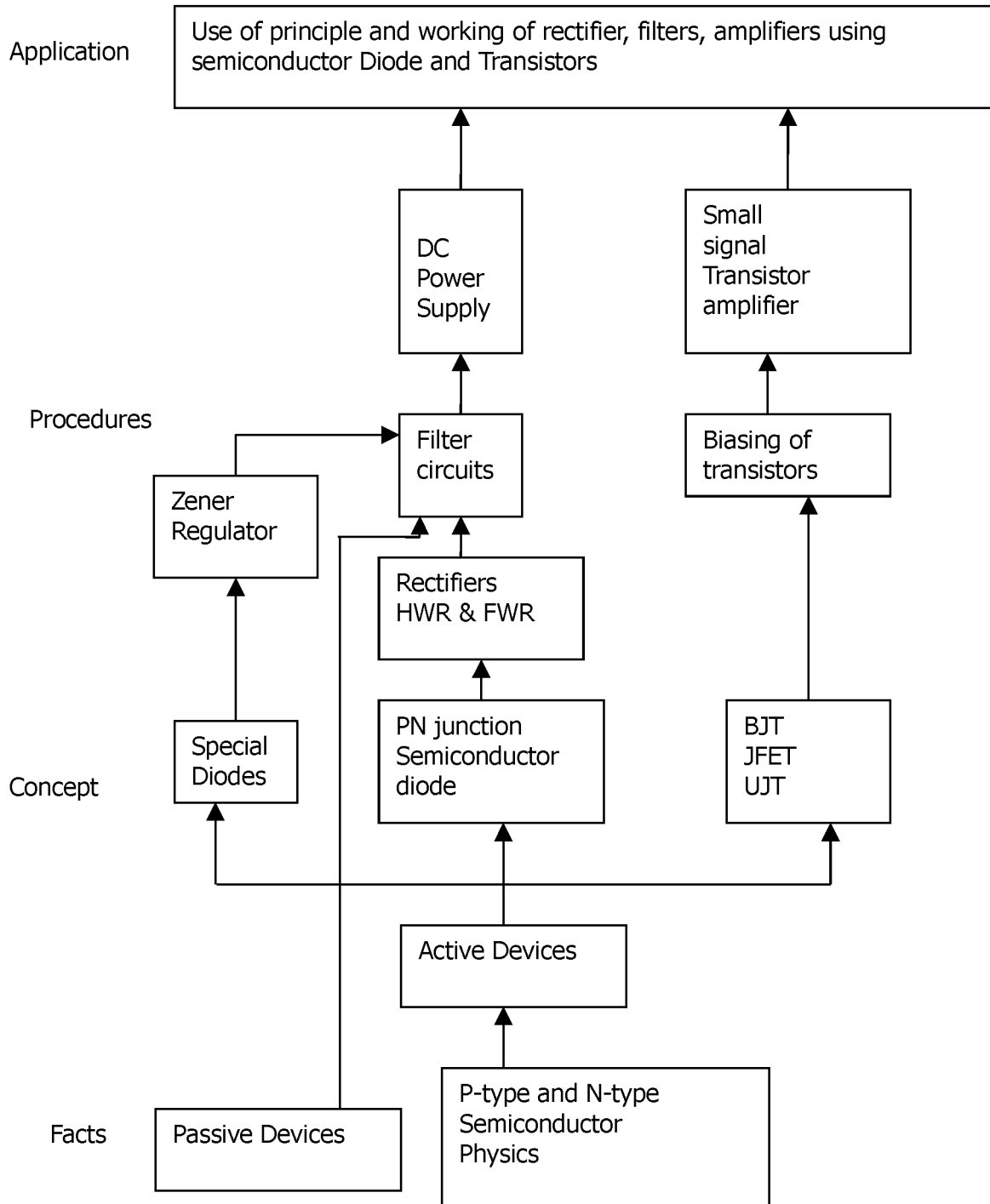
In this subject the following techniques are intended for the study:

- Understand the basic principles of electronic devices.
- Identify and specify various electronic components and devices.
- Understand the construction and working principles of different electronic devices.
- Understand the use of different electronic devices.

The various components and devices that will be studied are -

Sr. No.	Devices/ Components	Applications
1.	Diode	Switch, Rectifier etc.
2.	BJT	Switch, Amplifier, Voltage regulator etc.
3.	UJT	Triggering devices etc.
4.	JFET	Amplifier etc.
5.	Zener Diode	Voltage regulator etc.
6.	Capacitor	Filter etc.
7.	Inductor	Filter etc.

Learning Structure:



DEVELOPMENT OF SKILLS

The laboratory work is to be carried out to attain the following skills -

A. Intellectual Skills:

Sr. No.	Skills	Explanation
1	Understanding	To understand the behavior of the circuit.
2	Classifying	To discriminate between input, output and circuit/system.
3	Labeling	To label each part in the diagram.
4	Identifying	To identify the components and equipment. Selection of proper equipment.
5	Inference	To interpret the results/analyse the graphs/ calculate the parameters.
6	Discriminating	To identify the different parts of the plotted graphs/characteristics.

B. Motor Skills:

Sr. No.	Skills	Explanation
1	Observation	To observe the experimental kit, output.
2	Sketching	To draw the required sketch.
3	Listing	To prepare list of the components.
4	Connecting the circuit	To make the connections as per circuit diagram.
5	Noting the readings	To note down the observations and specifications.
6	Plotting	To plot the graph of dependent quantity versus variable quantity.

GRID TABLE

Following table gives grid of experiments and related intellectual and motor skills

- Teacher shall ensure the development of generic skills during the practicals.
- Students are expected to focus on acquiring specific skills mentioned therein.

No.	Experiment No. & Title	Intellectual skills						Motor skills					
		I ₁	I ₂	I ₃	I ₄	I ₅	I ₆	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆
01	Know your Electronics Laboratory Part -I (Introduction to various components used in electronics laboratory)	√		√	√			√	√	√	√	√	√
02	Know your electronics Laboratory Part -II (Introduction to different electronic equipments used in electronics laboratory)	√		√				√	√			√	
03	To determine V-I characteristic of diode and zener diode and to find their static and dynamic resistances.	√	√	√	√	√	√	√			√	√	√
04	To determine and interpret the characteristics of Junction Field Effect Transistor (JFET)	√	√	√	√	√	√	√		√	√	√	√
05	To draw and study characteristics of Uni Junction transistor (UJT).	√	√	√	√	√	√	√			√	√	√
06	To determine the load characteristics of rectifier with filter circuits.	√	√	√	√	√	√	√	√	√	√	√	√
07	To plot the output characteristics of BJT in common base (CB) configuration and find current amplification factor (α).	√	√	√	√	√	√	√			√	√	√
08	To plot the output characteristics of BJT in common emitter (CE) configuration and find current amplification factor (β).	√	√	√	√	√	√	√			√	√	√
09	To plot the frequency response of single stage CE amplifier and find out its cut off frequency and bandwidth.	√	√	√	√	√	√	√			√	√	√
10	To understand and plot frequency response of two stage common emitter amplifier	√	√	√	√	√	√	√			√	√	√
11	To understand zener diode as voltage regulator	√	√	√	√			√	√		√	√	√
12	To understand the working of transistorized series and shunt regulator	√	√	√	√			√	√		√	√	√

NOTE : √ Identified Skills

(The curriculum of this subject is referred and the above list of experiments is finalised to achieve the desired objectives)

STRATEGY FOR IMPLEMENTATION

It is suggested that the total experiments shall be accommodated in the periods (working hours) available in the semester.

TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Examination Scheme						
TH	TU	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
04	--	02	03	80	20	50#	---	25 [@]	175

@ - Internal Assessment. # - External assessment.

GUIDELINES FOR TEACHERS

Teachers shall discuss the following points with students before start of experiments of the subject.

1. **Learning Overview** : To develop better understanding of importance of the subject. To know related skills to be developed such as Intellectual skills and Motor skills.
2. **Learning Structure** : In this, topics and sub topics are organized in systematic way so that ultimate purpose of learning the subject is achieved. This is arranged in the form of fact, concept, principle, procedure, application and problem.
3. **Know your Laboratory Work** : To understand the layout of laboratory, specifications of Equipment / Instruments / components used, Materials, procedure, working in groups, planning time etc. Also to know total amount of work to be done in the laboratory.
4. Teacher shall ensure that the required equipments are in working condition before start of experiment, also keep operating instruction manual available.
5. Explain prior concepts to the students before the start of each experiment.
6. Involve students in the activities during the conduct of each experiment.
7. While recording the observations each student (from a batch of 20 students) shall be given a chance to perform or observe the experiment.
8. List of questions is given at the end of each experiment. Teacher shall instruct the students to attempt all questions given at the end of each experiment as a separate exercise. Teacher shall ensure that each student writes the answers to the allotted questions in the laboratory manual after the performance.
9. If the experimental set up has variations in the given circuit diagram, the teachers are advised to make the necessary changes, wherever needed.
10. Teacher shall continuously assess the performance of students as per norms prescribed by MSBTE.
11. Teacher should ensure that the respective skills and competencies are developed in the students after the completion of the practical exercise.
12. Teacher is expected to share the skills and competencies to be developed in the students.
13. Teacher may provide additional knowledge and skills to the students even though that may not be covered in the manual but are expected from the students by the industries.
14. Teachers shall ensure that the industrial visits recommended in the manual are covered.
15. Teacher may suggest the students to refer additional related literature of the Technical papers / Reference books / Seminar proceedings, etc.
16. During assessment teacher is expected to ask questions to the students to tap their achievements regarding related knowledge and skills so that students can prepare while submitting record of the practicals. Focus should be given on development of enlisted skills rather than theoretical / codified knowledge.
17. Teacher should enlist the skills to be developed in the students that are expected by the industry.
18. Teacher should organize Group discussions / brain storming sessions / Seminars to facilitate the exchange of knowledge amongst the students.
19. Teacher should ensure that revised CIAAN - 2006 norms are followed simultaneously and progressively.

20. Teacher should give more focus on hands on skills and should actually share the same.
21. Teacher shall also refer to the Circular No. MSBTE/D-50/Sem (I) Lab Manual/2006/4565 dated 6/6/2006 for additional guidelines.
22. As the experimental setup differs from institute to institute it is expected that the subject teacher shall modify the circuit diagrams as per setup requirement. Students are expected to do this work at the time of actual performance of experiment in the laboratory.

INSTRUCTIONS FOR STUDENTS

Students shall read the points given below for understanding the theoretical concepts and practical applications.

1. Students shall listen carefully to the lecture given by teacher about importance of subject, curriculum philosophy, learning structure, skills to be developed, information about equipment, instruments, procedure, method of continuous assessment, tentative plan of work in laboratory and total amount of work to be done in a semester.
2. Students shall undergo study visit of the laboratory for types of equipment, instruments, material to be used, before performing experiments.
3. Students shall read the write up of each experiment to be performed, a day in advance.
4. Students shall organise the work in the group and make a record of all observations.
5. Students shall understand the purpose of experiment and its practical implications.
6. Students shall write the answers of the questions allotted by the teacher during practical hours if possible or afterwards, but immediately.
7. Student should not hesitate to discuss any difficulty faced during conduct of practical / exercise.
8. The student shall study all the questions given in the laboratory manual and practice to write the answers to these questions.
9. Student shall develop maintenance skills as expected by the industries.
10. Student should develop the habit of pocket discussion / group discussion related to the experiments / exercises so that exchange of knowledge / skills could take place.
11. Student shall attempt to develop related hands - on - skills and gain confidence.
12. Student shall focus on development of skills rather than theoretical or codified knowledge.
13. Student shall visit the nearby workshops, workstation, industries, laboratories, technical exhibitions, trade fair etc. even not included in the Lab Manual. In short, students should have exposure to the area of work right in the student hood.
14. Student shall insist for the completion of recommended Laboratory work, industrial visits, answers to the given questions, etc.
15. Student shall develop the habit of evolving more ideas, innovations, skills etc. those included in the scope of the manual.
16. Student shall refer technical magazines, proceedings of the Seminars, websites related to the scope of the subjects and update their knowledge and skills with current developments.
17. Student should develop the habit of not to depend totally on teachers by developing self learning techniques.
18. Student should develop the habit to react with the teacher without hesitation with respect to the academics involved.
19. Student should develop habit to submit the practicals, exercise continuously and progressively on the scheduled dates and should get the assessment done.
20. Student should be well prepared while submitting the write up of the exercise. This will develop the continuity in the studies and he will not be over loaded at the end of the term.

List of Experiments and Record of Progressive Assessment

Sr. No.	Name of the Experiments	Page No.	Date of Performance	Date of submission	Assessment Max. Marks 10	Sign. of Teacher and Remarks
01	Know your Electronics Laboratory Part -I (Introduction to various components used in electronics laboratory) to A.C.					
02	Know your electronics Laboratory Part -II(Introduction to different electronic equipments used in electronics laboratory)					
03	To determine V-I characteristic of diode and zener diode and to find their static and dynamic resistances.					
04	To determine and interpret the characteristics of Junction Field Effect Transistor (JFET)					
05	To draw and study characteristics of Uni Junction transistor (UJT).					
06	To determine the load characteristics of rectifier with filter circuits.					
07	To plot the output characteristics of BJT in common base (CB) configuration and find current amplification factor (α).					
08	To plot the output characteristics of BJT in common emitter (CE) configuration and find current amplification factor (β).					
09	To plot the frequency response of single stage CE amplifier and find out its cut off frequency and bandwidth.					
10	To understand and plot frequency response of two stage common emitter amplifier					
11	To understand zener diode as voltage regulator					
12	To understand the working of transistorized series and shunt regulator					
					Total Marks Average Marks out of 15 *	

* **To be transferred to proforma A-2 of CIAAN - 2006**

(The curriculum of this subject is referred and the above list of experiments is finalised to achieve the desired objectives)