CMR Engineering College
Affiliated to JNTU, Hyderabad and Approved by AICTE-New Delhi

Department of Electronics and Communication Engineering

LAB IMPROVEMENT PROGRAM FOR FUTURE TRENDS (LIFT) MANUAL

A Guide for execution of Lab Courses

VISION OF THE INSTITUTE:

To be recognized as a premier institution in offering value based and futuristic quality technical education to meet the technological needs of the society.

MISSION OF THE INSTITUTE:

➢ To impart value based quality technical education through innovative teaching and learning methods.
➢ To continuously produce employable technical graduates with advanced skills to meet the current and future technological needs of the society.
➢ To prepare the graduates for higher learning with emphasis on academic and industrial research.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

VISION

To promote excellence in technical education and scientific research in electronics and communication engineering for the benefit of society.

MISSION

➢ To impart excellent technical education with state of art facilities inculcating values and lifelong learning attitude.

➢ To develop core competence in our students imbibing professional ethics and team spirit.

➢ To encourage research benefiting society through higher learning.

PROGRAMMES EDUCATIONAL OBJECTIVES

➢ PEO 1: Excel in professional career & higher education in Electronics & Communication Engineering and allied fields through rigorous quality education.

- PEO 2: Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.
- PEO 3: Solve real life problems relating to Electronics & Communication Engineering for the benefits of society.

PROGRAM OUTCOMES (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, social, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

LAB IMPROVEMENT FOR FUTURE TRENDS PROGRAMME (LIFT)

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GUIDELINES FOR LAB IMPROVEMENT FOR FUTURE TRENDS

(**LIFT PROGRAMME**)

I. **Aim of the Lift Programme:**

The main aim of the Lift programme in laboratory is to innovate, modify the existing facilities in labs, to create awareness among the students and develop Industry –Institution interactions and reach the standards in laboratories.

II. **Functions of the Lift Programme:**

(i)   To create better understanding among all the staff and lab staff / technicians about the concepts of Lift and other lab related activities.

(ii)   To Prepare Gap Analysis: This involves collection of requirements from each Lab of every department, information about expansion of labs, repairs and maintenance of labs etc.

(v)   To arrange Industrial Visits: A lab and lift related industrial visit will be organized in a year for II or III year students and a report is to be submitted by all the students who visited that particular industry.

(vi)   A report on Smart (Shadow) Engineering: This involves arrangement of Industrial practical learning, submission of Industrial visit report, Technical Survey reports and Market Survey of a product for development in laboratories.

(vii)   Verification of all the laboratories in every department by Lift Team along with the Principal and Concerned HODs to check whether the activities are going according to Lift guidelines, record keeping, Lab Manuals and Viva sessions etc.

(viii) Check for LEAD Experiments and its follow up

(ix)   Submission of proposals related to R&D, Project and Consultancy from lab staff to Principal Sir for further approvals.

LAB IMPROVEMENT FOR FUTURE TRENDS PROGRAMME (LIFT CONCEPT)

1. OBJECTIVES AND RELEVANCE:

The main aim of the Lift programme in laboratory is to innovate, modify the existing facilities in labs, to create awareness among the students and develop Industry Institution interactions and reach the standards in laboratories.

2. SCOPE:

The main scope of the Lift lab course is to cover all the experiments as per the schedule given in the prescribed week wise periods. With this, a student can better understand the concepts and operating systems so that he could be able to get better knowledge about each lab.

3. PREREQUISITES:

The basic level idea related to each experiment should be provided to the students before conducting main lab course Following details are to be explained related to experiment:

   a. Introduction to experiment – 30 min
   b. Operating of the equipment/instrument/software
   c. Record of Experimental results.
   d. Sample Calculations / Executable Programmers

4. SYLLABUS AS PER JNTUH:

The lab course should be planned as per the JNTUH syllabus. In this, LEAD experiments should also be included in cycle of experiments.

5. GUIDELINES FOR LEAD EXPERIMENT:

   a. A Lead Experiment is selected apart from all the other experiments that covered in JNTUH Syllabus.
   b. This experiment is exclusively new idea with the background from the rest of the experiments that continuously running in each laboratory.
   c. Lead experiment should utilize the existing resources within the laboratory itself.
   d. Every student should aware of Lead Experiment and himself involved in doing and knowing about the experimental technique.
   e. A separate page is provided to record lead experiment in record book stating all details like Aim, Procedure and Record of Results.
   f. A Lead experiment should be a unique one from all the other experiments.
   g. Each Lab Staff / Technicians must clearly explain all the students about the concept of Lead

Experiment and make them understand before going to that Experiment.

6. VIRTUAL LAB EXPERIMENT

The Virtual Laboratory is an interactive environment for creating and conducting simulated experiments: a playground for experimentation. To enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.

7. SUGGESTED BOOKS:

The suggested books should be recommended to the students as per the JNTUH syllabus prescribed.

8. WEBSITES (USEFUL LINKS):

The useful links should be provided to the students, where they can get easily accessing the knowledge of the experiment.

9. EXPERT DETAILS:

The expert details should be provided based on the experimental importance.

10. a. LAB SCHEDULE

The lab schedule should be provided to the students before coming to lab. They will know the next experiments to be conducted for that batch.

b. VIVA SCHEDULES:

An exclusive viva will be conducted for all the students to test their knowledge, ability to pick up from the experimental techniques, skill development in laboratories. This viva will be organized depending upon sessions schedule in each lab.

c. SCHEME OF EVALUATION

The students will know the individual marks evaluation for internal and external lab exams.

11. PROJECT/PRODUCT/PAPER BASED LEARNING

Proposal of project with extended abstract, Block Diagram / Circuit / Flow diagram and clear references may be presented and executed.(or)

A product of utility may be proposed to develop for in house usage / industrial requirements may be useful for any outside agency that can be marketable in order to generate revenue through consultancy. (or)

An article/white paper from a magazine /journal/weekly/any periodical in the entitled Subject

12. **MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D:**

The lab course should be designed in such a way that it should meet the requirements of research and development as well as consultancy projects. Also the Proposals of Project/R&D/Consultancy are as follows:

Proposal 1: Project Design & Execution.
Proposal 2: R& D Level Project Design & Execution.
Proposal 3: Consultancy Task / Project Design & Development.

a. **PROPOSAL FOR R & D ACTIVITY**:

1. An exact paper from a National / International journal in this entitled area / subject / area
   (IEEE Format)
   AND/OR
2. An article / white paper from a magazine / journal / weekly / any periodical in the entitled Subject.
   AND/OR
3. An Advanced technology development / proposal / article publication from any source of information.

b. **PROPOSAL FOR PROJECT ACTIVITY:**

A Proposal of a hobby/mini/proto/general/model/proto type project with extended abstract, Block Diagram/Circuit/Flow diagram and clear references may be presented and executed.

GUIDELINES FOR HOBBY/INCUBATION ACTIVITY:

A. A Hobby project/activity is necessary for staff as well as the students to improve Ones individual skills in laboratory work.

B. This Project consists of selecting the suitable innovation in existing theory or Practical with each lab and suggest for proposals within the scope of the organization.

C. After proposals are subjected to preliminary acceptance, then final proposals and budgeting will be started out.

D. In view of this hobby project, a proposal is made jointly either from students or Both students and staff and submit abstract along with block or flow diagram stating the applications and suitability in lab. This project will be sent for further approvals.

c. PROPOSAL FOR CONSULTANCY:

A programme / machine / product of utility may be proposed to develop for in house usage / industrial requirements may be useful for any outside agency that can be marketable in order to generate revenue through consultancy.

13. GUIDELINES FOR SHADOW ENGINEERING(VIP)

INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING ROGRAM):

OBJECTIVES OF SHADOW ENGINEERING:

1. The program which uplifts the knowledge of the students related to laboratories.
2. To improve the industry-college interactions.
3. To create industry like environment for all the students in order to make future Assignment.
4. This program leads to matrixing with the students.

PROPOSALS (WEEK WISE INDUSTRIAL VISITS) (IN HOUSE OR OUTSIDE VISIT)/TRAINING PROGRAMMES:

TABLE 1: INDUSTRIAL VISITS

S.No	Type of industry	Nature of industry	Date of visit	No. of students participated	Year/branch	Remarks

TABLE 2: INDUSTRIAL TRAINING (Smart Engg)
(Career Visit Approval)

S.no	Name of the Course	Nature of industry	Duration of Training	Authority	Date of Training/Certificate No.	Remarks

14. **ACTIVITIES IN LIFT PROGRAM**

CALIBRATION/INSTALLATION AND TESTING:

Calibration: Aim of this concept is to check:
i. Whether all the equipment is functioning correctly as per the standards.
ii. To bring correctness in the errors of instrument or equipment.
iii. To rectify the errors if any.

Installation: Aim of this concept is to make and maintain installation procedure for
a new equipment or already existing equipment

Testing :   Aim of this concept is to test the equipment after installation whether
it meets the existing standards.

   After calibration the details of equipment should be submitted in following format:

S.no	Type of equipment	Certificate no	Certificate issued by	Date of calibration	Date of calibration due	Remarks

15. **MAINTAINANCE AND TROUBLE SHOOTING SCHEDULES:**

A proposal is to be made from each lab branch wise. The proposal should carry following details
related to specific equipment in lab.

 S.No, Equipment Name, Type of Problem (Too much Noise, Abnormal Sound, Corrupt
Software, Anti Virus Problem, Missing of Display, CRT not working, Motor is not giving signal,
Digital display is not working, Break of tools, Misalignment of machine elements, PLC is not

properly working), Expected Reasons (Bearing failure, Improper alignment of machine centers, Missing of vibration pads etc)

Trouble shooting exercises should be properly recorded in a separate format as mentioned below:

S.No.	Date of recording activity	Equipment Name	Type of Trouble	Remedial Activity	Remarks

16. <u>Laboratory Additional Activity Coverage</u>

A. <u>Learn Emerging Advancements in the Domain (LEAD) Experiments</u>:

Sl.No.	Activity	Date of Coverage	Sign. Of Faculty	Remarks

B. <u>Trouble shooting Activity</u> :

Sl.No.	Activity	Date of Coverage	Sign. Of Faculty	Remarks

C. Calibration / Testing / Installation Activity :

Sl.No.	Activity	Date of Coverage	Sign. Of Faculty	Remarks

D. Project / Consultancy /R&D Activity (if any):

Sl.No.	Activity	Date of Coverage	Sign. Of Faculty	Remarks

NAME OF THE LABORATORIES

S.NO	YEAR-SEM	NAME OF THE LAB
1	II B.TECH – I SEM	BASIC SIMULATION
2	II B.TECH – I SEM	ELECTRONIC DEVICES AND CIRCUITS
3	III B.TECH – I SEM	ANALOG COMMUNICATIONS
4	III B.TECH – I SEM	INTEGRATED CIRCUITS APPLICATIONS & HDL
5	IV B.TECH – I SEM	MICROWAVE&DIGITAL COMMUNICATIONS
6	IVB.TECH – I SEM	ADVANCED ENGLISH AND COMMUNICATION SKILLS

SUBJECTWISE LAB PLANNER

NAME OF THE SUBJECT: BASIC SIMULATION LAB

CONTENTS:

1. OBJECTIVES AND RELEVANCE

2. SCOPE

3. PREREQUISITES

4. SYLLABUS AS PER JNTUH

5. LEAD EXPERIMENT

6. VIRTUAL LAB EXPERIMENT

7. SUGGESTED BOOKS

8. WEBSITES (USEFUL LINKS)

9. EXPERT DETAILS

10. (A)LAB SCHEDULE

    (B)VIVA SCHEDULE

    (C)SCHEME OF EVALUATION

11. PROJECT/PRODUCT/PAPER BASED LEARNING

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D PROPOSALS

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)

14. ACTIVITIES IN LIFT PROGRAM

15. MAINTAINANCE AND TROUBLESHOOTING

16. ASSESSMENT AND ACCREDITATION PROCEDURE AS PER NABL

1.OBJECTIVES AND RELEVANCE

The main objective of the lab course is to gain practical hands on experience by exposing the students to generate various signals and sequences ,convolution, correlation, Fourier transform, Laplace transform and Z transform on signals and sequences is to be performed.

2.SCOPE

Understanding of Basic simulation lab has the scope to make the learner comfortable to work in the area of Communication systems and also to implement various projects like monitoring and controlling applications.

3.PREREQUISITES

 Theoretical knowledge on subject Signals and Systems is required.

PART - A
PREAMBLE

This lab covers the experiments in Signals and Systems subject. The JNTU has given 18 experiments in the   syllabus out of which fourteen experiments are compulsory.

4. SYLLABUS-JNTUH

UNIT-I
EXPERIMENT NO. 1

To write a MATLAB program to perform some basic operations on matrices such as addition, subtraction, multiplication.   (JNTU SL.No.1)

OBJECTIVE

To perform some basic operations on matrices such as addition, subtraction, Multiplication.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window \ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-I
EXPERIMENT NO. 2a

To write a "MATLAB" Program to generate of continuous time signals like Unit Step, Sawtooth, Triangular, Sinusoidal, Ramp, and Sinc function.   (JNTU SL.No.2)

OBJECTIVE

To generate of continuous time signals like Unit Step, Saw tooth, Triangular, Sinusoidal, Ramp, and Sinc function.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-I

EXPERIMENT NO.2b

To write a "MATLAB" Program to generate of discrete time signals like unit Impulse, Unit Step, Unit Ramp, Exponential signal and Sinusoidal signals.   (JNTU SL.No.2)

OBJECTIVE

To generate of discrete time signals like Unit Impulse, Unit Step, Unit Ramp, Exponential signal and Sinusoidal signals.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-I

EXPERIMENT NO.3

To perform various operations on signals such as addition, multiplication, scaling,shifting and folding, computation of energy and average power using MATLAB program.

(JNTU SL.No.3)

OBJECTIVE

To perform various operations on signals such as addition, multiplication, scaling, shifting and folding, computation of energy and average power using   MATLAB program.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min

2. Open MATLAB

3. Open new M-file

4. Type the program

5. Save in current directory

6. Compile and Run the program

7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-2

EXPERIMENT NO.4

To write a MATLAB program to perform Gibbs Phenomenon operation

(JNTU SL.No.9)

OBJECTIVE

To perform the Gibbs Phenomenon operation

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-2

EXPERIMENT NO.5

To find Fourier transform and inverse Fourier transforms of given functions.

(JNTU SL.No.10)

OBJECTIVE

To perform the Fourier transform of the given functions.

PREREQUISITES

 Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-3

EXPERIMENT NO. 6a

To write a matlab program to verify the given system is linear or non-linear.

(JNTU SL.No.7)

OBJECTIVE

To perform whether the given system is linear or not.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-3

EXPERIMENT NO. 6b

To write a MAT Lab program to verify the given system is Time –invariant   or   Time variant. (JNTU SL.No.7)

OBJECTIVE

To perform whether the given system is Time –invariant or Time–variant.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-3

EXPERIMENT NO. 7

OBJECTIVE

To perform whether the given system is Time –invariant or Time–variant.

(JNTU SL.No.7)

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program

5. Save in current directory

6. Compile and Run the program

7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing

2. Digital communications

UNIT-4

EXPERIMENT NO. 8

 To write MATLAB program to find the convolution of two sequences   (JNTU SL.No.6)

OBJECTIVE

To perform convolution between two sequences

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min

2. Open MATLAB

3. Open new M-file

4. Type the program

5. Save in current directory

6. Compile and Run the program

7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing

2. Digital communications

UNIT-4

EXPERIMENT NO.9

To write a mat lab program to compute autocorrelation and cross correlation between signals.

                                                    (JNTU SL.No.6)

OBJECTIVE

To perform autocorrelation and cross correlation between two sequences

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-4

EXPERIMENT NO. 10

To write a MATLAB program to find the convolution of two sequences (JNTU SL.No.6)

OBJECTIVE

To perform convolution between two sequences

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-4

EXPERIMENT NO. 11

To write a program to detect the periodic signal by Noise using Auto correlation and
Cross Correlation method   (JNTU SL.No.16)

OBJECTIVE

To detect the periodic signal by Noise using Auto correlation and Cross Correlation Method.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-4

EXPERIMENT NO. 12

To write a program to find removal of noise by correlation or Auto correlation.

(JNTU SL.No.15)

OBJECTIVE

To find removal of by Noise by using Auto correlation and Cross Correlation method

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file

4. Type the program

5. Save in current directory

6. Compile and Run the program

7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing

2. Digital communications

UNIT-2

EXPERIMENT NO. 13

To generate a MATLAB Program to verify sampling theorem**.** (JNTU SL.No.14)

OBJECTIVE

To verify sampling theorem.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min

2. Open MATLAB

3. Open new M-file

4. Type the program

5. Save in current directory

6. Compile and Run the program

7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing

2. Digital communications

UNIT-5

EXPERIMENT NO. 14

MATLAB program to plot the given waveform using waveform synthesis using Laplace
 transform.   (JNTU SL.No.11)

OBJECTIVE

To plot the given waveform using waveform synthesis using Laplace transforms.

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

UNIT-5

EXPERIMENT NO. 15

To Write a MATLAB program to draw Pole-Zero map in Z-Plane (JNTU SL.No.12)

OBJECTIVE

To draw Pole-Zero map in Z-Plane

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

LEAD EXPERIMENTS

EXPERIMENT NO. 1

To Write a MATLAB program to perform the DFT of a given signal.

OBJECTIVE

To find frequency response of the given signal using DFT

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

EXPERIMENT NO. 2

To Write a MATLAB program to perform the FFT of a given signal.

OBJECTIVE

To find frequency response of the given signal using FFT

PREREQUISITES

Basic knowledge of MATLAB is required.

DESCRIPTION

1. Introduction to experiment -30 min
2. Open MATLAB
3. Open new M-file
4. Type the program
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

APPLICATIONS

1. Signal processing
2. Digital communications

5. <u>LEAD EXPERIMENT:</u>

<u>**Objective:**</u> To display the Image using Matlab.

<u>**Software Required:**</u> Matlab.

<u>**Description:**</u>

MATLAB is a programming language developed by MathWorks. It started out as a matrix programming language where linear algebra programming was simple. It can be run both under interactive sessions and as a batch job.

Display a grayscale image by reading an RGB image into the workspace and converting it to a grayscale image.

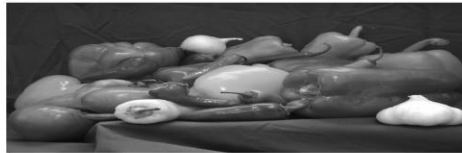<u>**Program: Display a grayscale image**</u>

Clc;

Clearall;

Closeall;

RGB = imread('peppers.png');

I = rgb2gray(RGB);

imshow(I)

end;

<u>**Result and Output:**</u>

Program: Display Image from File

Clc;

Clearall;

Closeall;

RGB = imread('peppers.png');

imshow(RGB);

end;

Output and Result:

Program: Displaying indexed image

Clc;

Clearall;

Closeall;

[X,map]=imread('corn.tif');
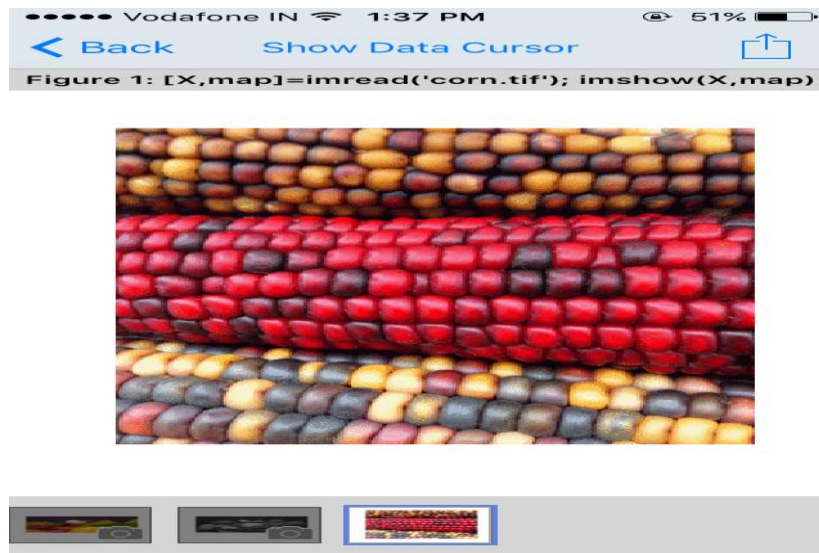
imshow(X,map)

end;

Output & Result:

Figure 1: [X,map]=imread('corn.tif'); imshow(X,map)

Program: Displaying Image Using Associated Spatial Referencing Object

Clc;

Clearall;

Closeall;

I=imread('pout.tif');

imshow(I)

end;

Output & Result:

6. **VIRTUAL LAB EXPERIMENT:**

OCTAVE is a freely distributed open source scientific software package, first developed by researchers from INRIA and ENPC, and now by the OCTAVE Consortium. It is similar to OCTAVE, which is a commercial product. Yet it is almost as powerful as OCTAVE. OCTAVE consists of three main components:

- an interpreter
- libraries of functions (OCTAVE procedures)
- libraries of Fortran and C routines

OCTAVE is specialized in handling matrices (basic matrix manipulation, concatenation, transpose, inverse, etc.) and numerical computations. Also it has an open programming environment that allows users to create their own functions and libraries.

This section is based on some user comments found in the internet, thus not necessarily all true. It is intended to give readers a general image about their differences besides those in syntax.

- OCTAVE has a thorough documentation; the one in OCTAVE is brief.
- OCTAVE has a lot of optimization on computation, thus it is faster than OCTAVE.
- OCTAVE has a very powerful simulation component called Simulink.
- OCTAVE has Scicos that serves the same purpose but it is weaker.
- OCTAVE has a much better integration with other programming languages and programs such as C, C++ and Excel.
- The graphics component of OCTAVE is weak (has fewer functions).
- Most importantly, OCTAVE is *FREE*. It certainly outweighs its deficiencies. It is remarked that OCTAVE is more than enough for casual and educational uses.

Removal of noise by auto correlation:

Aim: removal of noise by auto correlation

Equipments:

PC with windows (95/98/XP/NT/2000).

OCTAVE Software

Program:-

```
clear all

clc

t=0:0.1:pi*4;

s=sin(t);

k=2;

subplot(6,1,1)

plot(s);

title('signal s');

xlabel('t');

ylabel('amplitude');

n = randn([1 126]);

f=s+n;

subplot(6,1,2)

plot(f);

title('signal f=s+n');

xlabel('t');

ylabel('amplitude');

as=xcorr(s,s);

subplot(6,1,3)

plot(as);

title('auto correlation of s');
```

```
xlabel('t');

ylabel('amplitude');

an=xcorr(n,n);

subplot(6,1,4)

plot(an);

title('auto correlation of n');

xlabel('t');

ylabel('amplitude');

cff=xcorr(f,f);

subplot(6,1,5)

plot(cff);

title('auto correlation of f');

xlabel('t');

ylabel('amplitude');

hh=as+an;

subplot(6,1,6)

plot(hh);

title('addition of as+an');

xlabel('t');

ylabel('amplitude');
```

Result:-

In this experiment the removal of noise by auto correlation have been verified using OCTAVE
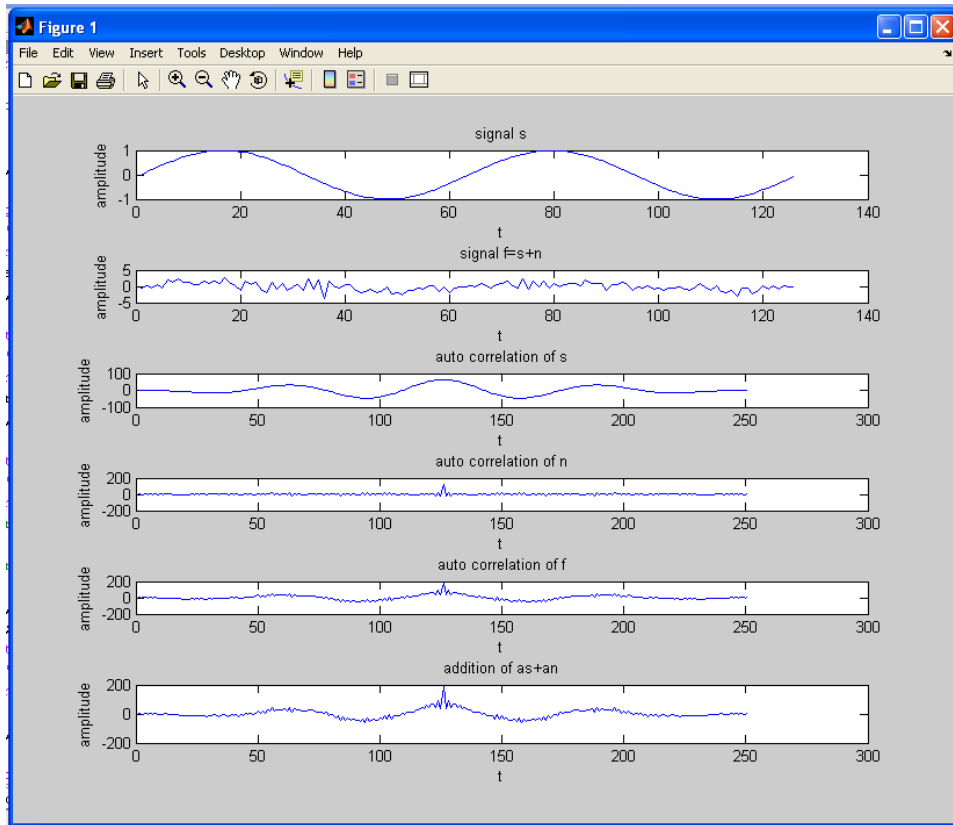
7. **SUGGESTED BOOKS**

1.Signals, Systems & Communications- B.P Lathi, BS Publications, 2003.

2.Signals & Systems – A.V.Oppenheim, A.S Willsky and S.H Nawab,PHI,2nd Edn

3.Signals & Systems-A.Rama Krishna Rao-2008,TMH

4. Signals & Systems-Simon Haykin and Van Veen, Wiley, 2nd Edn.

5. Fundamentals of Signals & Systems Michel J. Robert, MGH International Edn,2008

6.Introduction to signals and systems-K.Gopalan 2009,CENGAGE Learning

7.Signals, Systems and Transforms-C.L.Philips,J.M.Parr and Eve A.Riskin,3rd.,2004,PE

8.Signals, Systems using MATLAB-Chaparro,Academic press,2011

8. USEFUL LINKS

1. http://www.mathworks.in/support/books/book57482.html?category=11&language=1&view category

2.http://books.google.co.in/books/about/A_Guide_to_MATLAB.html?id=NekrOjT8oSIC&redirc=y

3.http://books.google.co.in/books?id=DEO3_9ZK-DgC&printsec=frontcover&source=gbs_ge_ summary_r&cad=0#v=onepage&q&f=false

4.https://en.wikibooks.org/wiki/MATLAB_Programming

5.http://www.e-booksdirectory.com/listing.php?category=585

9. EXPERTS' DETAILS

The expert details which have been mentioned below are only a few of the eminent on Known
Internationally, Nationally and Locally.

INTERNATIONAL

1. Prof.Yulin Wang-International School of Software, Wuhan University, China
2. Prof. George Constantine Giakos, The University of Akron, USA

NATIONAL

1. Dr.Mahesh Chandra, Department of Electronics and Communication Engineering BIT Mesra, Ranchi, India
2. P.Ramesh babu, Assitant professor at saranathan college of engineering, trichy-12,Tamilnadu, India

REGIONAL

1. Prof. N.S. Murthy, Dept. of ECE, NIT, Warangal.
2. P. Sri hari-Professor & Head of the Dept., Dept. of Electronics and Instrumentation Engg. GITAM University, Hyderabad

10. (A) LAB SCHEDULE: The lab schedule should be planned once in a week. The week wise scheduled experiment should be completed.

CYCLE 1

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
B1	Demo	Exp.1	Exp.2	Exp.3	Exp.4& Exp.5	Exp.6 & Exp.7	TEST
B2	Demo	Exp.1	Exp.2	Exp.3	Exp.4& Exp.5	Exp.6 & Exp.7	TEST

CYCLE 2

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
B1	Exp.8	Exp.9	Exp.10	Exp.11& Exp.12	Exp.13& Exp.14	Exp.15	TEST
B2	Exp.8	Exp.9	Exp.10	Exp.11& Exp.12	Exp.13& Exp.14	Exp.15	TEST

(B) VIVA SCHEDULE: The viva schedule should be planned prior starting to the lab
experiment.

ROUND - 1

Batches	week-1	week-2	week-3	week-4	week-5
B1,B2,B3	Viva				
B1,B2,B3		viva			
B1,B2,B3			viva		
B1,B2,B3				viva	
B1,B2,B3					viva

ROUND - 2

Batches	week-1	week-2	week-3	week-4	week-5
SG1	Viva				
SG2		viva			
SG3			viva		
SG4				viva	
SG5					viva

*SG: Selected Group with a maximum of 6 or 12 students

(C) SCHEME OF EVALUATION

INTERNAL LAB

Day to Day Evaluation ------ 15 Marks					Internal Exam ---10 Marks		
Uniform	Observation & Record	Performance of experiment	Result	Viva Voce	Aim, Apparatus, Program, Procedure	Execution and Result	Viva Voce
3M	3M	3M	3M	3M	4M	2M	4M
Total Marks:15+10=25 Marks							

EXTERNAL LAB

Aim, Apparatus, Program, Procedure	Execution	Result	Viva Voce
20M	15M	5M	10M
Total Marks:20+15+5+10=50 Marks			

11. PROJECT/PRODUCT/PAPER BASED LEARNING

Negative transformation of the image

The second linear transformation is negative transformation, which is invert of identity transformation. In negative transformation, each value of the input image is subtracted from the L-1 and mapped onto the output image. So what happens is that, the lighter pixels become dark and the darker picture becomes light. And it results in image negative.

In many of the cases, the images that we get, they contain white or grey level informations embedded in black pixels or very very dark pixels and the nature of the information is such that we have very few white or gray level informations present a white background which is very much dark. So, in such cases, finding out the information from the images, from the raw images, input images becomes very very difficult. So, in such cases, it is beneficial that instead of considering that raw image, if I just take the negative of the images. That is all the white pixels that we have that we have in the image or the larger intensity values that we have in the image, you make them darker and the darker intensity values, you make them lighter or brighter. So in effect, what we get is a negative of an image and within this negative image, we will find through result that visualization or extracting information which we want will be more convenient than in the original image. So, the kind of transformations that we need in this particular case is shown in this figure.

we consider that the digital image that we are considering that will have capital L number of intensity levels represented from 0 to capital L minus 1 in steps of 1. So again, along the horizontal axis, we have put the intensity values or gray level values of the input image and along the vertical axis, we have put the intensity values or gray level values of the processed image and this corresponding transformation function T, now can be represented as s is equal to T (r) which is nothing but L minus 1 minus r. So, we find that whenever r is equal to 0, then s will be equal to L minus 1 which is the maximum intensity value within our digital image and when r is equal to capital L minus 1 that is the maximum intensity value in the original image; in that case, s will be equal to 0. So, the maximum intensity value in the original image will be converted to the minimum intensity value in the processed image and the minimum intensity value in the processed image will be converted to maximum intensity value in the minimum intensity value in the original image will be converted to maximum intensity value in the

processed image. So in effect, what we are getting is a negative of the image and graphically, this transformation can be put in the form of this figure. So, here you find that this transformation is a straight line with a slope of minus 45 degree and passing through the points (0, L minus 1) and (L minus 1, 0) in this rs plane. Now, let us see what is the kind of result that we will get by applying this kind of transformation.

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D:

The Basic simulation lab course should be designed in such a way that it should meet the requirements of research and development as well as consultancy projects. Also the Proposals of Project/R&D/Consultancy are as follows:

Proposal 1: R& D Level Project Design & Execution
Proposal 2: Project Design & Execution
Proposal 3: Consultancy Task / Project Design & Development

PROPOSAL FOR R & D ACTIVITY:

1. An exact paper from a National/International journal in this entitled area/subject/area (IEEE Format)

Text to Speech Conversion with Phonematic Concatenation

Abstract— This paper presents a method to design a Text to Speech conversion module by the use of Mat lab by simple matrix operations. Firstly by the use of microphone some similar sounding words are recorded using a record program in the Mat lab window and recorded sounds are saved in .wav format in the directory. The recorded sounds are then sampled and the sampled values are taken and separated into their constituent phonetics. The separated syllables are then concatenated to reconstruct the desired words. By the use of various Mat lab commands i.e. wavread, subplot etc. the waves are sampled and extracted to get the desired result. This method is simple to implement and involves much lesser use of memory spaces.

Keywords-Text to Speech Conversion: Phonematic Concatenation; Sample

PROPOSAL FOR PROJECT ACTIVITY :

Design and analysis of FIR digital filter based on Matlab

Abstract

In digital control system, interference, which is mixed in the input signal, has a great influence on the performance of the system. Therefore, processing of input signal has to be done to get useful signal. Finite impulse response (FIR) filter plays an important role in the processing of digital signal. Designing the FIR filter by Matlab can simplify the complicated computation in simulation and improve the performance. By using the method of window function technique, the design of FIR filter has been processed by Matlab.

PROPOSAL FOR CONSULTANCY:

A proposal has been made to implement the following project using MATLab for Magni5 Technologies Pvt. Ltd, Hyderabad.

ECG RECOGNITION SYSTEM BY USING HMM

ABSTRACT

In this study, biomedical diagnosis system pattern recognition with normal and abnormal classes has been developed. First, future extraction processing was made by using the Doppler Ultrasound. During future extraction stage, Wavelet transforms and short time Fourier transform were used. As next step, Wavelet entropy were applied to these features. In the classification stage, Hidden Markov Model (HMM) was used. To compute the correct classification rate of proposed HMM classifier, it was compared to ANN by data set containing 215 samples. In our experiments specificity and sensitivity rate of proposed HMM classifier system with fuzzy C means (FCM)/K–means algorithms were found as 92% and 97.26% respectively. The present study shows that proper selection of this HMM's initial parameter values according to FCM/K-means algorithm improves the recognition rate of the proposed system which was also compared to our previous study named ANN.

FUNDED/UNFUNDED PROPOSALS (if any)

PROPOSAL FOR SDP:
TITLE: OPTIMIZATION TECHNIQUES IN MATLAB-MATHWORKS
OBJECTIVE: This SDP program is intended to bring down the awareness among all Staff in
                  Order to study the various optimization techniques in Matlab.

13. GUIDELINES FOR SHADOW ENGINEERING (VIP)

INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM):
OBJECTIVES OF SHADOW ENGINEERING:

1. The program which uplifts the knowledge of the students related to laboratories.
2. To improve the industry-college interactions.
3. To create industry like environment for all the students in order to make future Assignment.
4. This program leads to matrixing with the students.

PROPOSALS (WEEK WISE INDUSTRIAL VISITS) (IN HOUSE OR OUTSIDE VISIT)/TRAINING PROGRAMMES:
TABLE 1: INDUSTRIAL VISITS

S.no	Type of industry	Nature of industry	Date of visit	No. of students participated	Year/branch	remarks
1	TV station	Broadcasting		60	II/1V I SEM	

14. CALIBRATION/INSTALLATION AND TESTING:

CALIBRATION: Aim of this concept is to check,
  i.   Whether all the equipment is functioning correctly as per the standards
  ii. To bring correctness in the errors of instrument or equipment
  iii. To rectify the errors if any

INSTALLATION: Aim of this concept is to make and maintain installation procedure for a new equipment or already existing equipment.

TESTING: Aim of this concept is to test the equipment after installation whether it meets the existing standards.

Case 1: Calibration of Equipment

The basic simulation lab is based on MAT Lab software so that calibration is not required

Case 2: Installation of Equipment

Installation of MAT Lab software is done and is maintained

Case 3: Testing of Equipment

As of now no testing of equipment or software's is required.

15. MAINTAINANCE AND TROUBLESHOOTING:

(A) TROUBLE SHOOTING SCHEDULES:

A proposal is to be made from each lab branch wise. The proposal should carry following details related to specific equipment in lab.
The basic simulation lab consists of 30 systems all are working in good condition.

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

Accreditation is the formal recognition, authorization and registration of a laboratory that has demonstrated its capability, competence and credibility to carry out the tasks. It provides the feedback to laboratories as to whether they are performing according to technical competence as per guidelines of NABL (National Accreditation Board for Testing and Calibration Laboratories)

The laboratory should carry out the following important tasks towards getting ready for accreditation from NABL.

1. Preparation of methodology in each experiment
2. Preparation of Standard Operating procedure for each equipment
3. Preparation of Laboratory Manual as per the guidelines specified by Combined Lab Team(CLT) headed by Principal/HOD/Dean/incharge
4. Ensure Effective environmental conditions (temperature, humidity, storage and placement) in the laboratories by implementing proper housekeeping and cleaning of the equipments from dust, dirt etc.
5. Ensure Calibration of instruments/equipment(Only NABL accredited authorized laboratories provide calibration.
6. All the details of Calibration should be included in the format specified exclusively for calibration procedure. Ensure proper implementation of all the documents, formats to be included in the lab manual.
7. Impart training for all the technicians working in labs about the importance of documentation, log sheets, operating procedure of the lab.
8. Incorporate Internal Lab audits for effective functioning of the laboratories. Audits may be once in a month or 3 months or at the end of the semester. The audit schedule will be decided by the Chairman and Principal of the CLT team.
9. Auditors should submit the detailed report of each lab duly signed to the Principal.
10. Each lab should maintain all the bills/invoices of each instrument or equipment in a separate file.
11. All the stock registers either consumable or non consumable should be updated whenever any purchases of consumables or equipment takes place.
12. All the safety precautions are properly displayed in front of each lab. All the Lead

experiments should be maintained separately in a record /record in a separate folder.

13. Based on Pre Assessment report submitted by auditor, corrective actions should be carried out by each lab in charge and that must be forwarded to concerned HOD and Principal.

SUBJECTWISE LAB PLANNER
NAME OF THE SUBJECT: ELECTRONIC DEVICES & CIRCUITS LAB

CONTENTS:

1. OBJECTIVES AND RELEVANCE

2. SCOPE

3. PREREQUISITES

4. SYLLABUS AS PER JNTUH

5. LEAD EXPERIMENT

6. VIRTUAL LAB EXPERIMENT

7. SUGGESTED BOOKS

8. WEBSITES (USEFUL LINKS)

9. EXPERT DETAILS

10. (A)LAB SCHEDULE

   (B)VIVA SCHEDULE

   (C)SCHEME OF EVALUATION

11. PROJECT/PRODUCT/PAPER BASED LEARNING

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D PROPOSALS

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)

14. ACTIVITIES IN LIFT PROGRAM

15. MAINTAINANCE AND TROUBLESHOOTING

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

1. OBJECTIVES AND RELEVANCE

The main objective of the lab course is to gain practical hands on experience by exposing the students to understand the basic working principle of electronic devices and to specify various active and Passive electronic components and devices and identify the terminals and to draw the symbols for different electronic components. To investigate, test and verify characteristics of electronic devices, amplifiers and oscillators. Also helpful to learn operating principle and applications of electronic circuits and devices like amplifier, oscillator, switching circuits, wave shaping circuits and multivibrators.

2. SCOPE

Understanding of Electronic Devices and Circuits Lab has the scope to make the learner comfortable to work in the area of and also to implement various projects like monitoring and controlling applications. Industries involved in design and fabrication of devices, integrated circuits, embedded systems, electronic equipments etc have also provide large scale placements for engineers with this specialization. Installation and maintenance of electronic equipments used for health care in hospitals, equipments & systems for instrumentation and control in process industries automation systems of assembly line in production industries, etc are also handled by electronics engineers.

3. PREREQUISITES

The prerequisites for this lab are electromagnetic, and quantum physics, General bonding theory and covalent bonding and basic knowledge in electrical circuit analysis including the fundamental theorems.

4. SYLLABUS AS PER JNTUH:

The lab course should be planned as per the JNTUH syllabus. In this, LEAD experiments should also be included in cycle of experiments

LIST OF THE EXPERIMENTS:
1.   Forward & Reverse Bias Characteristics of PN Junction Diode.
2.   Zener diode characteristics and Zener as voltage Regulator.
3.   Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
4.   Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
5.   Half Wave Rectifier with & without filters.

6.   Full Wave Rectifier with & without filters.
7.   FET characteristics.
8.   Design of Self-bias circuit.
9.   Frequency Response of CC Amplifier.
10.   Frequency Response of CE Amplifier.
11.   Frequency Response of Common Source FET amplifier.
12.   SCR characteristics.
13.   UJT Characteristics

EXPERIMENT NO. 1

Forward & Reverse bias characteristics of PN junction diode.

OBJECTIVE
To perform PN Junction Diode Characteristics under forward and Reverse bias conditions and also calculating static & dynamic resistances.

PREREQUISITES
Knowledge of semiconductors, PN junction diode operation and ohms law.

DESCRIPTION
a. Introduction to experiment -30 min
b. Connection of experiment and its verifications
c. Experimental determination of PN Junction Diode characteristics.
d. Graphical determination of Static resistance and Dynamic resistance

APPLICATIONS
1. PN Junction Diode can be used in Rectifiers
2. Design of Clipper Circuits
3. Design of Clamper Circuits
4. used as Switch

EXPERIMENT NO. 2
Zener diode characteristics & Zener as voltage regulator

OBJECTIVE
To perform Zener Diode Characteristics under forward and Reverse bias Conditions and also calculating   Forward bias Resistance.

PREREQUISITES
Priniciple of operation of zener diode and PN junction diode characteristics.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Zener Diode characteristics.

d. Graphical determination of Cut in Voltage and Break down Voltage

APPLICATIONS

1. Zener Diode Used as a regulating element in Voltage Regulators.

2. In various Protection circuits.

3. Zener Limiters.

EXPERIMENT NO. 3

Input & Output characteristics of Transistor in CB configuration and h-parameter calculations

OBJECTIVE

Determination of the transistor characteristics when it is operated in common base Configuration

PREREQUISITES

To know the working principle of Transistor and common base configuration characteristics and operation of small signal analysis of transistor, knowledge of H Parameters.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Transistor characteristics CB configuration.

d. Graphical determination of Common Base Input and Output Characteristics

APPLICATIONS

1. CB Configuration used as a input stage of multi stage Amplifier.

2. High Frequency Applications

3. Used as Amplifier

EXPERIMENT NO. 4

Input & Output characteristics of Transistor in CE configuration and h-parameter calculations

OBJECTIVE

Determination of the transistor characteristics when it is operated in common Emitter configuration.

PREREQUISITES

Working principle of Transistor and common emitter configuration characteristics,

operation of small signal analysis of transistor, knowledge of h   parameters

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Transistor characteristics in CE configuration

d. Graphical determination of Common Emitter Input and Output Characteristic

APPLICATIONS

1. CE Configuration used in Audio Frequency Applications.

2. Coupling Device between various transistor stages.

3. Used as Amplifier

EXPERIMENT NO. 5

Half Wave Rectifier with & without filters.

OBJECTIVE

Study of Half Wave Rectifier with and without capacitance filters and determination of Regulation, Efficiency and Ripple factor.

PREREQUISITES

Basic Diode operation, Theory of Half Wave Rectifier and knowledge of the Capacitance Filter.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Half Wave Rectifier with & without filters.

d. Comparison of Practical and Theoretical calculations of Regulation, Efficiency and ripple factor.

APPLICATIONS

1. Used in Power Circuits to convert ac to dc.

2. Power Supply circuits.

EXPERIMENT NO. 6

Full Wave Rectifier with & without filters.

OBJECTIVE

Study of Full Wave Rectifier with and without capacitance filters and determination of regulation, Efficiency and Ripple factor.

PREREQUISITES

Basic Diode operation, Theory of Half wave and Full Wave Rectifiers and knowledge of the capacitance Filter.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Full Wave Rectifier with & without filters.

d. Comparison of Practical and Theoretical calculations of Regulation, Efficiency and ripple factor.

APPLICATIONS

1. Used in Power Circuits to convert ac to dc.

2. Power Supply circuits.

EXPERIMENT NO. 7

FET characteristics

OBJECTIVE

Determination of the drain and transfer characteristics for a given field effect Transistor and to find the drain resistance and Transconductance.

PREREQUISITES

Working principle of FET and its transfer characteristics

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Field Effect Transistor.

d. Graphical determination of Drain and Transfer Characteristics of FET.

APPLICATIONS

1. Used as Voltage Variable Resistor in amplifiers and automatic gain controls

2. Electronic Voltmeters

3. Switching Applications

EXPERIMENT NO. 8

Design of Self-bias circuit

OBJECTIVE

To design and test a transistor self bias circuit and calculation of stability factor

PREREQUISITES

Knowledge of biasing, Operation of Self bias circuit.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of self bias circuit by using thevenins equivalent circuit

d. Calculation of stability factor.

APPLICATIONS

1. Used as Amplifier.

2. Self bias circuit provides maximum thermal stability.

EXPERIMENT NO. 9

Frequency Response of CC Amplifier

OBJECTIVE

To design and test a common collector amplifier and find the following Parameters   current gain, voltage gain, Bandwidth, Input and output impedances.

PREREQUISITES

Operation of small signal analysis of transistor, working principle of common collector Amplifier.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of common collector amplifier and calculation of current gain, voltage gain, bandwidth, input and output impedances.

d. Graphical determination of CC amplifier characteristics.

APPLICATIONS

1. Used as amplifiers.

2. Impedance matching applications.

3. Emitter follower.

EXPERIMENT NO. 10

Frequency Response of CE Amplifier.

OBJECTIVE

To design and test a common collector amplifier and find the following Parameters current gain, voltage gain, Bandwidth, Input and output impedances.

PREREQUISITES

Operation of small signal analysis of transistor, working principle of common emitter amplifier.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of common Emitter amplifier and calculation of current gain,
   Voltage gain, bandwidth, input and output impedances.

d. Graphical determination of CE amplifier characteristics.

APPLICATIONS

CE amplifier widely used for amplification purpose.

EXPERIMENT NO. 11

Frequency Response of Common Source FET Amplifier.

OBJECTIVE

To design and find the parameters of the single stage Common source Amplifier and calculate the Mid band gain, Bandwidth, Input and output impedances.

PREREQUISITES

Working principle of FET common source amplifier, small signal frequency model of FET.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of FET CS amplifier and calculation of bandwidth, input and output
   impedance, mid band gain.

d. Graphical determination of FET CS amplifier Characteristics.

APPLICATIONS

CS amplifier provides good voltage amplification

EXPERIMENT NO. 12

SCR characteristics

OBJECTIVE

To study the SCR characteristics and also find the latching and holding current for given SCR.

PREREQUISITES

Working principle and characteristics of SCR.

DESCRIPTION

a. Introduction to experiment – 30 min

b. Connection of experiment and its verification.

c. Experimental determination of SCR characteristics and calculation of latching current and holding current.

d. Graphical determination of   SCR Characteristics

APPLICATIONS:

1. Used as electronic switch.

2. Used as   Rectifier. (ac voltage to dc voltage)

EXPERIMENT NO. 13

UJT characteristics

OBJECTIVE

Experimental determination of UJT characteristics. Determination of intrinsic Stand off ratio

PREREQUISITES

Working principle of UJT and its characteristics.

DESCRIPTION

a. Introduction to experiment – 30 min

b. Connection of experiment and its verification.

c. Experimental determination of UJT characteristics and calculation of intrinsic standoff ratio.

d. Graphical determination of UJT Characteristics

APPLICATIONS
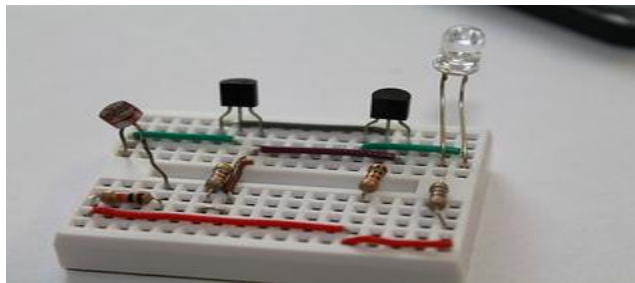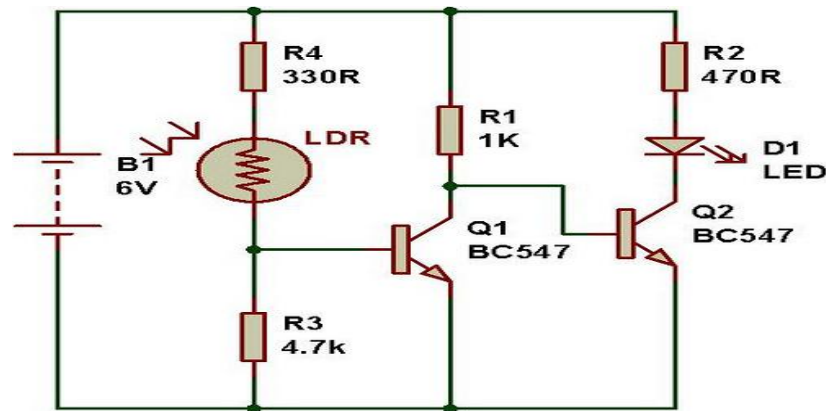
1. Most popular application is UJT Relaxation Oscillator.

2. Timing Circuits.

3. Saw tooth wave Generators.

4. Triggering of SCR.

5. LEAD EXPERIMENT

EXPERIMENT: 1 Dark sensor using Light dependent resistor (LDR).
OBJECTIVE:

Design and study of Dark sensor using Light dependent resistor

 PREREQUISITES

Knowledge on electronic components and working principle of LDR
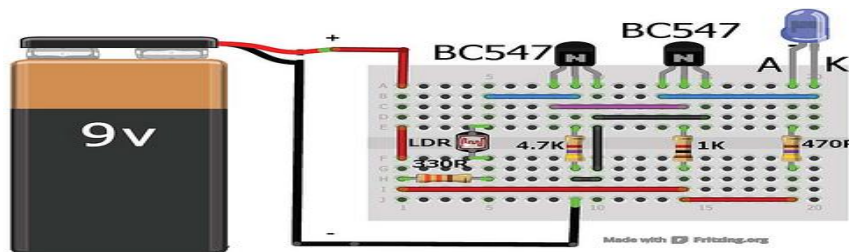
Description: This versatile dark sensor is made up of two transistors It is a versatile module, because you can use it   for testing several electronic components, such as, relay, reed switch, light dependent resistor (LDR), microphone, phototransistor, photodiode, etc. Besides, you can use this module for making simple clap switch, light operated switch, water level indicator when you block the light falling on LDR, the transistor Q1 switches off and transistor Q2 switches on, that drives the LED D1. Change the value of R3 to change its sensitivity.

APPLICATIONS

Used for testing several electronic components.

6. VIRTUAL LAB EXPERIMENT

Aim: To design and simulate a Half Wave Rectifier circuit.

Components required:
 Function generator, CRO, Regulated Power supply, resistor, diode, connecting wires.

Vlab Specifications Taken:

Half wave circuit design has been implemented on the virtual breadboard using following specifications:
  Power Supply: +10v and -10v
· Function generator: Selected wave with following specifications:
  Frequency = 1KHz.
  Amplitude: 5V
  Duty cycle = 50%
· Resistor R_1: 10.36K

Theory:

The conversion of AC into DC is called Rectification. Electronic devices can convert AC power into DC power with high efficiency. During the positive half cycle, the diode is forward biased and it conducts and hence a current flow through the load resistor. During the negative half cycle, the diode is reverse biased and it is equivalent to an open circuit, hence the current through the load resistance is zero. Thus the diode conducts only for one half cycle and results in half wave rectification. The input and output voltage waveform may be analytically written as:

$$V_{in} = V_p \sin wt, 0 \leq t \leq T$$

and

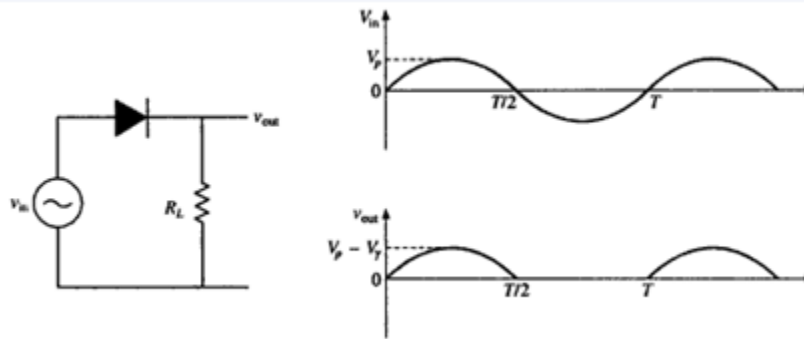$$V_{out} = V_{pl} \sin wt : 0 \leq t \leq T$$

$$V_{out} = 0 : \qquad 0 \leq t \leq T$$

where

$$V_{pl} = V_p - V_T$$

and V_T is cut-in voltage of the diode.

Circuit Diagram:

The average (dc) value of half wave rectified sine wave voltage is represented by

$$V_{av} = V_{dc} = \frac{1}{T}\left[\int_0^{T/2} V_{pl} \sin wt \, . \, d(wt) + \int_{T/2}^T 0 . \, d(wt)\right] = \frac{V_{pl}}{\Pi}$$

RMS voltage at the load resistance can be calculated as

$$V_{rms} = \sqrt{\frac{1}{T}\int_0^T V_{pl}^2 \sin^2 wt \, . \, d(wt)} = \frac{V_{pl}}{2}$$

 Procedure:

1.   Connect the circuit as shown in the circuit diagram.
2.   Give the input signal as specified.
3.   Switch on the power supply.
4.   Note down the value of AC and DC voltages from the CRO
5.   Draw the necessary waveforms on the graph sheet.

Observations:

1.   Observe the output waveform from CRO.
2.   Measure the value of AC and DC voltages of the output waveform from the CRO.
3.   Calculate

1.   **Ripple Factor**

Ripple factor is defined as the ratio of effective value of AC component to the average DC value.
Ripple Factor (r),

$$r = \sqrt{\left[\frac{V_{pl}/2}{V_{pl}/\Pi}\right]^2 - 1} = 1.21$$

2. **Efficiency**

Efficiency, eta is the ratio of the dc output power to ac input power:

$$\eta = \frac{dc\ output\ power}{ac\ output\ power} = \frac{P_{dc}}{P_{ac}} = \frac{V_{dc}^2/R_L}{V_{rms}^2/R_L} = 4/\Pi^2 = .406 = 40.6\%$$

3. **Form Factor**

Form Factor is given by,

$$Form\ factor = \frac{rms\ value}{average\ value} = \Pi/2 = 1.57$$

4. **Peak Factor**

Peak Factor is given by,

$$Peak\ factor = \frac{Peak\ value}{rms\ value} = V_{pl}/(V_{pl}/2) = 2$$

VLab Observations Obtained:

1.   output waveform frequency =1KHz
2.   Oupur Voltage V_{pl} = 1.91V
3. $V_{rms} = V_{pl}/2 = 0.955$V
4. $V_{dc} = V_{pl}/pi = 0.608$V

Calculations:

1. **Ripple Factor**

Ripple factor is defined as the ratio of effective value of AC component to the average DC value.
Ripple Factor (r),

$$r = \sqrt{\left[\frac{V_{pl}/2}{V_{pl}/\Pi}\right]^2 - 1} = 1.21$$

Experimentally,

$$r = \sqrt{(V_{rms}/V_{dc})^2 - 1} = \sqrt{(.955/.608)^2 - 1} = 1.211$$

$$r = \sqrt{(V_{rms}/V_{dc})^2 - 1} = \sqrt{(.955/.608)^2 - 1} = 1.211$$

2.   **Efficiency**

Efficiency, eta is the ratio of the dc output power to ac input power:

$$\eta = \frac{dc\ output\ power}{ac\ output\ power} = \frac{P_{dc}}{P_{ac}} = \frac{V_{dc}^2/R_L}{V_{rms}^2/R_L} = 4/\Pi^2 = .406 = 40.6\%$$

Experimentally,

$$\eta = \frac{dc\ output\ power}{ac\ output\ power} = \frac{P_{dc}}{P_{ac}} = \frac{V_{dc}^2/R_L}{V_{rms}^2/R_L} = \frac{(.608)^2}{(.955)^2} = 40.53\%$$

3.   **Form Factor**

Form Factor is given by,

$$Form\ factor = \frac{rms\ value}{average\ value} = \Pi/2 = 1.57$$

Experimentally,

$$Form\ factor = \frac{rms\ value}{average\ value} = 1.5707$$

4.   **Peak Factor**

Peak Factor is given by,

$$Peak\ factor = \frac{Peak\ value}{rms\ value} = V_{pt}/(V_{pt}/2) = 2$$

$$Peak\ factor = \frac{Peak\ value}{rms\ value} = \frac{V_{pl}}{(V_{pl}/2)} = 2$$

Experimentally,

$$Peak\ factor = \frac{Peak\ value}{rms\ value} = \frac{1.91}{.955} = 2$$

Result:

The Half Wave Rectifier circuit design output waveforms have been studied and the required parameters are calculated.

Precautions:

1.   Connections should be verified before clicking run button.
2.   The resistance to be chosen should be in Kohm range.
3.   Best performance is being obtained within 50Hz to 1Mhz

7. SUGGESTED BOOKS
TEXT BOOKS
1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and   SatyabrataJit, 2Ed.,1998, TMH.
2. Electronic Devices and Circuits – Mohammad Rashid, Cengage Learing, 2013
3. Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford

REFERENCE BOOKS:

1. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Electronic Devices and Circuits – B. P. Singh, Rekha Singh, Pearson, 2Ed, 2013.
4. Electronic Devices and Circuits - K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt. Ltd.
6. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed.

8. WEB SITES (USEFUL LINKS):

1.   http://www.engineersgarage.com/electronic-circuits
2.   http://archive.org/details/ElectronicDevicesCircuits

3. http://www.gobookee.net/electronic-devices-and-circuits/
4. http://engineeringppt.blogspot.in/electronic-devices-and-circuits.html
5. http://www.ieeeghn.org/wiki/index.php/IEEE_Electron_Devices_Society_History
6. http://www.documbase.com/electronic-devices-and-circuits-fundamentals.pdf
7. http://search.edaboard.com/electronic-books.html
8. http://www.general-files.com/files-d/download-electronic-devices-and-circuits/8/

9. EXPERT DETAILS

INTERNATIONAL

1. J. Millman ph.d and C.C.Halkias ph.d
   Associate Professor of Electrical Engineering,
   Columbia University
2. Prof. Trevor J.Trarnton,
   Director of Center for Solid State Electronics Research,
   Arizona State University, Tempe, USA
   Email:khan.tarik@asu.edu

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NATIONAL

1. Dr. Balasubrmanyam S K – Professor,
   Department of Electronics Engineering IIT(BHU),Varanasi.
   Email:bala@bhu.ac.in
2. Dr.Banerjee Swapna,
   Professor in electronics &EC engineering,IIT Khragpur
   Email: swapna [at] ece.iitkgp.ernet.in

REGIONAL

1. P. John Paul Dean Academics in Gurunanak Engineering College, Hyderabad
2. K.Lal Kishore Professor of ECE and Director of Academic and Planning, JNTU
   Hyderabad.

10 (a) LAB SCHEDULE: The lab schedule should be planned once in a week. The week wise
Scheduled experiment should be completed.

CYCLE 1 (For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Demo	Exp.1	Exp.2	Exp.10	Exp.9	Exp.7	Exp.8	Lead1
B3, B4	Demo	Exp.2	Exp.10	Exp.9	Exp.8	Exp.1	Exp.3	Lead1
B5, B6	Demo	Exp.10	Exp.9	Exp.8	Exp.1	Exp.2	Exp.7	Lead1
B7, B8	Demo	Exp.9	Exp.8	Exp.1	Exp.3	Exp.10	Exp.2	Lead1
B9, B10	Demo	Exp.8	Exp.1	Exp.2	Exp.7	Exp.3	Exp.10	Lead1

CYCLE 2(For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Exp.3	Exp.4	Exp.6	Exp.11	Exp.12	Exp.5	Hobby/lead2	test
B3, B4	Exp.7	Exp.6	Exp.11	Exp.12	Exp.5	Exp.4	Hobby/lead2	test
B5, B6	Exp.3	Exp.11	Exp.12	Exp.5	Exp.4	Exp.6	Hobby/lead2	test
B7, B8	Exp.7	Exp.12	Exp.5	Exp.4	Exp.6	Exp.11	Hobby/lead2	test
B9, B10	Exp.9	Exp.5	Exp.4	Exp.6	Exp.11	Exp.12	Hobby/lead2	test

(B) VIVA SCHEDULE: The viva schedule should be planned prior starting to the lab experiment.

ROUND – 1

Batches	week-1	week-2	week-3	week-4	week-5	week-6
B1,B2,B3, B4	viva					
B5,B6,B7,B8		Viva				
B9,B10,B11,B12			viva			
B13,B14,B15,B16				viva		
B17,B18,B19,B20					viva	

ROUND - 2

Batches	week-1	week-2	week-3	week-4	week-5
SG1	viva				
SG2		Viva			
SG3			viva		
SG4				viva	
SG5					Viva

*SG: Selected Group with a maximum of 6 or 12 students

(C).SCHEME OF EVALUTION

LAB EXTERNAL

S no.	Write-up (by Internal examiner)	Final evaluation (Internal Examiner)	Viva (External Examiner)
1.	Aim Equipment needed Circuit diagram Procedure Precautions Tabular form Expected graph	Based on observation, how the student is connecting the circuit, usage of equipment and typical readings And based on correctness of the practical graph to the expected graph and results.	Based on understanding of Experiment and theoretical questions in the related subject.
	Marks: 20	**Marks: 20**	**Marks: 10**
Total Marks:20+20+10=50 Marks			

LAB INTERNAL

Day to Day Evaluation ------ 15 Marks					Internal Exam ---10M		
Uniform	Observation & Record	Performance of experiment	Result	Viva Voce	Write-up	Connections & Result	Viva Voce
Marks:3	**Marks:3**	**Marks:3**	**Marks: 3**	**Marks:3**	**Marks:4**	**Marks :3**	**Marks :3**
Total Marks:15+10=25 Marks							

11. PROJECT/PRODUCT/PAPER BASED LEARNING

Solar Highway Lighting System with Auto Turn Off in Daytime:

In this project, an LED based street light system is designed that is powered using solar energy. The street light system also has an auto intensity control mechanism for automatically adjusting the light intensity. A light dependent resistor is used to sense the surrounding lighting conditions. The 8051 microcontroller reads this information and adjusts the intensity of LEDs through PWM technique. It also has a feature of automatically tuning off the street lights during daytime.

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D:

The lab course should be designed in such a way that it should meet the requirements of research and development as well as consultancy projects. Also the Proposals of Project/ R&D/Consultancy are as follows:

        Proposal 1: Project Design & Execution
        Proposal 2: R& D Level Project Design & Execution
        Proposal 3: Consultancy Task / Project Design & Development

PROPOSAL FOR R & D ACTIVITY:

1. An exact paper from a National/International journal in this entitled area/subject/area (IEEE Format) AND/OR
2. An article/white paper from a magazine /journal/weekly/any periodical in the entitled subject AND/OR
3. An Advanced technology development/ proposal/article publication from any source of Information.

Construction and technology of power semiconductor devices
Abstract

Power electronic systems play a dominant role in making more efficient use of electric power in many appliances and offer a wide range of ways to control how electrical energy is transported and used. These systems enable automation and robotics, and play a very important role in traction by enabling the use of electric cars and trains. Effective energy delivery and conversion control, including power generation from renewable energy sources and smart energy distribution grids, will continue to grow in importance in future, due to the rising demand for energy.

Power semiconductor devices lie at the heart of this power electronics revolution. Their main task is to modulate the energy flow to suit the demands of the application. Advances in power semiconductor device technology have improved the size, weight, efficiency, reliability and cost of power electronic systems, and have enabled an ever-increasing number of circuit topologies and

related applications. In recent times, energy-related social, economic and environmental concerns have been met by continuous progress in electrical power generation and control. The development trends in power devices are set to continue to enable future systems to satisfy performance expectations, especially in terms of power-handling capability and control.

PROPOSAL FOR PROJECT ACTIVITY:

1. A Proposal of a hobby/mini/proto/general/model/proto type project with extended abstract,
   Block Diagram/Circuit/Flow diagram and clear references may be presented and executed.

Hobby Project:

Title: 6 LED flasher

Description:

It works on the principle of charging and discharging of capacitors C1 and C2. Current from the positive of   battery flows through first set of LEDs D1-D3 to the collector of T1 through resistor R1. Resistor R1 limits current through the LEDs to protect them.

The current through R1 charges capacitor C2. It then discharges through the base of T2 and resistor R4. This gives base current to T2 and it conducts. As a result second set of LEDs D4-D6 lights as the current flows through T1.Capacitor C2 again charges and the cycle repeats. The same thing happens in the other side also. This gives alternate flashing of LEDs

**Circuit Diagram:**

D1-D6 LED R- Red G - Green
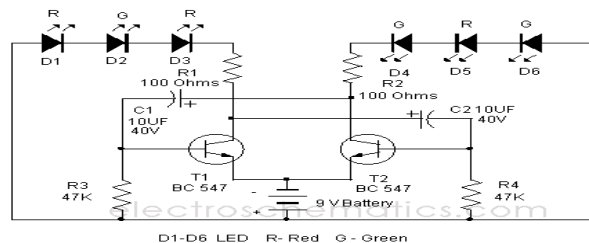
PROPOSAL FOR CONSULTANCY:

OBJECTIVE: A programme /machine/product of utility may be proposed to develop for in house usage/ Industrial requirements may be useful for any outside agency that can be marketable in order to generate revenue through consultancy

Twi-light using white LEDs:

This sunlight-controlled lamp uses a light-dependent resistor (LDR) as the sunlight sensor and a total of 25 high-brightness white LEDs. Separate resistors are connected in series with each row of the LEDs. The working of the circuit is very simple. During daytime, light falls on the LDR1 and it offers a low resistance. As a result, both the transistors (T1 and T2) do not conduct and the LEDs (LED1 through LED25) do not glow. On the other hand, during nighttime, the light does not fall on

LDR1 and it offers a high resistance. As a result, transistors T1 and T2 conduct and the LEDs (LED1 through LED25) glow. Assemble the circuit on a general-purpose PCB and enclose in a cabinet. Connect the LEDs (LED1 through LED25) and LDR1 on top of the box. Place the unit such that during daytime the sunlight falls directly on LDR1. For powering the circuit, use a 12V battery or any 12V adaptor.
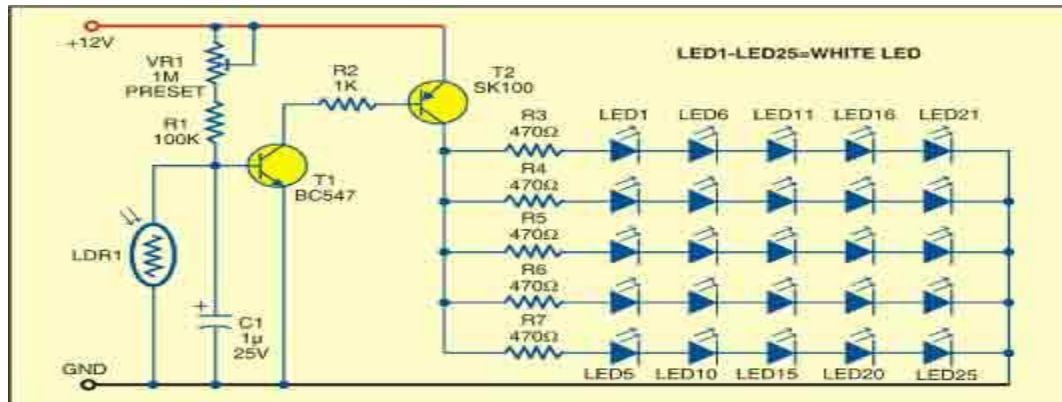
Proposed Equipment for usage: LDR, RESISTORS, CAPACITANCES, LEDS, POWER SUPPLY, TRANSISTORS.

FUNDED/UNFUNDED PROPOSALS (if any):
OBJECTIVE:
The proposals for AICTE grants like (SDPs, RPS and MODROBES etc) UGC grants, DST CPRI and other funding agencies by giving Title and abstract/objective OR Self Funded programme proposals may be submitted for Management approvals.

Proposal for Seminar Grant:
TITLE: Seminar on enhancement in FET's
OBJECTIVE: This seminar is intended to bring down the awareness among students and staff in order to study the various enhanced FET'S

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)

OBJECTIVES OF SHADOW ENGINEERING:

1. The program which uplifts the knowledge of the students related to laboratories.
2. To improve the industry-college interactions.
3. To create industry like environment for all the students in order to make future assignment.
4. This program leads to matrixing with the students.

TABLE 1: INDUSTRIAL VISITS

As of now no industrial visits is proposed.

S. No	Type of industry	Nature of industry	Date of visit	No. of students participated	Year/branch	Remarks
1	Square Micro System	PCBs		60	II/ECE	

TABLE 2: INDUSTRIAL TRAINING (Shadow Engg)
(Career Visit Approval)

S.no	Name of the Course	Nature of industry	Duration of Training	Authority	Date of Training/ Certificate No.	Remarks
1	MECHATRONICS	Advanced Electronics	1 WEEK	Dy Director		

14. ACTIVITIES IN LIFT PROGRAMME:

CALIBRATION/INSTALLATION AND TESTING:
Calibration: Aim of this concept is to check:
   i. whether all the equipment is functioning correctly as per the standards
   ii. To bring correctness in the errors of instrument or equipment.
   iii. To rectify the errors if any

   Installation: Aim of this concept is to make and maintain installation procedure for a
                 New equipment or already existing equipment

   Testing   :   Aim of this concept is to test the equipment after installation whether it
                 Meets the existing standards.

   The list of equipments (hardware/software):
      i.Necessity of tools for development and testing
      ii.Equipment to be calibrated
      iii.Installation of supporting equipment if any.

PROCEDURE FOR CALIBRATION:

Any Equipment or Instrument or Gauge or Machine can be calibrated as the standard guidelines mentioned under:

1. Identify the Equipment/Instrument/Gauge/Machine which is under defective or to be calibrated or correction for error

2. Identify the type of error and estimate its frequency of variation.

3. Check with Master Standards or equipment/instrument/machine which is working correctly and meeting our requirements.

4. Estimate the frequency of deviations from normal mode.

5. If the equipment is under warranty, then inform to concerned supplier or agency that will carry out calibration.

6. If the equipment is out of warranty then we can compare the deviations and set the error rectification.

7. Generally as per the procedure, the equipment or instruments can be calibrated by the agencies and issue calibration certificate which consists of date of calibration, calibration next due date and remarks as mentioned in the following format.

8. Record and keep all the calibration certificates in safe custody.

After calibration the details of equipment should be submitted in following format.

S.no	Type of equipment	Certificate no	Certificate issued by	Date of calibration	Date of calibration due	Remarks
1	Cathode ray Oscilloscope		SS Instruments, Kukatpally			
2	Trainer Kits		SS Instruments, Kukatpally			

iv. Calibration, Testing and Installation details equipment wise are mentioned as follows:

Case 1: Calibration of Equipment -- if any

Case 2: Installation of Equipment --------------------------------------- if any

Case 3: Testing of Equipment --- if any

Presently there is no new equipment is present for either testing or installations.

15. MAINTAINANCE AND TROUBLESHOOTING:
Maintenance:

Maintenance and trouble shooting of each equipment in a laboratory must follow the following guidelines:

Maintenance Schedules:

(1) Preventive Maintenance Schedules of lab will be decided by lab in charge along with concerned HOD. The details of schedule should be recorded in the following template of format.

S.No.	Name of the Equipment	Date of Maintenance	Type of Activity	Remarks
1	Cathode ray Oscilloscope		Cleaning and Servicing	Working well
2	Trainer Kits		Testing and Troubleshooting	Working OK
3	Power Supply's		Testing and Troubleshooting	Working OK
4	Multi-meters		Error Correction and Calibration	Working OK

 (2) Maintenance Reports duly signed by in charges as well as HODs and duly approved by Principal periodically.

TROUBLE SHOOTING SCHEDULES:

   A proposal is to be made from each lab branch wise. The proposal should carry following details related to specific equipment in lab.

   S.No., Equipment Name , Type of Problem (Too much Noise, Abnormal Sound, Corrupt Software, Anti Virus Problem, Missing of Display, CRT not working, Motor is not giving signal, Digital display is not working, Break of tools, Mis alignment of machine elements, PLC is not properly working), Expected Reasons (Bearing failure, Improper alignment of machine centres, Missing of vibration pads etc)

Trouble shooting exercises should be properly recorded in a separate format as mentioned below:

S.No.	Date of recording activity	Equipment Name	Type of Trouble	Remedial Activity	Remarks

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

   Accreditation is the formal recognition, authorization and registration of a laboratory that has demonstrated its capability, competence and credibility to carry out the tasks. It provides the feedback to laboratories as to whether they are performing according to technical competence as per guidelines of NABL (National Accreditation Board for Testing and Calibration Laboratories)

The laboratory should carry out the following important tasks towards getting ready for accreditation from NABL.

1. Preparation of methodology in each experiment
2. Preparation of Standard Operating procedure for each equipment
3. Preparation of Laboratory Manual as per the guidelines specified by Combined Lab Team(CLT) headed by Principal/HOD/Dean/incharge
4. Ensure Effective environmental conditions(temperature, humidity,storage and placement) in the laboratories by implementing proper housekeeping and cleaning of the equipments from dust, dirt etc.
5. Ensure Calibration of instruments/equipment(Only NABL accredited authorized laboratories provide calibration.
6. All the details of Calibration should be included in the format specified exclusively for calibration procedure.
7. Ensure proper implementation of all the documents, formats to be included in the lab manual.
8. Impart training for all the technicians working in labs about the importance of documentation, log sheets, operating procedure of the lab.
9. Incorporate Internal Lab audits for effective functioning of the laboratories. Audits may be once in a month or 3 months or at the end of the semester. The audit schedule will be decided by the Chairman and Principal of the CLT team.
10. Auditors should submit the detailed report of each lab duly signed to the Principal.
11. Each lab should maintain all the bills/invoices of each instrument or equipment in a separate file.
12. All the stock registers either consumable or non consumable should be updated whenever any purchases of consumables or equipment takes place.
13. All the safety precautions are properly displayed in front of each lab.
14. All the Lead experiments should be maintained separately in a record /record in a separate folder.
15. Based on Pre Assessment report submitted by auditor, corrective actions should be carried out by each lab in charge and that must be forwarded to concerned HOD and Principal.

SUBJECTWISE LAB PLANNER
NAME OF THE SUBJECT: ANALOG COMMUNICATION LAB

CONTENTS:

1. OBJECTIVES AND RELEVANCE

2. SCOPE

3. PREREQUISITES

4. SYLLABUS AS PER JNTUH

5. LEAD EXPERIMENT

6. VIRTUAL LAB EXPERIMENT

7. SUGGESTED BOOKS

8. WEBSITES (USEFUL LINKS)

9. EXPERT DETAILS

10. (A) LAB SCHEDULE

    (B) VIVA SCHEDULE

    (C) SCHEME OF EVALUATION

11. PROJECT/PRODUCT/PAPER BASED LEARNING

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D
    PROPOSALS

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND
    INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL
    LEARNING PROGRAM)

14. ACTIVITIES IN LIFT PROGRAM

15. MAINTAINANCE AND TROUBLESHOOTING

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER
    NABL

1. OBJECTIVE AND RELEVANCE:

The main objective of this lab is to gain the practical hands on experience by exposing the students to various modulation and demodulations techniques. And also understanding of the concepts involved in transmission and reception of the signals in communication.

2. SCOPE

Understanding of analog communication lab has the scope to make the learner comfortable to work in the communication area and become proficient in building and testing an analog electronic circuit. This subject gives us an idea or overview to learn concepts of Digital Communication system.

3. PREREQUISITES:

Knowledge of electronic devices, electronic circuits, signals and systems and Solid state physics is required. Also the laboratory course of electronic devices and circuits should have been completed.

4. SYLLABUS AS PER JNTUH: The lab course should be planned as per the JNTUH syllabus. In this, LEAD experiments should also be included in cycle of experiments.

(A) LIST OF THE EXPERIMENTS:
1. Amplitude modulation and demodulation
2. DSB-SC Modulator & detector
3. SSB Modulator & detector
4. Frequency modulation and demodulation
5. Study of spectrum analyzer
6. Pre-emphasis and de-emphasis
7. Time division Multiplexing and De multiplexing
8. Frequency division Multiplexing and De multiplexing
9. Verification of Sampling theorem
10. Pulse amplitude modulation & Demodulation
11. pulse width modulation & Demodulation
12. pulse position modulation & Demodulation
13. AGC characteristics
14. Frequency Synthesizer
15. Phase Lock Loop

MAIN LINKAGE OF AC THEORY WITH LAB EXPERIMENTS:

UNIT-I:
EXPERIMENT 1: AMPLITUDE MODULATION AND DEMODULATION

OBJECTIVE
 To generate amplitude modulated wave and determine the percentage modulation. Also demodulate the modulated wave.

PREREQUISITES
Knowledge on electronic components, signals and systems

PROCEDURE:
1. Switch on the trainer and check the o/p of carrier generator on oscilloscope.
2. Connect around 20 kHz with 2 volts A.F signal at AF i/p to the modulator circuit.
3. Connect the carrier signal at Carrier i/p of modulator circuit.
4. Observe the Modulator output signal at AM O/P spring by making necessary changes
   in A.F signal.
5. Vary the modulating frequency and amplitude and observe the effects on the
   modulated   wave forms.
6. The depth of modulation can be varied using the variable knob (potentiometer) provided at A.F
   signal.
7. The percentage of modulation or modulation factor can be calculated using the following
   formulae.

$$\% \text{ of modulation} = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$$

$$\text{Modulation factor } (m) = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$$

8. Connect the output of the modulator to the input of demodulator circuit and observe the output
   which is same as input.

APPLICATIONS
- Used in the communication systems
- Used in radio broadcasting
- It was first used to carry audio over telephone lines.

UNIT-II:

EXPERIMENT 2:   DSB-SC MODULATOR & DETECTOR
OBJECTIVE:
To generate am-double side band suppressed carrier (DSB-SC) signal.

PREREQUISITES
Knowledge on electronic components, signals and systems

PROCEDURE:
1. Switch on the trainer.
2. Connect 200Hz sine wave, and 100 KHz square wave from the Function Generators.
3. Adjust R_1 (1K linear pot). Connect your oscilloscope to the output.
4. Vary R_1 (1K) both clockwise and counter clockwise. Observe the output.
5. Disconnect the SINE input to R1 (1K). The output should not be close to zero.
6. Increase the oscilloscope's vertical input sensitivity to measure the output voltage.
7. Set the vertical input control to 1V/cm. Connect the SINE input to R1 (1K) and adjust
8. R1 for maximum output without producing clipping. Measure the peak side band output voltage.

    Epk sidebands = _____.

9. Calculate the carrier suppression in dB.

       dB = - 20 log Epk sideband
                           Eout carrier only

APPLICATIONS
- In TV it is used to transmit color information.
- For transmitting stereo information in FM sound broadcast at VHF.

UNIT-III:

EXPERIMENT 3: SINGLE SIDE BAND MODULATION AND DEMODULATION

OBJECTIVE
To study single side band signal generation using phase shift method and demodulation using Synchronous detector.

PREREQUISITES:
Knowledge on electronic components, signals and systems

PROCEDURE:
1.   Study the circuit operation of SSB system thoroughly.

2.   Observe the output of the RF generator using CRO. There are two outputs from the RF generator, one is direct output and another is 90^0 phase shift with the direct output. The output frequency is 100KHz and the amplitude is $\geq 0.2V_{pp}$ (potentiometers are provided to vary the output amplitude)

3.   Observe the output of the AF generator using CRO. There are two outputs from the AF generator, one is direct output and another is 90^0 phase shift with the direct output. A switch is provided to select the required frequency (2K, 4K or 6 KHz). AGC potentiometer is provided to adjust the gain of the oscillator (or to set the output to good shape) And the amplitude is $= 10V_{pp}$ (potentiometers are provided to vary the output amplitude)

4.   Measure and record the RF signal frequency using frequency counter.

5.   Set the amplitudes of the RF signals to 0.1 V_{PP} and connect 0^0 phase shift signal to one balanced modulator and 90^0 phase shift to another balanced modulator as shown in figure.

6.   Selected the required frequency (2K, 4K or 6 KHz) of the AF generator with the help of switch and adjust the AGC potentiometer until the output amplitude is $=\square$ $10V_{pp}$ (when amplitude controls are in maximum condition).

7.   Measure and record the AF signals frequency using frequency using frequency counter.

8.   Set the AF signal amplitudes to 8 V_{pp} using amplitude control and connect to the balanced modulators as shown in below figure.

9.   Observe the outputs of both the balanced modulators simultaneously using Dual trace Oscilloscope, and adjust the balance control until you get the output wave forms (DSB – SC) as shown in figure.

10. To get SSB lower side band signal, connect balanced modulator outputs (DSB-SC) to subtractor.

11. Measure and record the SSB signal frequency using counter.

12.   Calculate theoretical frequency of SSB (LSB) and compare it with the practical value.
     LSB = RF frequency – AF frequency

13. To get SSB upper side band signal, connect the output of the balanced modulator to the summer circuit.

14. Measure and record the SSB upper side band signal frequency using counter.

15. Calculate theoretical value of the SSB (USB) frequency and compare it with practical value.
     USB = RF frequency + AF frequency

     Ex: If RF frequency is 100 KHz and AF frequency is 2 KHz

     Then USB = 100KHz + 2 KHz = 102 KHz

APPLICATIONS

- It is used for Frequency division multiplexing
- It is used for long-distance voice radio transmissions

UNIT-IV:

No experiments suggested as per the JNTU syllabus. Basic introduction concepts of FM are discussed .

UNIT-V:

EXPERIMENT 4:   FREQUENCY MODULATION AND DEMODULATION
OBJECTIVE

 To study Frequency modulation and demodulation and to calculate Frequency deviation and Frequency index.

PREREQUISITES

Knowledge on electronic components, signals and systems

PROCEDURE:

1. Switch on the experimental board.
2. Connect Oscilloscope to the FM O/P and observe that carrier frequency at that point without any A.F input.
3. Connect around 1 KHZ with 2 volts sine wave (A.F. Signal) to the input of the frequency modulator (At AF input)
4. Now observe the frequency modulation output on the 1st channel of CRO and adjust the amplitude of the AF signal to get clear frequency modulated wave form.
5. Vary the modulating frequency (A.F signal) , and amplitude and observe the effects on the modulated wave form.
6. Connect the FM o/p to the FM i/p of De-modulator.
7. Vary the potentiometer provided in the demodulator section.
8. Observe the output at demodulation o/p on second channel of CRO.

APPLICATIONS

- FM is used at audio frequencies to synthesize sound.
- Used in telecommunications
- Used in signal processing
- Used for direct-satellite broadcasting

EXPERIMENT 5: PHASE LOCKED LOOP USING LM565

OBJECTIVE

To study phase lock loop and its capture range, lock range and free running VCO frequency.

PREREQUISITES

Knowledge on electronic components, signals and systems

DESCRIPTION

a. Introduction to experiment – 30 min

b. Connection of experiment and its verification.

c. Experimental determination of results

APPLICATIONS

- Used as Frequency Divider and Multiplier
- Used for Frequency Synthesis and Angle Modulation by PLL
- Used in Modems

UNIT-VI:

EXPERIMENT 6: PRE-EMPHASIS AND DE-EMPHASIS

OBJECTIVE

To observe the effects of pre-emphasis on given input signal. And to observe the effects of de-emphasis on given input signal.

PREREQUISITES

Knowledge on electronic components, signals and systems

PROCEDURE:

1.   Switch on Pre-emphasis and De-Emphasis Trainer.
2.   Give the input from signal generator to AF I/P of pre- emphasis circuit. By varying the amplitude knob set the input voltage to some mill volts say(4mV,6mV,etc.,)
3.   Observe the output waveform on CRO channel – 1, by connecting either 75mH or 50mH.
4.   The output of pre-emphasis circuit must below the audio frequency range.
5.   Connect the output of Pre-Emphasis to the I/P of De-emphasis circuit.
6.   Observe the De-Emphasis output at AF O/P of De-Emphasis circuit.
7.   Measure the output voltage in CRO for each frequency and note down the values.
8.   Calculate the attenuation and logF Values.
9.   Plot the graph between frequencies on X-axis and attenuation on Y-axis to show the emphasis curve.
10.   Various values of R and C are available so that, the time constant is suitably selected depending upon the application.

APPLICATIONS

- Used in FM transmitters & receivers.

UNIT –VII:

EXPERIMENT 7:   AGC CHARACTERISTICS

OBJECTIVE:
To study the AGC Characteristics

PREREQUISITES
Knowledge on electronic components, signals and systems

DESCRIPTION

a. Introduction to experiment – 30 min.
b. Connection of experiment and its verification.
c. Experimental determination of results.

APPLICATIONS
- Used in AM radio receivers.
- Used in Radar.
- Used in Telephone recording.
- Used in biological.

UNIT-VIII

EXPERIMENT 8:   TIME DIVISION MULTIPLEXING AND DE MULTIPLEXING

OBJECTIVE
 To Study of Time division multiplexing and de multiplexing.

PREREQUISITES
Knowledge on electronic components, signals and systems.

DESCRIPTION

a. Introduction to experiment – 30 min.
b. Connection of experiment and its verification.
c. Experimental determination of results.

APPLICATIONS
- Used in The GSM telephone system.
- Used in SONET.

EXPERIMENT 9: FREQUENCY DIVISION MULTIPLEXING AND DE-MULTIPLEXING

OBJECTIVE
To Study of frequency division multiplexing and de multiplexing.

PREREQUISITES
Knowledge on electronic components, signals and systems.

DESCRIPTION
a. Introduction to experiment – 30 min.
b. Connection of experiment and its verification.
c. Experimental determination of results.

APPLICATIONS
- FDM is used by telephone systems to transmit multiple telephone calls through high capacity trunk lines.
- FDM used in television broadcasting.
- Used in communications satellites.

EXPERIMENT 10:   VERIFICATION OF SAMPLING THEOREM

OBJECTIVE
To verify sampling theorem.

PREREQUISITES
Knowledge on electronic components, signals and systems.

DESCRIPTION
a. Introduction to experiment – 30 min.
b. Connection of experiment and its verification.
c. Experimental determination of results.

APPLICATIONS
- Used in Analog to Digital Converters.

EXPERIMENT 11:   PULSE AMPLITUDE MODULATION & DEMODULATION

OBJECTIVE
To study the PAM modulation and demodulation of PAM and observe the output waveform.

PREREQUISITES
Knowledge on electronic components, signals and systems.

DESCRIPTION

a. Introduction to experiment – 30 min.

b. Connection of experiment and its verification.

c. Experimental determination of results.

APPLICATIONS

- Use in electronic drivers for LED lighting.
- Use in Ethernet.

EXPERIMENT 12: PULSE WIDTH MODULATION & DEMODULATION

OBJECTIVE

To study the Pulse Width Modulation (PWM) and Demodulation process and record the corresponding waveforms.

PREREQUISITES

Knowledge on electronic components, signals and systems.

DESCRIPTION

a. Introduction to experiment – 30 min.

b. Connection of experiment and its verification.

c. Experimental determination of results.

APPLICATIONS

- Used in Telecommunications**.**
- PWM is also used in efficient voltage regulators.
- Used for Audio effects and amplification.

EXPERIMENT 13: PULSE POSITION MODULATION & DEMODULATION

OBJECTIVE

To study the Pulse Position Modulation (PPM) and demodulation process and record Corresponding waveforms.

PREREQUISITES

Knowledge on electronic components, signals and systems.

DESCRIPTION

a. Introduction to experiment – 30 min.

b. Connection of experiment and its verification.

c. Experimental determination of results.

APPLICATIONS

- Used specially in RF (Radio Frequency) communications.

5. LEAD EXPERIMENT

Costas loop receiver

```
Ts=1/8000;
t=linspace(0,1,1000)
x=sin(2*pi*t*200).^2;
k1=0.5;
B1=12;
a=2*0.707*(2*B1*Ts/(0.707+1/(4*0.707)))/k1
b=(2*B1*Ts/(0.707+1/(4*0.707)))/k1
buffy=zeros(1,2);
buffx=0;
input=ones(1,4000);
for n=1:length(input)
 y(n)=k1*((a+b)*input(n)-a*buffx)+(2-k1*(a+b))*buffy(1)-(1-k1*a)*buffy(2);
  buffy(2)=buffy(1);
  buffy(1)=y(n);
  input(n)=buffx;
end
plot(y)
save costas_prm a b Ts
load costas_prm
fc=2000;
fm=200;
t=linspace(0.11,0.18,8000);
carrier=cos(2*pi*fc*t);
m= sin(2*pi*fm*t);
x=m.*carrier;
figure
plot(t,x)
wcTs=2*pi*fc*Ts;
buff1=0;
buff2=0;
x_analytic=hilbert(x);
figure;
plot(t,x_analytic);
for n=1:length(x)
  cenv=x_analytic(n)*exp(-i*buff1);
  c1=real(cenv);
  c2=imag(cenv);
  q=c1*c2;
  q_prime=(b*q+buff2);
  q_hat=a*q+q_prime;
```

```
    buff2=q_prime;
    buff1=q_hat+wcTs+buff1;
    output(n)=c1;
end
figure
plot(t,output)
```

Result:
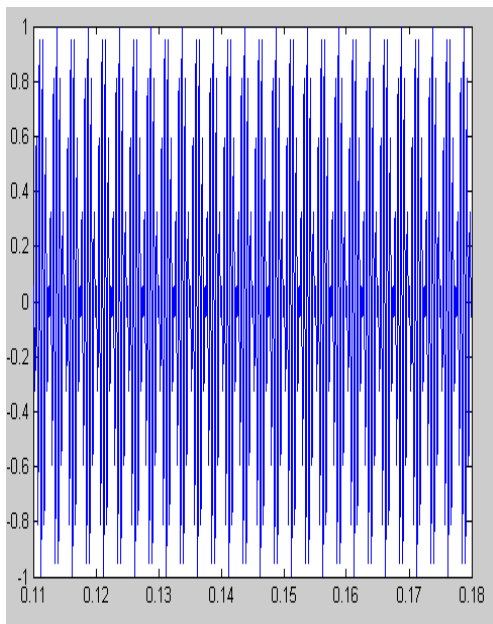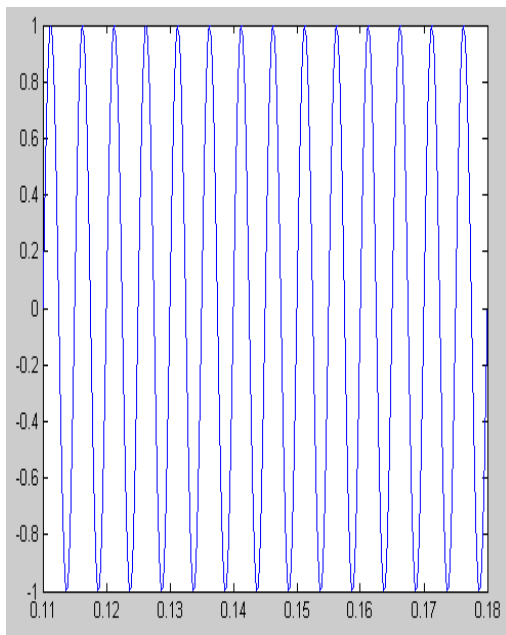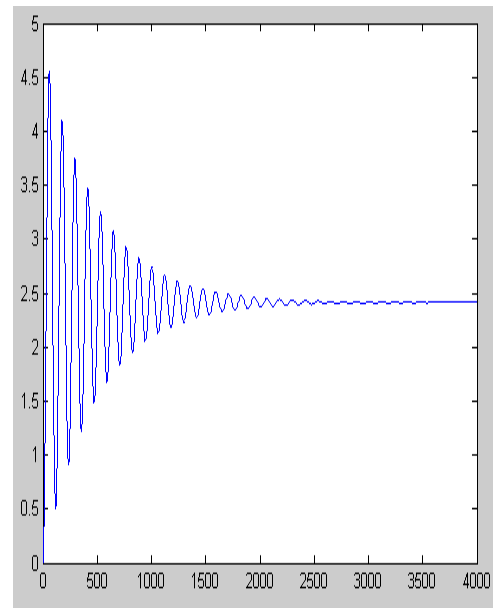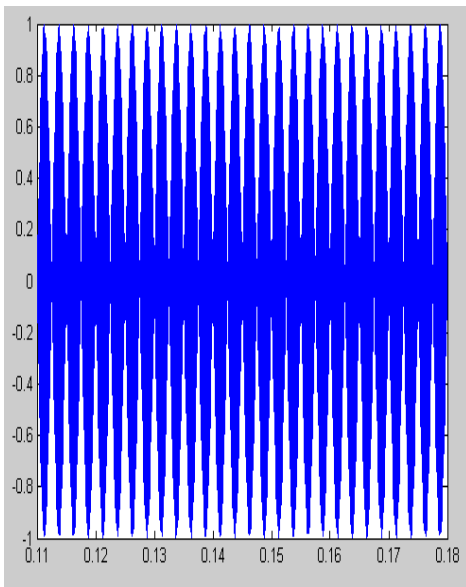
6. VIRTUAL LAB EXPERIMENT

Amplitude Modulation by using SCI LAB

AIM: To generate the Amplitude Modulation (AM) wave by using SCI Lab software.

Apparatus

SCILAB Software

Program
// generate carrier signal
fc = 5000;
Ac = 9;
t = linspace(0,10*(10^(-3)),500);
Vc = Ac*sin(((2*%pi)*fc)*t);
subplot(411)
plot(t,Vc)
// generate modulating signal
fm = 500;
Am = 4.5;
Vm = Am*sin(((2*%pi)*fm)*t);
subplot(412)
plot(t,Vm)
// generate modulation signal with index modulation m = 0.5
m = Am/Ac;
Vt = (Ac*(1+m*sin(((2*%pi)*fm)*t))) .*sin(((2*%pi)*fc)*t);
subplot(413)
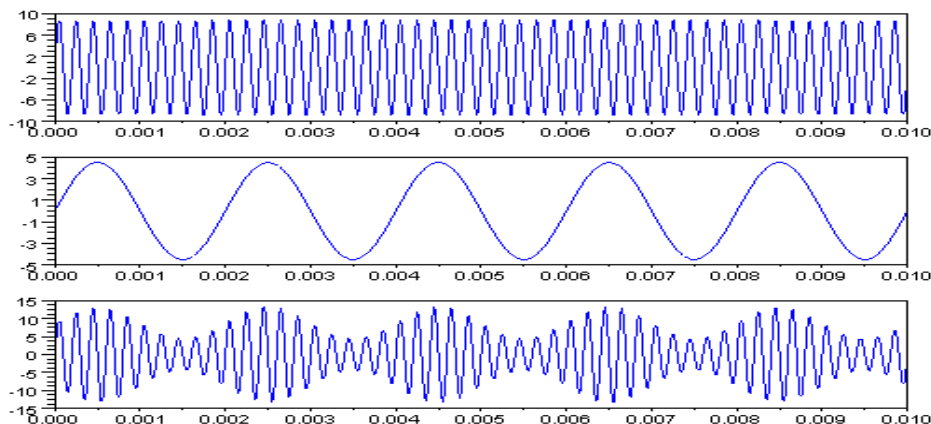plot(t,Vt)

Expected waveforms:

Figure (a) i) Carrier Signal   ii) Modulating Signal   iii) Amplitude Modulation Signal

Result: Generation of Amplitude modulated wave by using SCI lab software have been verified.

7. SUGGESTED BOOKS:

TEXT BOOKS:
1. Principles of Communication Systems - H Taub & D. Schilling, Gautam Sahe. TMH, 2007 3rd Edition
2. Principles of Communication Systems - Simon Haykin. John Wiley, 2r" Edition,.

REFERANCE BOOKS:
1. Electronics & Communication System - George Kennedy and Bernard Davis, 4th Edition TMH 2009
2. Analog Communications- KN Hari Bhat & Ganesh Rao, Pearson Publications, 2nd Edition, 2008.
3. Communication Systems Second Edition - R.P. Singh. SP Sapre, TMH, 2007
4. Communication Systems - B.P Lathi, BS Publication, 2006.

8. WEB SITES (USEFUL LINKS):

1. http://www.ece.ucf.edu/files/labs/EEL4515_LabManual.pdf
2. www.studymode.com/.../Analog-Communication-Manual-46547844
3. http://myclassec.blogspot.in/2009/11/analog-communication-lab-Question -bank.html
4. http://www.ee.ic.ac.uk/naylor/notes/comms2.pdf
5. www.scribd.com/doc/26029070/Analog-Communications-Lab
6. http://www.youtube.com/watch?v=FksDWIkAXWM&list=PLSFM7g7ViT RJYwY9n5rWHnr9f0cBZp0QY

9. EXPERT DETAILS

INTERNATIONAL
1. Nisha Gupta, Professor Dept of ECE, BIT Mesra, Email: ngupta@bitmesra.ac.in
2. Salil Kumar Sanyal, Professor Dept of ECE, Jadavpur University salil@etce.jdvu.ac.in,salil_kumars@hotmail.com

NATIONAL
1. Sreeraj Dept OF E&ECE , BITS pilani Email: sreeraj @goa.bits-pilani.ac.in)

2. R.Gangopadhayay
   Asst Professor ,Dept.of E& ECE
   email: ranjan@ece.iitkgp.ernet.in

REGIONAL
1. DR.D. Srinivas,Hod Dept OF ECE JNTUH
   Email:dsraoece@jntuh.ac.in
2. Ms.Swetha,Dept OF ECE, Bapatla Engineering College
   Email:sweta_ece@yahoo.co.in

10. (A) LAB SCHEDULE:
The lab schedule should be planned once in a week. The week wise Scheduled experiment should be completed.

CYCLE 1 (For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Demo	Exp.1	Exp.2	Exp.10	Exp.9	Exp.7	Exp.8	Lead1
B3, B4	Demo	Exp.2	Exp.10	Exp.9	Exp.8	Exp.1	Exp.3	Lead1
B5, B6	Demo	Exp.10	Exp.9	Exp.8	Exp.1	Exp.2	Exp.7	Lead1
B7, B8	Demo	Exp.9	Exp.8	Exp.1	Exp.3	Exp.10	Exp.2	Lead1
B9, B10	Demo	Exp.8	Exp.1	Exp.2	Exp.7	Exp.3	Exp.10	Lead1

CYCLE 2(For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Exp.3	Exp.4	Exp.6	Exp.11	Exp.12	Exp.5	Hobby/lead2	Test
B3, B4	Exp.7	Exp.6	Exp.11	Exp.12	Exp.5	Exp.4	Hobby/lead2	Test
B5, B6	Exp.3	Exp.11	Exp.12	Exp.5	Exp.4	Exp.6	Hobby/lead2	Test
B7, B8	Exp.7	Exp.12	Exp.5	Exp.4	Exp.6	Exp.11	Hobby/lead2	Test
B9, B10	Exp.9	Exp.5	Exp.4	Exp.6	Exp.11	Exp.12	Hobby/lead2	Test

(B) VIVA SCHEDULE: The viva schedule should be planned prior starting to the lab experiment.

ROUND - 1(For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
B1,B2,B3	viva						
B4,B5,B6		viva					
B7,B8,B9			viva				
B10,B11,B12				viva			
B13,B14,B15					viva		
B16.B17,B18						Viva	
B19,B20							Viva

ROUND - 2(For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
SG1	Viva						
SG2		viva					
SG3			Viva				
SG4				Viva			
SG5					viva		
SG6						viva	

*SG: Selected Group with a maximum of 6 or 12 students

(C). SCHEME OF EVALUATION

<u>**LAB EXTERNAL**</u>

S no.	Write-up (by Internal examiner)	Final evaluation (Internal Examiner)	Viva (External Examiner)
1	Aim Equipment needed Circuit diagram Procedure Precautions Tabular form Expected graph	Based on observation, how the student is connecting the circuit, usage of equipment and typical readings And based on correctness of the practical graph to the expected graph and results.	Based on understanding of Experiment and theoretical questions in the related subject.
	Marks: 20	**Marks: 20**	**Marks: 10**
	Total Marks:20+20+10=50 Marks		

LAB INTERNAL

Day to Day Evaluation ------ 15 Marks					Internal Exam ---10M Marks		
Uniform	Observation & Record	Performance of experiment	Result	Viva Voce	Write-up	Connections & Result	Viva Voce
Marks:3	Marks:3	Marks:3	Marks:3	Marks:3	Marks:4	Marks:3	Marks:3
Total Marks:15+10=25 Marks							

11. PROJECT/PRODUCT/PAPER BASED LEARNING

FM TRANSMITTER

OBJECTIVE: Design & Study of the FM Transmitter

PREREQUISITES
Knowledge on electronic components, signals and systems

CIRCUIT DIAGRAM

Medium power FM transmitter   www.circuitstoday.com
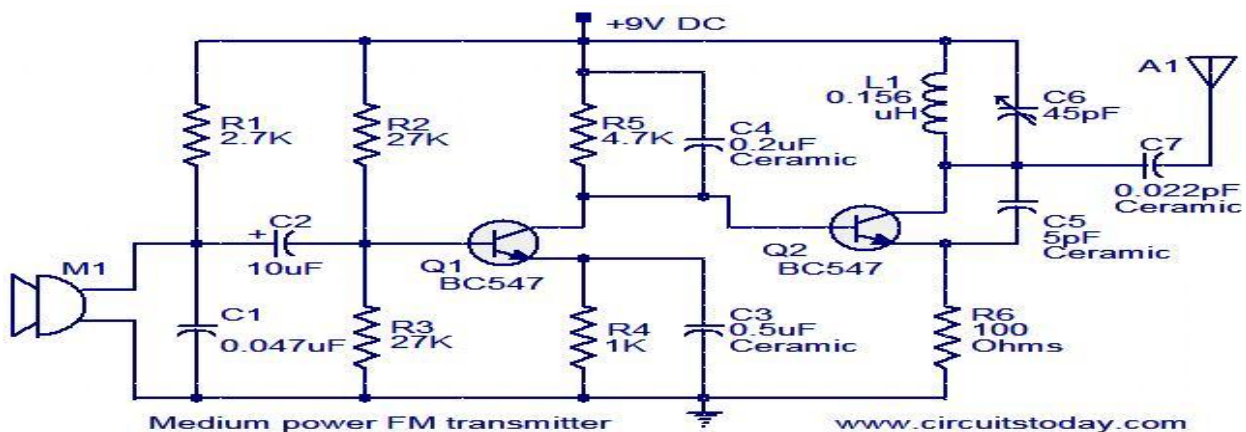
APPLICATIONS:

- Used in FM broadcasting

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D: The lab course should be designed in such a way that it should meet the requirements of research and development as well as consultancy projects. Also the Proposals of Project/R&D/Consultancy are as follows:

Proposal 1: Project Design & Execution.

Proposal 2: R& D Level Project Design & Execution.

Proposal 3: Consultancy Task / Project Design & Development

PROPOSAL FOR R & D ACTIVITY:

1. An exact paper from a National/International journal in this entitled area/subject/area (IEEE Format) AND/OR

2. An article/white paper from a magazine /journal/weekly/any periodical in the entitled subject   AND/OR

3. An Advanced technology development/ proposal/article publication from any source of Information

PROPOSALS 2:

MATLAB Based PCM Modeling and Simulation
Abstract

PCM is the key technology of digital communication, and has especially been widely used in the optical fiber communication, digital microwave communication, satellite communication. Modeling PCM communication systems with the pulse code system by programming, and conduct computer simulation by MATLAB, to analysis performance of the linear PCM and logarithmic PCM.

Keywords: PCM modeling, SNR, quantitative, compression feature, simulation analysis.

PROPOSAL FOR PROJECT ACTIVITY:

1. A Proposal of a hobby/mini/proto/general/model/proto type project with extended abstract, Block Diagram/Circuit/Flow diagram and clear references may be presented and executed.

Hobby Project:

AM receiver using ZN414

Circuit diagram:

AM receiver using ZN414Z   www.circuitstoday.com
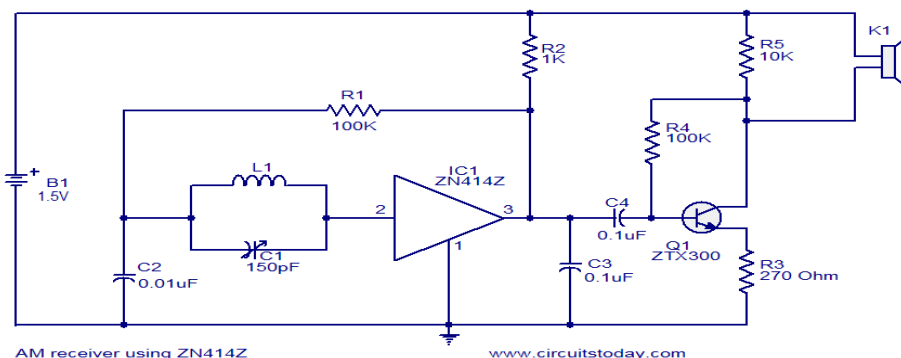
Description:

This is the circuit diagram of the simplest single chip AM radio. The circuit is designed around the IC ZN414Z which is a ten transistor tuned radio frequency receiver .The IC has only three leads and is available in the TO92 package. All necessary circuits required for an AM receiver (RF amplifier, detector and AGC are incorporated inside the IC).In the circuit given below, capacitor C1 and resistor R1 forms the tank circuit which is essential for tuning. Capacitor C4 decouples DC from the output of the IC and C1 bye-passes the noise. Transistor Q1 and associated components forms a classic driver stage for the headphone. Head phone is connected across the resistor R5 and R4 gives necessary biasing for the transistor Q1.

Notes
- Assemble the circuit on a good quality PCB.
- The circuit can be powered from a 1.5V cell.
- Do not give more than 1.8V to the circuit as it will destroy the IC.
- For L1 make 80 turns of 0.3mm enameled copper wire on a 5cm long ferrite rod.
- K1 can be a high impedance crystal earpiece.

PROPOSAL FOR CONSULTANCY:

Proposed Equipment for usage:
A program/machine/product of utility may be proposed to develop for in house usage/Industrial requirements may be useful for any outside agency that can be marketable in order to generate revenue through consultancy.

Proposal to design laser torch-based voice transmitter and receiver for voice transmission up to 500mts.

 Proposed component for usage:

Resistors: 100k ohm, 1M ohm,   10k pot,
Capacitors: 100uf 25V Electrolytic Capacitor, 0.1 uf , 741 op amp ,LM 386 aud amp
NPN photo transistor

INTRODUCTION TO CONCEPT OR PRODUCT OF UTILITY

LASER TORCH-BASED VOICE TRANSMITTER AND RECEIVER

Introduction

Using this circuit you can communicate with your neighbors wirelessly. Instead of RF signals, light from a laser torch is used as the carrier in the circuit. The laser torch can transmit light up to a distance of about 500 meters. The phototransistor of the receiver must be accurately oriented towards the laser beam from the torch. If there is any obstruction in the path of the laser beam, no sound will be heard from the receiver. The transmitter circuit comprises condenser microphone transistor amplifier BC548 followed by a pomp stage built around µA741. The gain of the op-amp can be controlled with the help of 1-mega-ohm pot meter VR1.The AF output from IC1 is coupled to the base of transistor BD139 (T2), which, in turn, modulates the laser beam.

The transmitter uses 9V power supply. However, the 3-volt laser torch (after removal of its battery) can be directly connected to the circuit—with the body of The torch connected to the emitter of BD139 and the spring-loaded lead protruding from inside the torch to circuit ground. The receiver circuit uses an n-p-n phototransistor as the light sensor that is followed by a two-stage transistor preamplifier and LM386-based audio Power amplifier. The receiver does not need any complicated alignment. Just keep the phototransistor oriented towards the remote transmitter's laser point and adjust The volume control for a clear sound. To avoid 50Hz hum noise in the speaker, keep the phototransistor away from AC light sources such as bulbs. The reflected sunlight, however, does not cause any problem. But the sensor should not directly face the sun.

Circuit Diagram

Transmitter

Fig.1: Transmitter

Receiver:
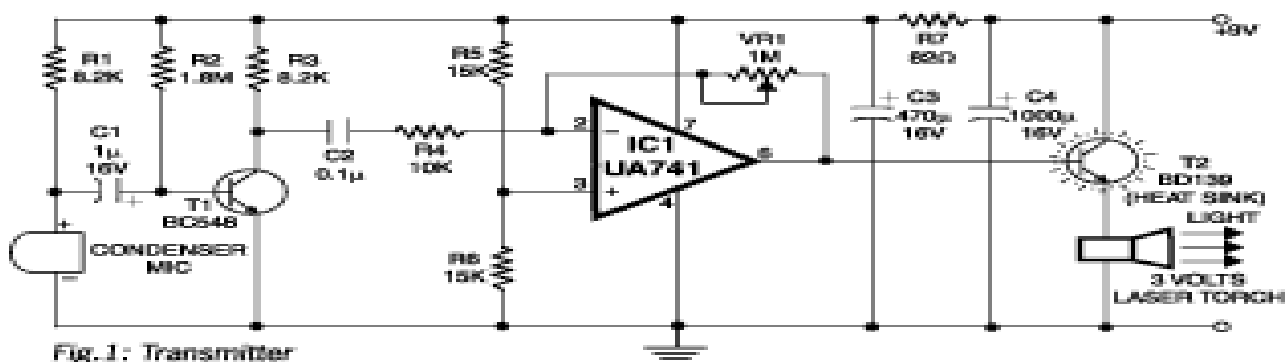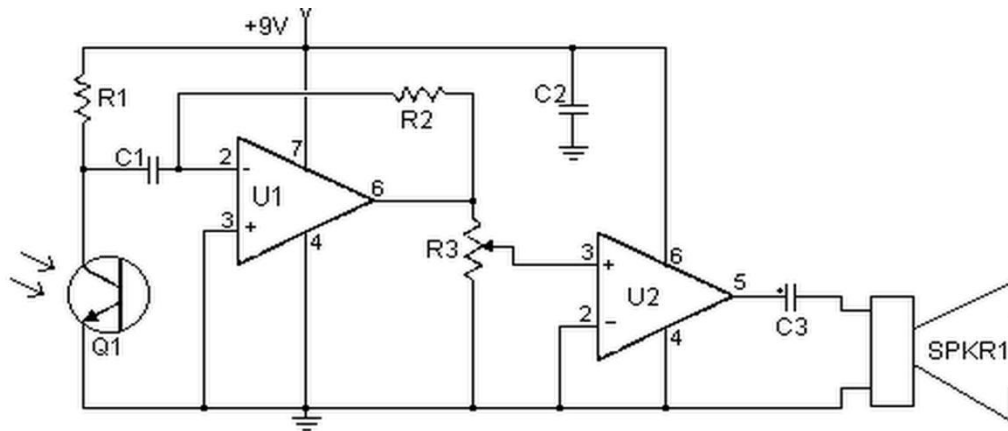

R1= 100k ohm   C2= 0.1 uf
R2= 1M ohm   C3= 100uf 25V Electrolytic Capacitor
R3= 10k pot   U1= 741 op amp
C1= 0.1 uf   U2= LM 386 aud amp
Q1= NPN photo transistor

OR

Proposal to design Listening device for hearing class room lecture from a long distance.

Proposed component for usage: single transistor 2N3904 (T1), a custom-made coil (L1), a trimmer (VC1), 22K ohm, 47K ohm,330 ohm resistors, a condenser microphone (MIC1), 50Pf,1nf,4.7pf,22nf.

FM BUG
        The one thing every spy needs is a small and well concealed listening device. The FM Listening Bug Kit gives you all you need to build a small, single Transistor, FM transmitter that can operate between 80 MHz and 150 MHz. Allowing you to tune it to an open frequency on an FM Radio and listen to what is going on in the room you leave that bug in. This bug has an effective range of about 100 meters. This FM bug transmitter circuit will let you spy on people. The transmitter can be placed in the desired room and the conversation heard from a place far away just using a regular FM radio set.The circuit is designed around a single transistor 2N3904 (T1), a custom-made coil (L1), three capacitors (C1 through C3), a trimmer (VC1), two resistors (R1 and R2) and, of course, a condenser microphone (MIC1). The circuit transmits in the frequency range of 88-105 MHz. Transmission range is 100 meters. Working of the circuit is simple and based on analogue modulation in which a carrier signal is varied corresponding to the message signal.
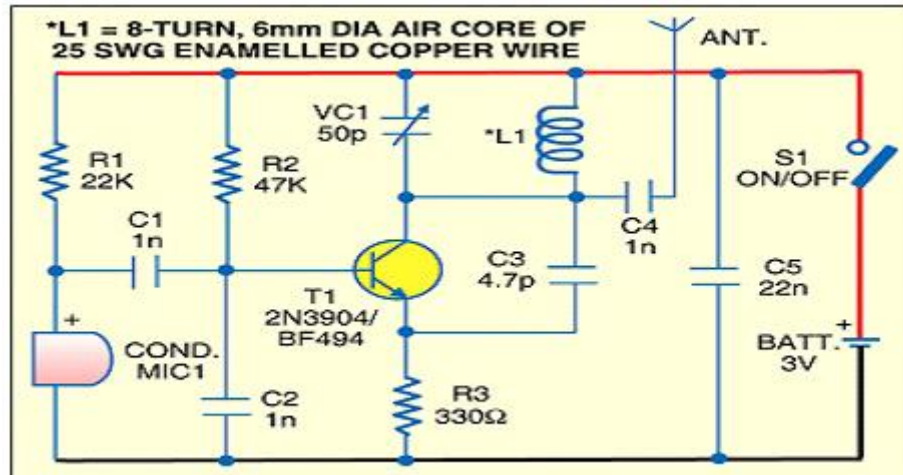
The microphone picks up the sounds in its vicinity to produce corresponding electrical signal. This is the message signal that needs to be transmitted over FM band. The message signal is fed to the base of transistor T1. The tank circuit made using trimmer VC1 and coil L1 generates the carrier frequency. This frequency can be tuned using the trimmer. Transistor T1 modulates the audio signal from condenser microphone over the carrier signal produced by tank circuit. This modulated signal is transmitted through the antenna (ANT).Using trimmer VC1, tune the carrier frequency in FM band and confirm it with an oscilloscope. You will hear the conversation picked up by MIC1 when you tune frequency of the FM radio set to match frequency of the carrier. Prepare the coil L1 using about 25cm length of 25SWG wire. Wrap the wire around a cylindrical object of 6mm diameter and take it out after eight turns. Assemble the circuit on a general-purpose PCB and enclose in a suitable cabinet. After proper soldering, fix switch S1 on the front side of the cabinet. Ensure that the oscillator is properly tuned. Addition of a dipole antenna will extend range of the FM bug transmitter. The circuit works off a 3V battery.

FUNDED/UNFUNDED PROPOSALS (if any):

The proposals for AICTE grants like (SDPs, RPS and MODROBES etc) UGC grants, DST PRI and other funding agencies by giving Title and abstract/objective OR Self Funded program proposals may be submitted for Management approvals.

TITLE: Seminar on Realization of Communication systems using MATLAB

OBJECTIVE: This seminar programme is intended to bring down the awareness among all Students and staff in order to study the various applications of communication systems like FM Radio, RADAR, and Television using mat lab.

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM):
OBJECTIVES OF SHADOW ENGINEERING:

1. The program which uplifts the knowledge of the students related to laboratories.
2. To improve the industry-college interactions.
3. To create industry like environment for all the students in order to make future assignments.
4. This program leads to matrixing with the students

PROPOSALS (WEEK WISE INDUSTRIAL VISITS) (IN HOUSE OR OUTSIDE VISIT)/TRAINING PROGRAMMES:

The following proposals are going to make

1. **Sulaxana Circuits private limited**
   Plot No. 36 & 37, ANRICH Industrial Estate
   IDA Bollaram, Hyderabad – 500 032, A.P., India
   Phone: +91-40-3242-0340
   Fax: +91-8458-279 583
   Email: Information@SCLpcb.com

2. **Doordarshan kendra**

S. No	Name of the Course	Nature of industry	Duration of Training	Authority	Date of Training/Certificate No.	remarks
1	OFC	Advanced Training Institute for Electronics and Process Instrumentation	**1** Week	GM		

Ramanthapur,
Hyderabad-500 043
EPABX No. : 040-27038761
Fax : 040-27038790

If students are visited different companies like Sulaxana circuits private limited, Doordarshan kendra etc.

TABLE 1: INDUSTRIAL VISITS

S. No	Type of industry	Nature of industry	Date of visit	No. of students participated	Year/branch	Remarks
1	Sulaxana Circuits	PCBs		60	III/ECE	
2	Doordarshan Kendra	Public service broadcasting and Telecasting		60	III/ECE	

TABLE 2: INDUSTRIAL TRAINING (Shadow Engineering) (Career Visit Approval)

If students are different companies like Advanced Training Institute for Electronics and Process Instrumentation, MSME.

14. ACTIVITIES IN LIFT PROGRAMME (CALIBRATION/INSTALLATION AND TESTING):

Calibration: Aim of this concept is to check:

i. whether all the equipment is functioning correctly as per the Standards.
ii. To bring correctness in the errors of instrument or equipment.
iii. To rectify the errors if any.

Installation: Aim of this concept is to make and maintain installation procedure for a new equipment or already existing equipment.
Testing   : Aim of this concept is to test the equipment after installation whether it meets the existing standards.

The list of equipments (hardware/software):

(i) Necessity of tools for development and testing
(ii) Equipment to be calibrated
(iii) Installation of supporting equipment if any.

After calibration the details of equipment should be submitted in following format.
As all the equipments in the lab are kit based, so that calibration is not done by lab in-charge

S.no	Type of equipment	Certificate no	Certificate issued by	Date of calibration	Date of calibration due	Remarks
1	Spectrum Analyzer	MS/13-14/827	Scientech Technologies	16/08/2013		
2	CRO	12-13/672	Scientech Technologies	29/06/2012		

Procedure for Installation:

Mat lab Installation:

 STEPS**:** Installation of MATLAB Software for window XP/VISTA / Windows 7/8
         Get administrator privileges for the system on which you plan to install MATLAB.
         Use WinRAR to extract RAR file
Step1: Start the installer for Windows, double-clicking on setup.exe
Step 2: Choose to Install Without Using the Internet
        When it starts, the installer displays the following dialog box. Select the Install without
        using the Internet option and Click OK to proceed with installation.

Step 3: Review the License Agreement
        Review the software licensing agreement and, if you agree to its terms, click Yes.
Step 4: Enter the File Installation Key
        Enter your File Installation Key and Click OK.
Step 5: Choose the Installation Type
         In the Installation Type dialog box, specify whether you want to perform a Custom
         Installation and click next.
Step 6: Specify the Installation Folder Specify the name of the folder where you want to install
         MathWorks products. Accept the default installation folder or click Browse to select a
         different one. If the folder doesn't exist, the installer creates it.
Step 7: Specify Products to Install (Custom Only)
         Leave it by default and continue.
Step 8: Specify the Location of the License File.
         Enter the full path of your License File in the text box (or drag and drop the file) and
         Click Next.
Step 9: Specify Installation Options (Custom Only)
        After selecting installation options, click next to proceed with the installation.

Step 10: Confirm Your Choices and Begin Copying Files
         Before it begins copying files to your hard disk, the installer displays a summary of
         your installation choices. To change a setting, click back. To proceed with the
         Installation, click Install. As it copies files to your hard drive, the installer displays a
         status dialog box to show the progress of the installation.

Step 11: Complete the Installation.

iv.   Calibration, Testing and Installation details equipment wise are mentioned as Follows:
        Case 1: Calibration of   Equipment: CRO
        Case 2: Installation of mat lab.
15. MAINTAINANCE AND TROUBLESHOOTING:

(A)Maintenance:

Maintenance and trouble shooting of equipment in a laboratory must follow the following guidelines:

Maintenance Schedules:

(1) Preventive Maintenance Schedules of lab will be decided by lab in charge along with concerned HOD. The details of schedule should be recorded in the following template of format.

S. No.	Name of the Equipment	Date of Maintenance	Type of Activity	Remarks
1	AM /FM Kit		Checking of IC working	

(2) Maintenance Reports duly signed by in charges as well as HODs and duly approved by Principal periodically.

(B) TROUBLE SHOOTING SCHEDULES:

A proposal is to be made from each lab branch wise. The proposal should carry following details related to specific equipment in lab.

S. No., Equipment Name , Type of Problem (Too much Noise, Abnormal Sound, Corrupt Software, Anti Virus Problem, Missing of Display, CRT not working, Motor is not giving signal, Digital display is not working, Break of tools, Misalignment of machine elements, PLC is not properly working), Expected Reasons (Bearing failure, Improper alignment of machine centre, Missing of vibration pads etc)

Trouble shooting exercises should be properly recorded in a separate format as mentioned below:

S. No	Date of recording activity	Equipment Name	Type of Trouble	Remedial Activity	Remarks
1		AM kit	Distortion	Changing the IC/ Changing the amplitude of input signals.	

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

Accreditation is the formal recognition, authorization and registration of a laboratory that has demonstrated its capability, competence and credibility to carry out the tasks. It provides the feedback to laboratories as to whether they are performing according to technical competence as per guidelines of NABL (National Accreditation Board for Testing and Calibration Laboratories)

The laboratory should carry out the following important tasks towards getting ready for accreditation from NABL.

1. Preparation of methodology in each experiment.
2. Preparation of Standard Operating procedure for each equipment
3. Preparation of Laboratory Manual as per the guidelines specified by Combined Lab Team (CLT) headed by Principal/HOD/Dean/incharge.
4. Ensure Effective environmental conditions (temperature, humidity, storage and placement) in the laboratories by implementing proper housekeeping and cleaning of the equipments from dust, dirt etc.
5. Ensure Calibration of instruments/equipment (Only NABL accredited authorized laboratories provide calibration.
6. All the details of Calibration should be included in the format specified exclusively for calibration procedure.
7. Ensure proper implementation of all the documents, formats to be included in the lab manual.
8. Impart training for all the technicians working in labs about the importance of documentation, log sheets, operating procedure of the lab.
9. Incorporate Internal Lab audits for effective functioning of the laboratories. Audits may be once in a month or 3 months or at the end of the semester. The audit schedule will be decided by the Chairman and Principal of the CLT team.
10. Auditors should submit the detailed report of each lab duly signed to the Principal.
11. Each lab should maintain all the bills/invoices of each instrument or equipment in a separate file.
12. All the stock registers either consumable or non consumable should be updated whenever any purchases of consumables or equipment takes place.
13. All the safety precautions are properly displayed in front of each lab.
14. All the Lead experiments should be maintained separately in a record /record in a separate folder.
15. Based on Pre Assessment report submitted by auditor, corrective actions should be carried out by each lab in charge and that must be forwarded to concerned HOD and Principal.

SUBJECTWISE LAB PLANNER

NAME OF THE SUBJECT: ICA & HDL LAB

CONTENTS:

1. OBJECTIVES AND RELEVANCE

2. SCOPE

3. PREREQUISITES

4. SYLLABUS AS PER JNTUH

5. LEAD EXPERIMENT

6. VIRTUAL LAB EXPERIMENT

7. SUGGESTED BOOKS

8. WEBSITES (USEFUL LINKS)

9. EXPERT DETAILS

10. (A)LAB SCHEDULE

    (B)VIVA SCHEDULE

    (C)SCHEME OF EVALUATION

11. PROJECT/PRODUCT/PAPER BASED LEARNING

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D PROPOSALS

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)

14. ACTIVITIES IN LIFT PROGRAM

15. MAINTAINANCE AND TROUBLESHOOTING

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

1. OBJECTIVES AND RELEVANCE

The main objective of this lab course is to gain the practical hands on experience by exposing the students to various linear IC applications. The students will have an understanding of the concepts involved in various Linear and Digital integrated circuits and their various applications. Through this lab the students will get a thorough understanding of various linear ICs and finally this lab introduces the 741 operational amplifiers, 555 timer and its various applications.

Students will also able to do different experiments on various encoder and decoder techniques. And also understanding of the concepts   involved in Adders, Comparators.

2. SCOPE
This lab is more useful in Understanding of Linear and Digital IC Applications and understanding the application of IC's in consumer electronic industries to manufacture the electronic appliances. Understanding of HDL lab has the scope to make the learner comfortable to work in the VLSI area.

3. PREREQUISITES
Theoretical knowledge on subject Integrated Circuit Applications also requires the awareness of various digital electronics and analog electronics like electronic devices and circuits, pulse digital circuits, numbering systems combinational and sequential circuits. Knowledge of Digital Circuits, Digital design through Verilog, and Switching theory and Logic Design is required.

4. SYLLABUS-JNTUH
PART – 1: ICA LAB

UNIT –I
EXPERIMENT NO. 1
Adder, Sub-tractor and Comparator using IC 741 Op-Amp.

OBJECTIVE
To study the applications of IC 741 as adder, subtractor and comparator.

PREREQUISITES
Basic knowledge about Electronic Devices and Circuits , Operation of IC 741 ,Regulated Power Supply, Function Generator, CRO.

DESCRIPTION
a. Introduction to experiment -30 min.
b. Connection of experiment and its verifications.
c. Experimental determination of Adder, Subtractor, Comparator.
d. Graphical determination of input and output waveforms of comparator.

APPLICATIONS

The applications of comparator are

1. Zero crossing detectors.
2. Window detector.
3. Time marker generator.
4. Phase meter.

EXPERIMENT NO. 2

Integrator and Differentiator Circuits using IC 741.

OBJECTIVE

To design and verify the operation of an integrator and differentiator for a given input.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 741, Regulated Power Supply, Function Generator, CRO .

DESCRIPTION

a. Introduction to experiment -30 min.

b. Connection of experiment and its verifications.

c. Experimental determination of an integrator and differentiator for a given input.

d. Graphical determination of input and output waveforms of integrator and differentiator.

APPLICATIONS

1. The differentiator used in wave shaping circuits to detect high frequency components in an input signal and also as a rate of change of frequency detector in FM demodulators.

2. The integrator is used in analog computers and analog to digital converters and signal-wave shaping circuits.

EXPERIMENT NO. 3

Schmitt trigger circuits using IC 741 & IC 555.

OBJECTIVE

To design the Schmitt trigger circuit using IC 741 and IC 555.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 741 , Operation of IC 555,Regulated Power Supply, Function Generator, CRO .

DESCRIPTION

a. Introduction to experiment -30 min.

b. Connection of experiment and its verifications.

c. Experimental determination of Schmitt trigger.

d. Graphical determination of UTP and LTP of the Schmitt trigger.

APPLICATIONS

Schmitt triggers are typically used in open loop configurations for noise immunity and closed loop configurations to implement function generators.

EXPERIMENT NO. 4

Voltage Regulator using IC 723.

OBJECTIVE

To design a low voltage variable regulator of 2 to 7V using IC 723.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 723 , Operation of IC 555 Regulated Power Supply, Function Generator, CRO .

DESCRIPTION

a. Introduction to experiment -30 min.

b. Connection of experiment and its verifications.

c. Experimental determination of characteristics of a voltage variable regulator.

d. Graphical determination of Load and Line Regulation characteristics.

APPLICATIONS

Voltage regulators are used as

1.Control circuits in PWM.

2.Series type switch mode supplies.

3.Rregulated power supplies.

4.Voltage stabilizers.

UNIT-II

EXPERIMENT NO. 5

Active Low Pass & High Pass Butterworth Filter(Second Order).

OBJECTIVE

To study Op-Amp as second order LPF and second order HPF and to obtain frequency response.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 741 ,Regulated Power Supply, Function Generator, CRO .

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of frequency response for second order low pass & high pass filter.

d. Graphical determination of input and output waveforms of integrator and differentiator.

APPLICATIONS

High-pass filters have many applications.

1. They are used as part of an audio crossover to direct high frequencies to a tweeter while attenuating bass signals which could interfere with, or damage, the speaker.
2. High-pass filters are also used for AC coupling at the inputs of many audio power amplifiers.

EXPERIMENT NO. 6

IC 555 Timer as Mono-stable Operation Circuit.

OBJECTIVE

To generate a pulse using Mono-stable Multi-vibrator by using IC555.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 555, Regulated Power Supply, Function Generator, CRO.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of frequency response for second order low pass & high pass filter.

d. Graphical determination of output waveform and measure the pulse duration.

APPLICATIONS

1. Missing Pulse Detector.
2. Frequency Divider.
3. PWM.
4. Linear Ramp Generator

EXPERIMENT NO. 7

IC 565 PLL Applications.

OBJECTIVE

To study and verify the operation of NE 565 PLL.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 565, Regulated Power Supply, Function Generator, CRO.

DESCRIPTION

a. Introduction to experiment -30 min.

b. Connection of experiment and its verifications .

c. Experimental determination of operation of NE 565 PLL.

d. Graphical determination of output waveform and measure the pulse duration.

APPLICATIONS

Phase-locked loops are widely employed in

1.   Radio.
2.   Telecommunications.
3.   Computers and other electronic applications.
4.   They can be used to recover a signal from a noisy communication channel, generate stable frequencies at a multiple of an input frequency (frequency synthesis), or distribute clock timing pulses in digital logic designs such as microprocessors.

EXPERIMENT NO. 8

IC 741 waveform generators-sine, square wave and triangular waves.

OBJECTIVE

To study the operation of waveform generators by using IC 741.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits , Operation of IC 741, Regulated Power Supply, Function Generator, CRO.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of 3 to 8 decoder by verifying truth table.

APPLICATIONS

Waveform generators are used to generate the different types of signals, in communication.

UNIT –III
No experiments in this unit as per syllabus.

APPLICATIONS

The applications are
1. It can be used for gate lights controlling.
2. It can also be used as a automatic street lights control system.

PART 2: HDL LAB

EXPERIMENT 1: HDL CODE TO REALIZE ALL LOGIC GATES

OBJECTIVE: To develop the source code for logic gates by using VERILOG and obtain the simulation.

PREREQUISITES
Knowledge on Basic Number systems and Logic Gates

PROCEDURE
1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name .
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board for your Project.
8. Click on OK and then Yes.
9. Edit Verilog Code for the Design in Project.
10. Click On RUN SYNTHESIZE to synthesize the Design.
11. Right click on the Verilog design and then click on add source for Simulating the Design.
12. Select add or Create design source and the click next.
13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS
1. Used in Digital IC.
2. Used In Memorier, Registers, Adders.

EXPERIMENT 2: DESIGN OF 2-TO-4 ENCODER

OBJECTIVE: To develop the source code for encoder by using VERILOG and obtain the simulation.

PREREQUISITES

Knowledge on Logic Gates and Number systems

PROCEDURE

1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name.
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board for your Project.
8. Click on OK and then Yes.
9. Edit Verilog Code for the Design in Project.
10. Click On RUN SYNTHESIZE to synthesize the Design.
11. Right click on the Verilog design and then click on add source for Simulating the Design.
12. Select add or Create design source and the click next.
13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS

Used in Communication as Transmitters

EXPERIMENT 3: DESIGN OF 8-TO-3 ENCODER

OBJECTIVE

To develop the source code for encoder by using VERILOG and obtain the simulation.

PREREQUISITES

Knowledge on Logic Gates and Number systems

PROCEDURE

1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name.
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board for your Project.
8. Click on OK and then Yes.
9. Edit Verilog Code for the Design in Project.
10. Click On RUN SYNTHESIZE to synthesize the Design.
11. Right click on the Verilog design and then click on add source for Simulating the Design.
12. Select add or Create design source and the click next.
13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS
Used in Communication as Transmitters.

EXPERIMENT 4: DESIGN OF 8to1 MULTIPLEXER AND 1to8 DEMULTIPLEXER

OBJECTIVE
 To develop the source code for 8x1 multiplexer and demultiplexer by using VERILOG and obtain the simulation.

PREREQUISITES
Knowledge on Logic Gates and Number systems

PROCEDURE
1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name .
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board for your Project.
8. Click on OK and then Yes.
9. Edit Verilog Code for the Design in Project.
10. Click On RUN SYNTHESIZE to synthesize the Design.
11. Right click on the Verilog design and then click on add source for Simulating the Design.
12. Select add or Create design source and the click next.
13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS
Used in home sterio set, telephone network, digital semiconductors.

EXPERIMENT 5: DESIGN OF 4-BIT BINARY TO GRAY CONVERTER

OBJECTIVE
To develop the source code for binary to gray converter by using VERILOG and obtained the simulation.

PREREQUISITES
Knowledge on Logic Gates and Number systems

PROCEDURE
1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.

4. Click next.

5. Click on next and then click on create file and enter file name.

6. Click Next-Next-Next.

7. Choose a default Xilinx Part or Board for your Project.

8. Click on OK and then Yes.

9. Edit Verilog Code for the Design in Project.

10. Click On RUN SYNTHESIZE to synthesize the Design.

11. Right click on the Verilog design and then click on add source for Simulating the Design.

12. Select add or Create design source and the click next.

13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS:

A stadiometer is a piece of medical equipment used for measuring human height.

EXPERIMENT 6: 4-BIT COMPARATOR

OBJECTIVE

 To develop the source code for 4-Bit comparator by using VERILOG and obtained the simulation.

PREREQUISITES

Knowledge on Logic Gates and Number systems

PROCEDURE

 1. Double Click on Vivado 2014.2 icon.

2. Click on file-new Project.

3. Click on next and enter project name.

4. Click next.

5. Click on next and then click on create file and enter file name.

6. Click Next-Next-Next.

7. Choose a default Xilinx Part or Board for your Project.

8. Click on OK and then Yes.

9. Edit Verilog Code for the Design in Project.

10. Click On RUN SYNTHESIZE to synthesize the Design.

11. Right click on the Verilog design and then click on add source for Simulating the Design.

12. Select add or Create design source and the click next.

13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS

Used in Schmitt trigger, Op-AMP

EXPERIMENT 7: DESIGN OF FULL ADDER USING THREE MODELING STYLES

OBJECTIVE
To develop the source code for full adder using three modeling styles by using VERILOG and obtained the simulation.

PREREQUISITES
Knowledge on Logic Gates and Number systems

PROCEDURE
1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name.
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board for your Project.
8. Click on OK and then Yes.
9. Edit Verilog Code for the Design in Project.
10. Click On RUN SYNTHESIZE to synthesize the Design.
11. Right click on the Verilog design and then click on add source for Simulating the Design.
12. Select add or Create design source and the click next.
13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS
Used in Processor chip, like Snapdragon, Exynous or Intel Pentium for CPU part.

EXPERIMENT 8: DESIGN OF FLIP FLOPS (SR, JK, D, T)

OBJECTIVE
To develop the source code for FLIP FLOPS by using VERILOG and obtained the simulation.

PREREQUISITES
Knowledge on Logic Gates and Number systems

PROCEDURE
 1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name.
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board for your Project.

8. Click on OK and then Yes.

9. Edit Verilog Code for the Design in Project.

10. Click On RUN SYNTHESIZE to synthesize the Design.

11. Right click on the Verilog design and then click on add source for Simulating the Design.

12. Select add or Create design source and the click next.

13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS

Used in Bounce elimination switch, Latch, Registers, Counters, Memory.

EXPERIMENT 9: DESIGN OF 4-BIT BINARY COUNTER AND BCD COUNTER

OBJECTIVE: To develop the source code for 4-bit binary counter and BCD counter by using VERILOG and obtained the simulation.

PREREQUISITES

Knowledge on Logic Gates and Number systems

PROCEDURE

1. Double Click on Vivado 2014.2 icon.

2. Click on file-new Project.

3. Click on next and enter project name.

4. Click next.

5. Click on next and then click on create file and enter file name.

6. Click Next-Next-Next.

7. Choose a default Xilinx Part or Board for your Project.

8. Click on OK and then Yes.

9. Edit Verilog Code for the Design in Project.

10. Click On RUN SYNTHESIZE to synthesize the Design.

11. Right click on the Verilog design and then click on add source for Simulating the Design.

12. Select add or Create design source and the click next.

13. Enter file name then click OK and Finish –OK –YES.

APPLICATIONS

Used in Digital clocks, Automobile Parking controls.

EXPERIMENT 10: FINITE STATE MACHINE DESIGN

OBJECTIVE

To develop the source code for finite state machine design by using VERILOG and obtained the simulation

PREREQUISITES

Knowledge on Logic Gates and Number systems

PROCEDURE

1. Double Click on Vivado 2014.2 icon.
2. Click on file-new Project.
3. Click on next and enter project name.
4. Click next.
5. Click on next and then click on create file and enter file name.
6. Click Next-Next-Next.
7. Choose a default Xilinx Part or Board For vur Project.
8. Click on OK and then Yes.
9. Edit Verilog Code for the Design in Project.
10. Click On RUN SYNTHESIZE to synthesize the Design.
11. Right click on the Verilog design and then click on add source for Simulating the Design.
12. Select add or Create design source and the click next.
13. Enter file name then click OKand Finish –OK –YES.

APPLICATIONS

Used in Vending Machines, Traffic Lights, Video Games, CPU Controllers, Speech Recognition.

5.   A) LEAD EXPERIMENT

Application of Dark Sensor for automatic lighting system

ABSTRACT

The main objective of this Product is to implement "AUTOMATIC CONTROL OF GATE STREET LIGHT" using LDR, and to implement it to save the electric power, and to reduce the man power in case of street light control system.

• Needs no manual operation for switching.
• When there is a need of light in dark places it automatically detects and switches ON the Light.
• Light is switched ON at night and put it OFF in the day time.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits, Operation of IC 741, Regulated Power Supply, CRO.

DESCRIPTION

a. Introduction to Product.
b. Connection of experiment and its verifications
c. Experimental determination of relay operation and then light control.

COMPONENTS REQUIRED:
➢ 100k resistor x2, 4.7k resistor x1
➢ Photo resistor x1, 180 ohm resistor
➢ LM741 op-amp IC,LED (any color) x1
➢ jumper wires, 9v battery
➢ A breadboard

WORKING
• When light falls on the LDR then its resistance decreases which results in increase of the voltage at pin 2 of the IC 555.
• IC 555 has got comparator inbuilt, which compares between the input voltage from pin2 and 1/3rd of the power supply voltage
• When input falls below 1/3rd then output is set high otherwise it is set low.
• Since in brightness, input voltage rises so we obtain no positive voltage at output of pin 3 to drive relay or LED, besides in poor light condition we get output to energize.

LDR
• It is a special type of resistor whose value depends on the brightness of light which is falling on it.
• It has resistance of about 1Mega Ohm when in total darkness, but a resistance of only about 5k ohms when brightness illuminated.
• It responds to a large part of light spectrum.

TRANSFORMER
For 9v ac power supply we can use step down transformer in order to convert 230 volt to 9 volt.

P.C.B
• With the help of P.C.B it is easy to assemble circuit with neat and clean end products.
• P.C.B is made of Bakelite with surface pasted with copper track-layout.
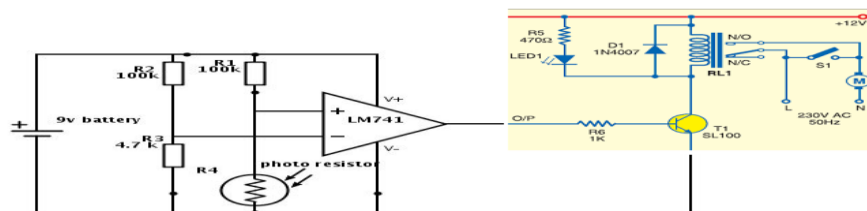• Connection pin is passed through the hole and is soldered.

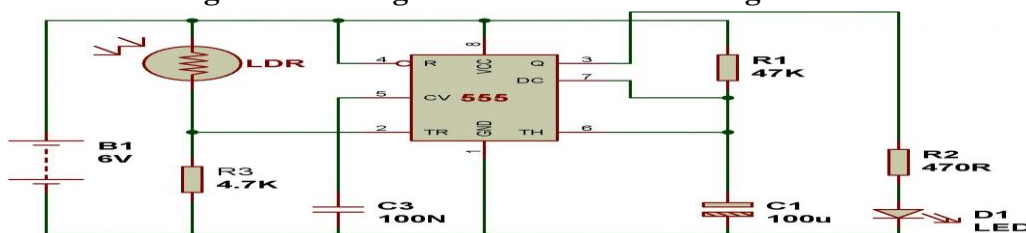**Fig: Circuit Diagram of Dark Sensor using 741 IC**

Fig: Circuit Diagram of Dark Sensor using 555 IC

5. B) LEAD EXPERIMENT

Debouncing buttons on FPGA

Introduction

Using mechanical switches for a user interface is a ubiquitous practice. However, when these switches are actuated, the contacts often rebound, or bounce, off one another before settling into a stable state. Several methods exist to deal with this temporary ambiguity, using either hardware or software. Here, we look at correcting this problem with a simple digital logic circuit (a common task when interfacing FPGAs or CPLDs with pushbuttons or other switches). Generic VHDL code to implement this methodology is included.

Theory of Operation

Figure 1 illustrates the debounce circuit in question. The circuit continuously clocks the button's logic level into FF1 and subsequently into FF2. So, FF1 and FF2 always store the last two logic levels of the button. When these two values remain identical for a specified time, then FF3 is enabled, and the stable value is clocked through to the result output.

The XOR gate and N-bit counter accomplish the timing. If the button's level changes, the values of FF1and FF2 differ for a clock cycle, clearing the N-bit counter via the XOR gate. If the button's level is unchanging (i.e. if FF1 and FF2 are the same logic level), then the XOR gate releases the counter's synchronous clear, and the counter begins to count. The counter continues to increment in this manner until it (1) reaches the specified time and enables the output register or (2) is interrupted and cleared by the XOR gate because the button's logic level is not yet stable.

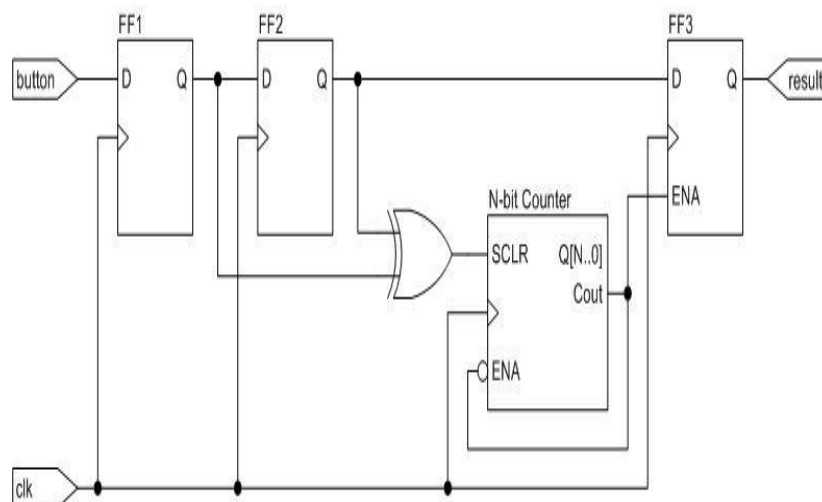**Figure 1. Debounce CircuitSizing the Counter**

The counter's size determines the time required to validate the button's stability. When the counter increments to the point that its carry out bit is asserted, it disables itself from incrementing

further and enables the output register FF3. The circuit remains in this state until a different button value is clocked into FF1, clearing the counter via the XOR gate.The size of the counter and the clock frequency together determine the time period *P* that validates the button's stability. Equation 1 describes this relationship.

In typical applications, the number of clock cycles is large, so the additional two clock cycles from loading FF2 and FF3 can safely be disregarded.Most switches reach a stable logic level within 10ms of the actuation. Supposing we have a 50MHz clock, we need to count $0.01*50,000,000 = 500,000$ clock cycles to reach 10ms. A 19-bit counter fulfills this requirement. Using the counter's carry out pin, as shown in Figure 1, eliminates the requirement of evaluating the entire output bus of the counter. With this method, the actual time implemented is $(2^{19}+2)$ / $50,000,000 = 10.49$ms.

Debouncing typically does not require a high level of resolution, so the relatively small error introduced by using the carry out pin to identify the validation time is adequate for most applications. However, if greater time resolution is desired, and-ing some of the counter's most significant bits achieves this with minimal additional logic usage.

code for button debouncing on [FPGA](#):

//fpga4student.com

// FPGA projects, Verilog projects, VHDL projects

// Verilog code for button deboucing on FPGA

// debouncing module

module debounce(**input** pb_1,clk,**output** pb_out);

wire slow_clk;

wire Q1,**Q2**,Q2_bar;

clock_div u1(clk,slow_clk);

my_dff d1(slow_clk, pb_1,**Q1**);

my_dff d2(slow_clk, **Q1**,**Q2**);

assign Q2_bar = ~**Q2**;

assign pb_out = **Q1** & Q2_bar;

endmodule

// Slow clock for debouncing

module clock_div(**input** Clk_100M, **output reg** slow_clk);

  reg [**26**:**0**]counter=**0**;

  always @(**posedge** Clk_100M)

  begin

    counter <= (counter>=**249999**)?**0**:counter+**1**;

    slow_clk <= (counter < **125000**)?**1'b0**:**1'b1**;

  end

endmodule

// D-flip-flop for debouncing module

module my_dff(**input DFF_CLOCK**, **D**, **output reg Q**);

  always @ (**posedge DFF_CLOCK**) **begin**

    Q <= **D**;

  end

endmodule

Simulation Result:

The example code *debounce.vhd* available here instantiates the circuit in Figure 1. The GENERIC *counter_size* defines the size *N* of the counter. Figure 2 shows a simulation for this design with the counter size set as 2 for demonstration and readability purposes.
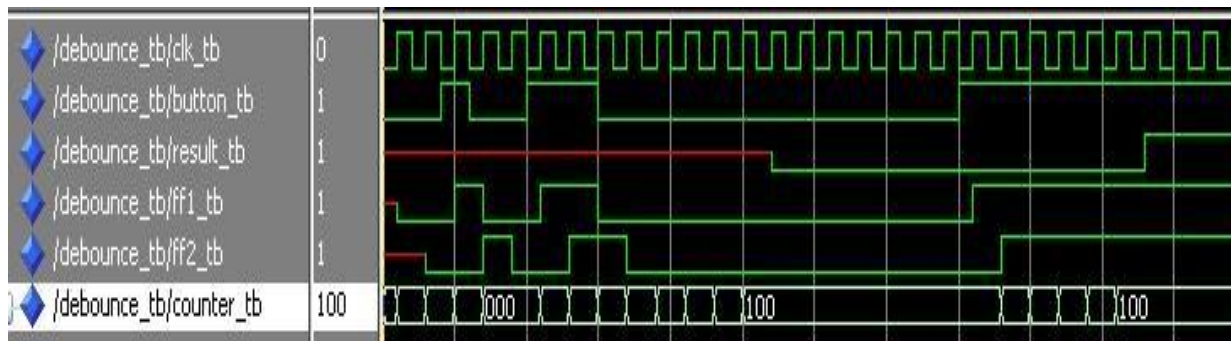

Figure 2. ModelSim Simulation Results

6. VIRTUAL LAB EXPERIMENT
i)   Monostable and Astable Multivibrator by using Simulink/Virtual Breadboard
software.

Introduction
Applications such as oscillators, pulse generators, ramp or square wave generators, multivibrators require a circuit capable of timing intervals. The most popular circuit is the 555 timer. The IC is consisting of combinations of linear comparators and digital flip flops. The IC 555 is reliable and easy to use for various applications. The entire IC is housed in eight pin package. The IC can operate from 5 to 18 V. The timer IC 555 consist of two transistors, two comparators, three equal resistors, flip flop and output stage. A series connection of three equal resistors sets the reference voltage level of the two comparators at 2VCC/3 and VCC/3 the output of these comparators setting or resetting the flip/flop unit. The IC timer 555 has two operational modes, monostable or astable multivibrator. The IC 555 available in two packages DIP and TO99.

Pin Description of IC555 Timer

• pin1. - Ground, The ground pin connects the 555 timer to the negative (0v) supply rail.

• Pin2. - Trigger, The negative input to comparator No 1. A negative pulse on this pin "sets"• the internal Flip-flop when the voltage drops below 1/3Vcc causing the output to switch from a "LOW" to a "HIGH" state.

• Pin3. - Output, The output pin can drive any TTL circuit and is capable of sourcing or sinking up to 200mA of current at an output voltage equal to approximately Vcc - 1.5V so small speakers, LEDs or motors can be connected directly to the output.

• Pin4. - Reset, This pin is used to "reset" the internal Flip-flop controlling the state of the output, pin 3. This is an active-low input and is generally connected to a logic "1"• level when not used to prevent any unwanted resetting of the output.

• Pin5. - Control Voltage, This pin controls the timing of the 555 by overriding the 2/3Vcc level of the voltage divider network. By applying a voltage to this pin the width of the output signal can be varied independently of the RC timing network. When not used it is connected to ground via a 10nF capacitor to eliminate any noise.

• Pin6. - Threshold, The positive input to comparator No 2. This pin is used to reset the Flip-flop when the voltage applied to it exceeds 2/3Vcc causing the output to switch from "HIGH"• to "LOW"• state. This pin connects directly to the RC timing circuit.

• Pin7. - Discharge, The discharge pin is connected directly to the Collector of an internal NPN transistor which is used to "discharge" the timing capacitor to ground when the output at pin 3 switches "LOW".

• Pin8. - Supply +Vcc, This is the power supply

Astable Operation:
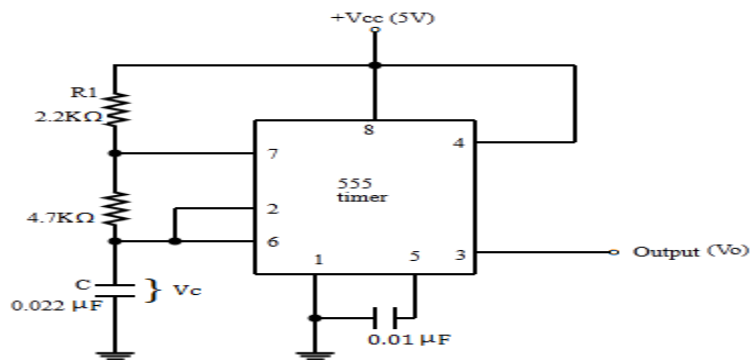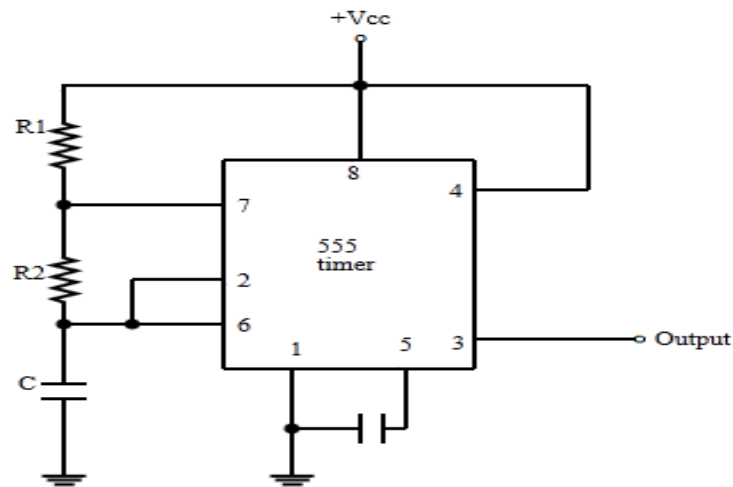
Fig. 1(a) : Circuit Diagram   Fig. 1(b) : Circuit Diagram with Component values

One popular application of IC 555 is astable multivibrator. Fig. 1 shows astable circuit constructed using the external resistors and capacitor to set the timing of the output signal. The capacitor charges through resistors R1 and R2 the voltages across capacitor rises to 2VCC/3. This voltage acts as a threshold voltage at pin 6 which is input to internal comparator which finally trigger the internal flip flop so that output pin goes low. Also flip flop drives the internal discharge transistor to ON allowing capacitor to get discharge from R2 this lead to decrease in capacitor voltage to VCC/3 and the flip flop get trigger and discharge transistors gets off and output set to high. This leads to charging of capacitor through R1 and R2 to VCC.
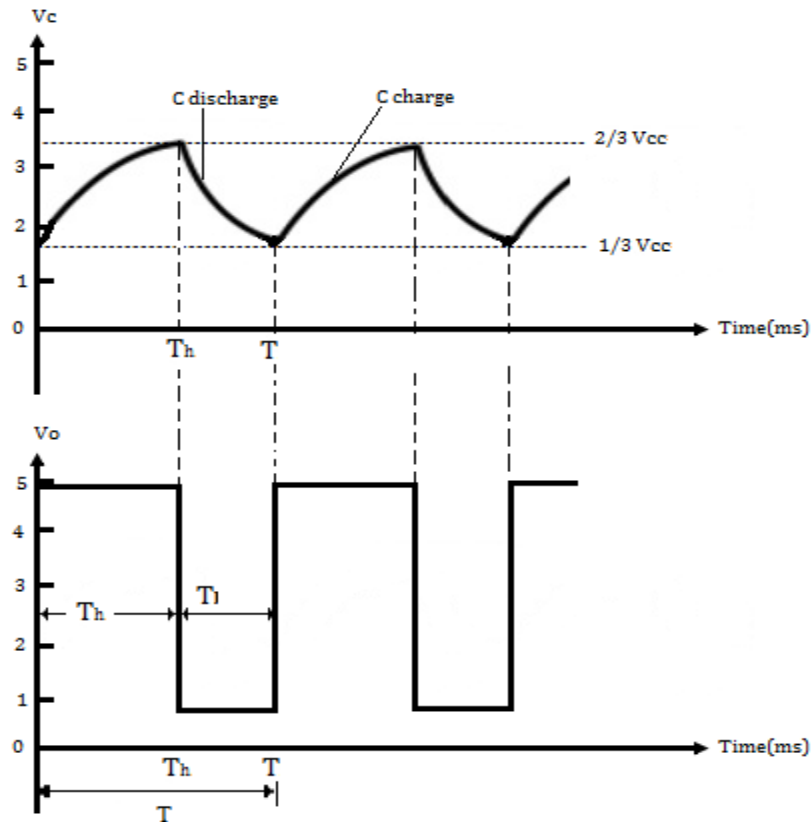
Fig. 2 : Astable Multivibrator Waveforms

The fig. 2 shows the waveforms associated with astable multivibrator. The calculation for the timing related to low and high output is given by The calculation for low and high has been as per the following equations

TH = 0.7(R1 +R2)C
TL = 0.7R2C
The total time T is given as,
T = TH + TL
The equation for total time interval T is given as

T = (R1 + 2R2)C/1.44

For the given values R1 = 2.2KΩ R2 = 4.7 KΩ and C= 0.022μF, frequency of operation will be 5.64 KHz and duty cycle will be 59.5%.
Monostable Operation:
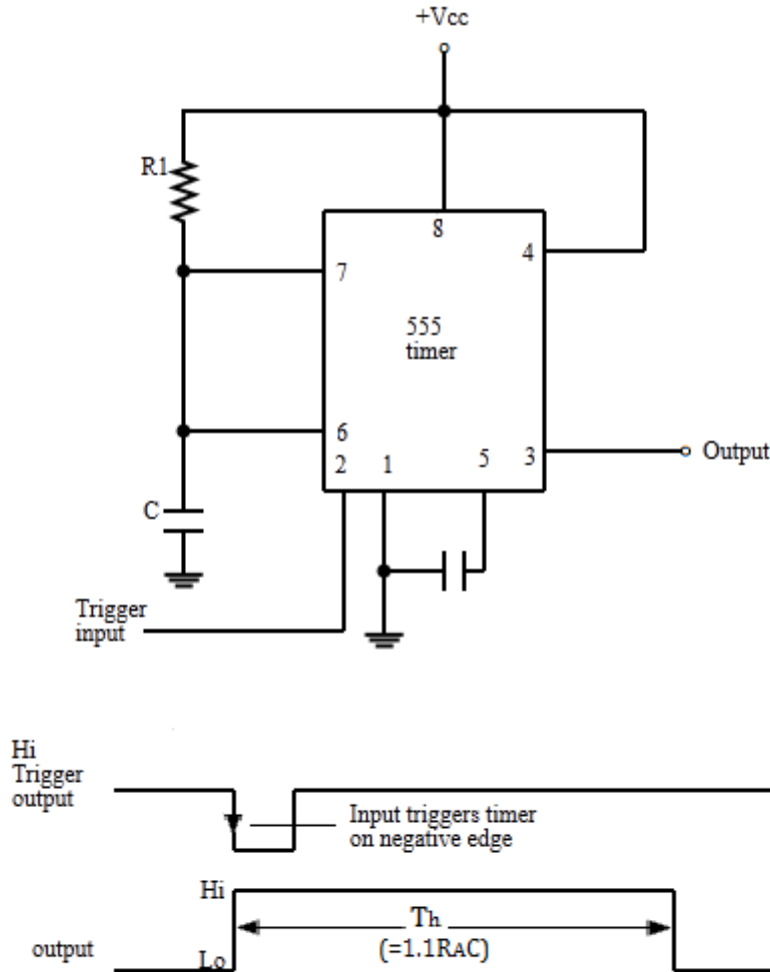
Fig. 3 : Monostable Multivibrator (a) : Circuit (b) : Waveforms

Timer IC 555 is also used as one shot or monostable operation. The circuit diagram is as shown in fig.3 Since there are many real life application where many applications needs to operate for only specific time interval for such application one shot or monostable operation is suitable. When negative going pulse is applied to pin 2 which leads to output pin 3 goes to high.

The time taken by

$$TH = 1.1 \; R1 \; C$$

The negative edge of the trigger pulse causes the internal comparator 2 trigger the flip flops leads to output high at pin 3.The voltage across capacitor rises to 2VCC/3 through supply and resistor R1. When the voltage across capacitor reaches to 2VCC/3 the internal comparator 1 triggers the flip flop from and which send the output from high to low. Fig shows the waveforms associated with the operation of the IC 555 as a monostable. The output waveform shows that the wide range from microsecond to many seconds can be possible with appropriate values of R1 and C. This flexibility

of   time   period   makes   IC   555   versatile   for   many   real   life   applications.

7. SUGGESTED BOOKS
ICA LAB
1. Linear Integrated Circuits-D. Roy Chowdhury, new Age international (p)Ltd, 3rd   Edition, 2008.
2. Digital Fundamentals- Floyd and Jain,Pearson Education ,8th edition,2005.
3. Op-Amp & Linear Integrated Circuits-Concepts & Applications by James M.Fiore, Cengage / Jaico,2/e, 2009.

HDL LAB

1. T. R. Padmanabhan and B. Bala Tripura Sundari, WSE, Design through Verilog HDL, Wiley, 2009.
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2nd Edition.
3. Fundamentals of Digital Logic with Verilog design – Stephen Brown and Zvonkoc Vranesic, TMH, 2nd Edition,2010.
4. Advanced Digital Logic Design using Verilog, State Machine Synthesis for FPGA- Sunggu Lee,Cengage Learning,2012.
5. Verilog HDL – Samir Palnitkar, 2nd Edition, Pearson Education, 2009.
6. Advanced Digital Design with the Verilog HDL – Michel D.Cilan PHI, 2009.

8. WEB SITES

1. http://nptel.iitm.ac.in/courses/117106030/
2. http://www.nprcet.org/e%20content/Misc/e-Learning/EEE/II%20YEAR/EE2254%20-%20Linear%20Integrated%20Circuits%20Applications.pdf
3. http://home.cogeco.ca/~rpaisley4/LM555.html
4. http://electronicsclub.info/555timer.htm
5. http://vol.verilog.com
6. http://nptel.ac.in/video.php?subjectId=106105083
7. www.sandeepani-training.com/
8. http://www.vectorindia.org/verilog.html
9. http://en.wikipedia.org/wiki/Verilog
10. http://www.verilog.com/
11. https://www.doulos.com/knowhow/verilog_designers_guide/
12. http://www.asic-world.com/verilog/veritut.html
13. http://www.altera.com/support/examples/verilog/verilog.html
14. http://www.electrosofts.com/verilog/
15. http://iverilog.com/

9. EXPERTS' DETAILS

The expert details which have been mentioned below are only a few of the eminent ones known Internationally, Nationally and Locally.

INTERNATIONAL

1. Mr.D.Roy Chowdhury, Ph.D. University of Michigan,Dept. of Electronics and Communication Engg.
2. Mrs. Azita Emami , Ph.D.California Institute of Technology, Professor of Electrical Engineering, Dept. of Electrical Engg.
3. Dr. Zainalabedin Navabi, Professor of Electrical and Computer Engineering, Worcesterm Polytechnic Institute, Worcester, e-mail: navabi@wpi.edu

NATIONAL

1. Prof.Roy Paily Palathinkal,Deptt. of Electrical Engg.,IIT Guwahati
2. Prof. Gaurav Trivedi, Deptt. of ECE, IIT, Guwahati.
3. Mr. R.K.Baruah, Tezpur University.
4. Dr. T. R. Padmanabhan, Professor of Computer Science and Engineering, Amrita School of Engineering, Coimbatore. e-mail: trp@amrita.edu
5. Dr. B. Bala Tripura Sundari, Associate Professor of Electronics and Communications Engineering, Amrita Vishwa Vidyapeetham University, Coimbatore.
   e-mail: b_bala@cb.amrita.edu

REGIONAL

1. Prof..Mr.K.Nageshwar Rao, Deptt. of ECE ,JITS,Warangal.
2. Dr.A.S Reddy, Principal, CMREC
3. Prof. C.Ashok Kumar, Depr. Of ECE, CMREC.
4. Dr. J. V. R. Ravindra, Professor Dept. of ECE, Vardhaman College of Engineering, Hyderabad. e-mail: jvr.ravindra@vardhaman.org

10. (A) LAB SCHEDULE: The lab schedule should be planned once in a week. The week wise Scheduled experiment should be completed.

CYCLE 1 (For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Demo	Exp.1	Exp.2	Exp.10	Exp.9	Exp.7	Exp.8	Lead1
B3, B4	Demo	Exp.2	Exp.10	Exp.9	Exp.8	Exp.1	Exp.3	Lead1
B5, B6	Demo	Exp.10	Exp.9	Exp.8	Exp.1	Exp.2	Exp.7	Lead1
B7, B8	Demo	Exp.9	Exp.8	Exp.1	Exp.3	Exp.10	Exp.2	Lead1
B9, B10	Demo	Exp.8	Exp.1	Exp.2	Exp.7	Exp.3	Exp.10	Lead1

CYCLE 2(For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Exp.3	Exp.4	Exp.6	Exp.11	Exp.12	Exp.5	Hobby/lead2	Test
B3, B4	Exp.7	Exp.6	Exp.11	Exp.12	Exp.5	Exp.4	Hobby/lead2	Test
B5, B6	Exp.3	Exp.11	Exp.12	Exp.5	Exp.4	Exp.6	Hobby/lead2	Test
B7, B8	Exp.7	Exp.12	Exp.5	Exp.4	Exp.6	Exp.11	Hobby/lead2	Test
B9, B10	Exp.9	Exp.5	Exp.4	Exp.6	Exp.11	Exp.12	Hobby/lead2	Test

(B) VIVA SCHEDULE: The viva schedule should be planned prior starting to the lab experiment.

ROUND - 1

Batches	week-1	week-2	week-3	week-4	week-5
B1,B2,B3	viva				
B1,B2,B3		Viva			
B1,B2,B3			Viva		
B1,B2,B3				Viva	
B1,B2,B3					Viva

ROUND - 2

Batches	week-1	week-2	week-3	week-4	week-5
SG1	viva				
SG2		Viva			
SG3			Viva		
SG4				Viva	
SG5					Viva

*SG: Selected Group with a maximum of 6 or 12 students

(C). SCHEME OF EVALUATION

LAB EXTERNAL

S no.	Write-up (by Internal examiner)	Final evaluation (Internal Examiner)	Viva (External Examiner)
1	Aim Equipment needed Circuit diagram Procedure Precautions Tabular form Expected graph	Based on observation, how the student is connecting the circuit, usage of equipment and typical readings And based on correctness of the practical graph to the expected graph and results.	Based on understanding of Experiment and theoretical questions in the related subject.
	Marks: 20	**Marks: 20**	**Marks: 10**
	Total Marks:20+20+10=50 Marks		

LAB INTERNAL

Day to Day Evaluation ------ 15 Marks					Internal Exam ---10M Marks		
Uniform	Observation & Record	Performance of experiment	Result	Viva Voce	Write-up	Connections & Result	Viva Voce
Marks:3	**Marks:3**	**Marks:3**	**Marks:3**	**Marks:3**	**Marks:4**	**Marks:3**	**Marks: 3**
Total Marks:15+10=25 Marks							

11. PROJECT/PRODUCT/PAPER BASED LEARNING

PARAMETERIZED CARRY-LOOK-AHEAD MULTIPLIER ON FPGA USING VERILOG HDL

Abstact:—

This project examines a modification to the Wallace/Dadda Multiplier to use carry lookahead adders instead of full adders to implement the reduction of the bit product matrix into the two numbers that are summed to make the product. Four bit carry lookahead adders are used in the reduction in place of individual full adders. Each carry lookahead adder reduces up to 9 partial products (instead of 3 with a full adder) while taking the same amount of time. This leads to fewer reduction stages than a traditional Wallace/Dadda Multiplier. The results show that 1 fewer stage is required for 4 by 4, 8 by 8, and 16 by 16 bit multipliers and 2 stages are saved for larger multipliers.
Keywords—High-speed multiplier, Carry lookahead adders, Dadda multipliers.

12. MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D:

The Integrated Circuit Applications Lab course should be designed in such a way that it should meet the requirements of research and development as well as consultancy projects. Also the Proposals of Project/R&D/Consultancy are as follows:

      Proposal 1: Project Design & Execution

      Proposal 2: R& D Level Project Design & Execution

      Proposal 3: Consultancy Task / Project Design & Development.

PROPOSAL FOR PROJECT ACTIVITY:

1. A Proposal of a hobby/mini/proto/general/model/proto type project with extended abstract, Block Diagram/Circuit/Flow diagram and clear references may be presented and executed.

HOBBY PROJECT:

Automatic water tank level controller

ABSTRACT

The drinking water crisis in India is reaching alarming proportions. It might very soon attain the nature of global crisis. Hence, it is of utmost importance to preserve water. In many houses there is unnecessary wastage of water due to overflow in Overhead Tanks. Automatic Water Level Controller can provide a solution to this problem. The operation of water level controller works upon the fact that water conducts electricity. So water can be used to open or close a circuit. As the water level rises or falls, different circuits in the controller send different signals. These signals are used to switch ON or switch OFF the motor pump as per our requirements.

PREREQUISITES

Basic knowledge about Electronic Devices and Circuits, Operation of IC 555, Regulated Power Supply, CRO.

DESCRIPTION

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of ON and OFF functioning of the circuit

    The water-level controller circuit (see Fig. 1) is built around IC 555 (IC2) to monitor the water level in the overhead tank and 'on'/'off' status of the motor through the inverter and driver circuits. The transistor switch circuitry monitors the flow of water and raises an alarm if the pump runs dry.
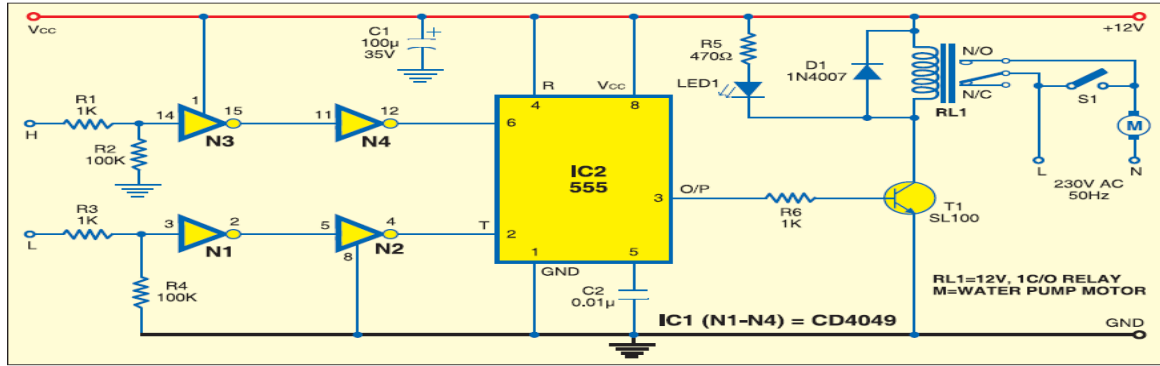
Fig. 1: Simple water level controller

Fig 5: Circuit Diagram of water tank level controller using 555 IC

Working of Automatic water tank level controller:

We know the property of 555 timer IC, i.e. its output goes HIGH when voltage at the second pin(trigger pin) is less than 1/3 Vcc.· Also we can reset back the IC by applying a LOW voltage at the 4th pin (Reset pin).

In this project 3 wires are dipped in water tank. Let us define two water levels- Bottom (L) level and Top (H) level. One of the wire or probe is from Vcc, which can be called as middle level (M).
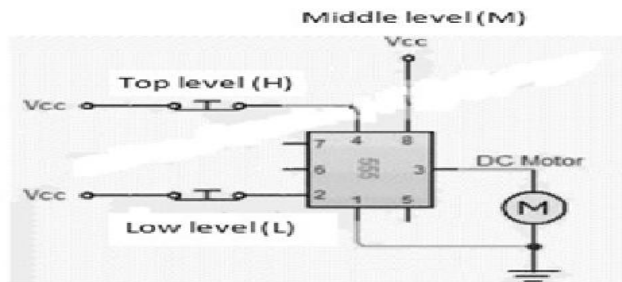
Fig.6: Position of three sensors in timer 555

The probe from bottom level is connected to the trigger (2nd) pin of 555 IC. So the voltage at 2nd pin is Vcc when it is covered by water. When water level goes down, the 2nd pin gets disconnected (untouched) from water   i.e. voltage at the trigger pin becomes less than Vcc. Then the output of 555 becomes high. The output of 555 is fed to a SL 100 transistor, it energizes the relay coil and the water pump set is turned ON.
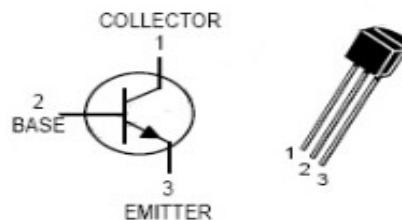
Fig.7: SL 100 transistor

· While the water level rises, the top level probe is covered by water and the transistor becomes
  ON. Its collector voltage goes to Vce(sat) =0.2V.

· The low voltage at the 4th pin resets the IC. So the output of 555 becomes 0V. Hence the motor
   will turn OFF automatically.

· For practical implementation, you must use a relay. Rating of relay is chosen according to the
   load (Motor). 32 Ampere relay is best suited for domestic applications.
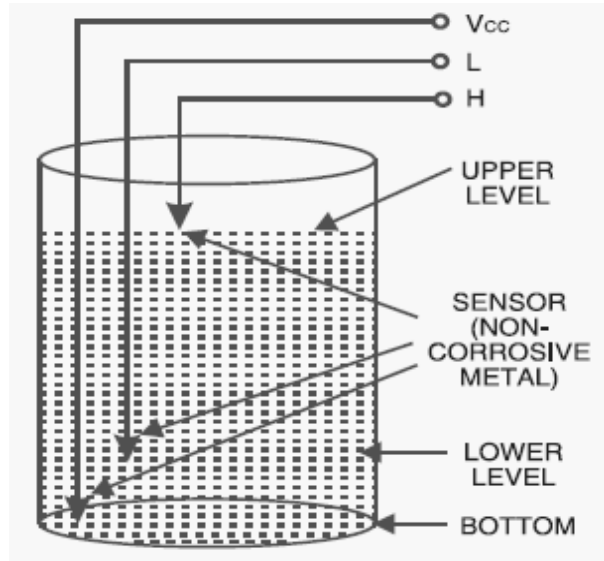
Fig.8: Probe/Sensor arrangement diagram

APPLICATIONS

The applications are
   1. It can be used for water level control.
   2. It can also be used as a Automatic fluid level control system in Industries.

CONCLUSION

Thus by using this simple arrangement we can save wastage of water and electricity. It is very
important for us to control the use of natural source of energy. By using this circuit we can solve
our purpose very easily.

PROPOSAL FOR CONSULTANCY:

A proposal has been made to implement the following project for Magni5 Technologies Pvt. Ltd,
Hyderabad.

GSM BASED PASSWORD PROTECTED DEVICE CONTROL AND SECURITY SYSTEM

ABTRACT:

   "GSM based Control System" implements the emerging applications of the GSM
technology. Using GSM networks, a control system has been proposed that will act as an embedded
system which can monitor and control appliances and other devices locally using built-in input and

output peripherals. Remotely the system allows the user to effectively monitor and control the house/office appliances and equipments via the mobile phone set by sending commands in the form of SMS messages and receiving the appliances status. The main concept behind the project is receiving the sent SMS and processing it further as required to perform several operations. The type of the operation to be performed depends on the nature of the SMS sent. The principle in which the project is based is fairly simple. First, the sent SMS is stored and polled from the receiver mobile station and then the required control signal is generated and sent to the intermediate hardware that we have designed according to the command received in form of the sent message. We have selected a particular Nokia mobile set (Nokia 3310) for our project. The messages are sent from the mobile set that contain commands in written form which are then processed accordingly to perform the required task. A microcontroller based system has been proposed for our project. There are several terminologies that are used extensively throughout this project report. GSM (Global System for Mobile Communications): It is a cellular communication standard. SMS (Short Message Service): It is a service available on most digital mobile phones that permit the sending of short messages (also known as text messaging service).

PROPOSAL FOR R & D ACTIVITY:

1. An exact paper from a National/International journal in this entitled area/subject/area(IEEE Format)

<div align="center">AND/OR</div>

2. An article/white paper from a magazine /journal/weekly/any periodical in the entitled Subject

<div align="center">AND/OR</div>

3. An Advanced technology development/ proposal/article publication from any source of
   Information

FPGA Implementation of Secure Arithmetic Coding For Data Communication Applications
ABSTRACT

FPGA Implementation of Secure Arithmetic Coding for Data Communication Applications is a method for data compression without any loss in data along with encryption. Arithmetic coding is a form of variable-length entropy encoding that converts a string into another representation that represents frequently used characters using fewer bits and infrequently used characters using more bits, with the goal of using fewer bits in total. As opposed to other entropy encoding techniques that separate the input message into its component symbols and replace each symbol with a code word, arithmetic coding encodes the entire message into a single number, a fraction n where $(0.0 \leq n < 1.0)$.

Traditional arithmetic coding provides essentially no security in the face of a chosen plaintext attack, in which an attacker has the ability to specify a sequence of input symbols and observe the corresponding output, and to repeat this process an arbitrary number of times. That

information can then be used to decode any output from the encoder. Although arithmetic coding offers extremely high coding efficiency, it provides little or no security as traditionally implemented. The system utilizes an arithmetic coder in which the overall length within the range [0,1] allocated to each symbol.

Encoder and Decoder for secure arithmetic coding were designed in VHDL. ModelSim Simulator tool is used for functional verification of the design. A test bench was written in VHDL which instantiates both encoder and decoder to check end to end testing. Place and route was done to fit the design on to Spartan 3E FPGA. Finally Typical applications of secure arithmetic coding are studied.

FUNDED/ UNFUNDED PROPOSALS:

The proposal for Two Weeks Embedded Systems Faculty Development Programme (FDP) under AICTE grants is applied and waiting for its approval.

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)

OBJECTIVES OF SHADOW ENGINEERING:

1. The program which uplifts the knowledge of the students related to laboratories.
2. To improve the industry-college interactions.
3. To create industry like environment for all the students in order to make future assignment.
4. This program leads to matrixing with the students.

TABLE 1: INDUSTRIAL VISITS

As of now no industrial visits is proposed.

S. No	Type of industry	Nature of industry	Date of visit	No. of students participated	Year/branch	Remarks
1	Square Micro System	PCBs		60	III/ECE	

TABLE 2: INDUSTRIAL TRAINING (Shadow Engg)
(Career Visit Approval)

S.no	Name of the Course	Nature of industry	Duration of Training	Authority	Date of Training/ Certificate No.	Remarks
1	IC Design	CDAC				

14. ACTIVITIES IN LIFT PROGRAMME:

CALIBRATION/INSTALLATION AND TESTING:
Calibration: Aim of this concept is to check:

i. whether all the equipment is functioning correctly as per the standards
ii. To bring correctness in the errors of instrument or equipment.
iii. To rectify the errors if any

Installation: Aim of this concept is to make and maintain installation procedure for a
            New equipment or already existing equipment

Testing   :   Aim of this concept is to test the equipment after installation whether it
                 Meets the existing standards.

The list of equipments (hardware/software):
            Necessity of tools for development and testing.
            Equipment to be calibrated.
            Installation of supporting equipment if any.

PROCEDURE FOR CALIBRATION:
Any Equipment or Instrument or Gauge or Machine can be calibrated as the standard guidelines mentioned under:
1. Identify the Equipment/Instrument/Gauge/Machine which is under defective or to be calibrated or correction for error
2. Identify the type of error and estimate its frequency of variation.
3. Check with Master Standards or equipment/instrument/machine which is working correctly and meeting our requirements.
4. Estimate the frequency of deviations from normal mode.
5. If the equipment is under warranty, then inform to concerned supplier or agency that will carry out calibration.
6. If the equipment is out of warranty then we can compare the deviations and set the error rectification.
7. Generally as per the procedure, the equipment or instruments can be calibrated by the agencies and issue calibration certificate which consists of date of calibration, calibration next due date and remarks as mentioned in the following format.
8. Record and keep all the calibration certificates in safe custody.

After calibration the details of equipment should be submitted in following format.

S.no	Type of equipment	Certificate no	Certificate issued by	Date of calibration	Date of calibration due	Remarks
1	Cathode ray Oscilloscope		SS Instruments, Kukatpally			
2	Trainer Kits		SS Instruments, Kukatpally			

iv. Calibration, Testing and Installation details equipment wise are mentioned as follows:

      Case 1: Calibration of Equipment -------------------------------------- if any

      Case 2: Installation of Equipment ------------------------------------- if any

      Case 3: Testing of Equipment --- if any

      Presently there is no new equipment is present for either testing or installations**.**

15. MAINTAINANCE AND TROUBLESHOOTING:
Maintenance:

Maintenance and trouble shooting of each equipment in a laboratory must follow the following guidelines:

Maintenance Schedules:

(1) Preventive Maintenance Schedules of lab will be decided by lab in charge along with concerned HOD. The details of schedule should be recorded in the following template of format.

S.No.	Name of the Equipment	Date of Maintenance	Type of Activity	Remarks
1	Cathode ray Oscilloscope		Cleaning and Servicing	Working well
2	Trainer Kits		Testing and Troubleshooting	Working OK
3	Power Supply's		Testing and Troubleshooting	Working OK
4	Multi-meters		Error Correction and Calibration	Working OK

  (2) Maintenance Reports duly signed by in charges as well as HODs and duly approved by Principal periodically.

TROUBLE SHOOTING SCHEDULES:

A proposal is to be made from each lab branch wise. The proposal should carry following details related to specific equipment in lab.

S.No., Equipment Name , Type of Problem (Too much Noise, Abnormal Sound, Corrupt Software, Anti Virus Problem, Missing of Display, CRT not working, Motor is not giving signal, Digital display is not working, Break of tools, Mis alignment of machine elements, PLC is not properly working), Expected Reasons (Bearing failure, Improper alignment of machine centres, Missing of vibration pads etc)

Trouble shooting exercises should be properly recorded in a separate format as mentioned below:

S.No.	Date of recording activity	Equipment Name	Type of Trouble	Remedial Activity	Remarks

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

Accreditation is the formal recognition, authorization and registration of a laboratory that has demonstrated its capability, competence and credibility to carry out the tasks. It provides the feedback to laboratories as to whether they are performing according to technical competence as per guidelines of NABL (National Accreditation Board for Testing and Calibration Laboratories)

The laboratory should carry out the following important tasks towards getting ready for accreditation from NABL.

1. Preparation of methodology in each experiment
2. Preparation of Standard Operating procedure for each equipment
3. Preparation of Laboratory Manual as per the guidelines specified by Combined Lab Team(CLT) headed by Principal/HOD/Dean/incharge
4. Ensure Effective environmental conditions(temperature, humidity,storage and placement) in the laboratories by implementing proper housekeeping and cleaning of the equipments from dust, dirt etc.
5. Ensure Calibration of instruments/equipment(Only NABL accredited authorized laboratories provide calibration.
6. All the details of Calibration should be included in the format specified exclusively for calibration procedure.
7. Ensure proper implementation of all the documents, formats to be included in the lab manual.
8. Impart training for all the technicians working in labs about the importance of documentation, log sheets, operating procedure of the lab.

9.   Incorporate Internal Lab audits for effective functioning of the laboratories. Audits may be once in a month or 3 months or at the end of the semester. The audit schedule will be decided by the Chairman and Principal of the CLT team.

10. Auditors should submit the detailed report of each lab duly signed to the Principal.

11. Each lab should maintain all the bills/invoices of each instrument or equipment in a separate file.

12. All the stock registers either consumable or non consumable should be updated whenever any purchases of consumables or equipment takes place.

13. All the safety precautions are properly displayed in front of each lab.

14. All the Lead experiments should be maintained separately in a record /record in a separate folder.

15. Based on Pre Assessment report submitted by auditor, corrective actions should be carried out by each lab in charge and that must be forwarded to concerned HOD and Principal.

SUBJECTWISE LAB PLANNER

NAME OF THE SUBJECT: MICROWAVE AND DIGITAL COMMUNICATION LAB

<u>**CONTENTS:**</u>

1. **OBJECTIVES AND RELEVANCE**

2. **SCOPE**

3. **PREREQUISITES**

4. **SYLLABUS AS PER JNTUH**

5. **LEAD EXPERIMENT**

6. **VIRTUAL LAB EXPERIMENT**

7. **SUGGESTED BOOKS**

8. **WEBSITES (USEFUL LINKS)**

9. **EXPERT DETAILS**

10. **(A)LAB SCHEDULE**

    (B)VIVA SCHEDULE

    (C)SCHEME OF EVALUATION

11. **PROJECT/PRODUCT/PAPER BASED LEARNING**

12. **MAPPING OF LAB WITH PROJECT/CONSULTANCY/R & D PROPOSALS**

13. **GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)**

14. **ACTIVITIES IN LIFT PROGRAM**

15. **MAINTAINANCE AND TROUBLESHOOTING**

16. **ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL**

1. OBJECTIVE *AND RELEVANCE*

The main objective of this lab is to gain the practical hands on experience by exposing the students to various microwave bench setups and microwave components. And also understanding of the concepts involved in microwave signal generation, transmission and reception in microwave communication.

2. SCOPE

Understanding of Microwave lab has the scope to make the learner comfortable to work in the communication area. This subject gives us an idea or overview to learn concepts of microwave engineering.

3. PREREQUISITES

Knowledge of microwave components propagation of wave concepts and the operation of CRO is required. This lab recommends complete practice of microwave components and devices.

4. SYLLABUS AS PER JNTUH

MICROWAVE

1.Reflex Klystron Characteristics
2.Gunn Diode Characteristics
3.Directional Coupler Characteristics
4.VSWR Measurement
5.Measurement of Waveguide Parameters
6.Measurement of Impedance of given load
7.Measurement of Scattering Parameters of a Magic Tee
8.Measurement of Scattering Parameters of a Circulator
9.Attenuation Measurement
10.Microwave Frequency Measurement

DIGITAL COMMUNICATION

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying .
7. Differential phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code - Encoder and Decoder
12. Convolution Code - Encoder and Decoder

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.

MAIN LINKAGE OF MWE THEORY WITH LAB EXPERIMENTS MWE&DC

PART-I MWE LAB

EXPERIMENT NO 1
Characteristics of the Reflex Klystron Tube.

OBJECTIVE
To study the characteristics of the Reflex Klystron Tube.

PREREQUISITES
Basic knowledge about Reflex Klystron Tube.

DESCRIPTION
a. Demonstration about experiment
b. Connecting microwave components which are required.
c. Observing the Frequency characteristics of Reflex Klystron Tube

APPLICATIONS
1. Satellite Communications
2. Radar Communications

EXPERIMENT NO 2
study V-I characteristics of Gunn Diode

OBJECTIVE:
To study V-I characteristics of Gunn Diode

PREREQUISITES
Basic knowledge about Gunn Diode

DESCRIPTION
a. Demonstration about experiment
b. Connecting microwave components which are required.
c. Observing the Characteristics of Gunn Diode.

APPLICATIONS

1. Satellite Communications
2. Radar Communications

EXPERIMENT NO 3
OBJECTIVE

Study the function of multi-hole directional coupler by measuring S parameters.

PREREQUISITES

Basic knowledge about multi-hole directional coupler

DESCRIPTION

a. Demonstration about experiment
b. Connecting microwave components which are required.
c. Observing the Characteristics multi-hole directional coupler.

APPLICATIONS

Couplers are commonly used for sampling a single direction of power which is flowing through a transmission line.

EXPERIMENT NO 4:

OBJECTIVE:
To Measure the VSWR (Voltage standing wave ratio).

PREREQUISITES:
Basic knowledge of electromagnetic wave theory.

DESCRIPTION:

a. Introduction to experiment -30 min
b. Connection of experiment and its verifications
c. Experimental determination of VSWR meter.
d. Mathematical calculations to find VSWR

APPLICATIONS:

1.Cellular communication
2.wifi communication

EXPERIMENT NO 5 :
Measurement of waveguide parameters
OBJECTIVE:
To measure the guided wavelength, phase velocity and group velocity of a waveguide.
 PREREQUISITES:
Basic knowledge of electromagnetic wave theory.

DESCRIPTION:
a. Introduction to experiment -30 min
b. Connection of experiment and its verifications
c. Measurement of Waveguide Parameter.
d. Mathematical calculations to find phase velocity, group velocity and guide wavelength

APPLICATIONS:
1. Signal Phase velocity, group velocity , impedance can be measured.

EXPERIMENT NO 6:
Measurement of Impedance of given load.
OBJECTIVE:
To measure the unknown impedance at the input of the given component under test.
PREREQUISITES:
Basic knowledge of electromagnetic wave theory.
DESCRIPTION:
a. Introduction to experiment -30 min
b. Connection of experiment and its verifications
c. Experimental determination
d. Mathematical calculations to find impedance
APPLICATIONS:
The unknown terminating impedance can be determined by measuring standing wave ratio &
distance of a convenient maxima or minima from the load.

EXPERIMENT NO 7
OBJECTIVE
To Study the Scattering parameters of Magic Tee
PREREQUISITES:
Basic knowledge about Magic Tee
DESCRIPTION
Demonstration about experiment
Connecting microwave components which are required.
Observing the Characteristics Magic Tee.
APLICATIONS
1. Used As Duplexer
2. Used as Mixer
EXPERIMENT NO 8:
Measurement of Scattering Parameters of a Circulator
OBJECTIVE:
To measure the S parameters (magnitude) of the Circulator.
PREREQUISITES:
 Basic knowledge of S-parameters and microwave bench setup.

DESCRIPTION:

a. Introduction to experiment

b. Connection of experiment and its verifications

c. Experimental determination

d. Mathematical calculations to find s parameters

APPLICATIONS:

1. Isolator

2. Duplexer

3. Reflection amplifier

EXPERIMENT NO 9:

OBJECTIVE:

To measure the attenuation introduced by the given wave guide.

PREREQUISITES

Basic knowledge of electromagnetic wave theory.

DESCRIPTION:

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination

d. Mathematical calculations to find attenuation

APPLICATIONS:

1. Variable and fixed attenuation measurement of the signal.

EXPERIMENT NO 10

OBJECTIVE:

To measure the frequency of a microwave source

PREREQUISITES:

Basic knowledge of electromagnetic wave theory.

DESCRIPTION:

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Measurement of microwave frequency.

APPLICATIONS:

1. Frequency measurement in communication.

PART-2 DC LAB

EXPERIMENT NO 1:

UNIT-1:

EXPERIMENT NO 1: Time division multiplexing and de-multiplexing
OBJECTIVE: To transmit a multiplexed output of different frequency message signals through a

single channel using TDM system and recover back the original message signals through a

de-multiplexer at receiver end.

PREREQUISITES: Basic knowledge of multiplexing and demultiplexing techniques.
Description:
  a. Introduction to experiment -30 min
  b. Connection of experiment and its verifications
  c. Experimental determination of time division multiplexing and   demultiplexing.
  d. Graphical determination of input and output waveforms of Time division multiplexing and
     demultiplexing

APPLICATIONS:

  1. Used as Multiplexer
  2. Used as Demultiplexer

EXPERIMENT NO 2

UNIT-2:
EXPERIMENT NO 2: Pulse code modulation & demodulation
OBJECTIVE: To convert an analog signal into a pulse digital signal using PCM system and to

convert the digital signal into analog signal using PCM demodulation system.

PREREQUISITES: Basic knowledge of modulation and demodulation techniques

Description:

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Pulse code modulation & demodulation.

d. Graphical determination of input and output waveforms of Pulse code modulation &

demodulation

APPLICATIONS:

1. Used as A/D converter
2. Used as D/A converter

EXPERIMENT NO 4

UNIT-2:

EXPERIMENT NO 4: Delta modulation and Demodulation

OBJECTIVE: To transmit an analog message signal in its digital form and again reconstruct back the original analog message signal at receiver by using Delta modulator.

PREREQUISITES: Basic knowledge of modulation and demodulation techniques

Description:

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Delta modulation and Demodulation.

d. Graphical determination of input and output waveforms of Delta modulation and Demodulation

APPLICATIONS:

1. Used as A/D converter

EXPERIMENT NO 5

UNIT-2:

EXPERIMENT NO 5: Frequency shift keying.

OBJECTIVE: To generate the frequency shift keying signal for a given binary data and also demodulate the original data input.

PREREQUISITES: Basic knowledge of shift keying techniques

Description:

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of Frequency shift keying.

d. Graphical determination of input and output waveforms of Frequency shift keying.

APPLICATIONS:

1. Used in frequency division

EXPERIMENT NO 6

UNIT-2:

EXPERIMENT NO 6: Phase shift keying

OBJECTIVE: To generate the phase shift keying signal for the given binary data & to demodulated to receive the transmitted binary data.

PREREQUISITES: Basic knowledge of shift keying techniques

Description:

a. Introduction to experiment -30 min

b. Connection of experiment and its verifications

c. Experimental determination of phase shift keying.

d. Graphical determination of input and output waveforms of phase shift keying .

APPLICATIONS:

1. Used as phase shifter

EXPERIMENT NO 7

UNIT-2:
EXPERIMENT NO 7: Differential phase shift keying
OBJECTIVE: To generate differentially phase shift keying signal and also demodulate the original binary data.
PREREQUISITES: Basic knowledge of shift keying techniques
Description:
a. Introduction to experiment -30 min
b. Connection of experiment and its verifications
c. Experimental determination of Differential phase shift keying.
d. Graphical determination of input and output waveforms of Differential phase shift keying .

APPLICATIONS:

1. Used as phase shifter

5. LEAD EXPERIMENT

AIM: To study about the voice communication by using microwave test bench
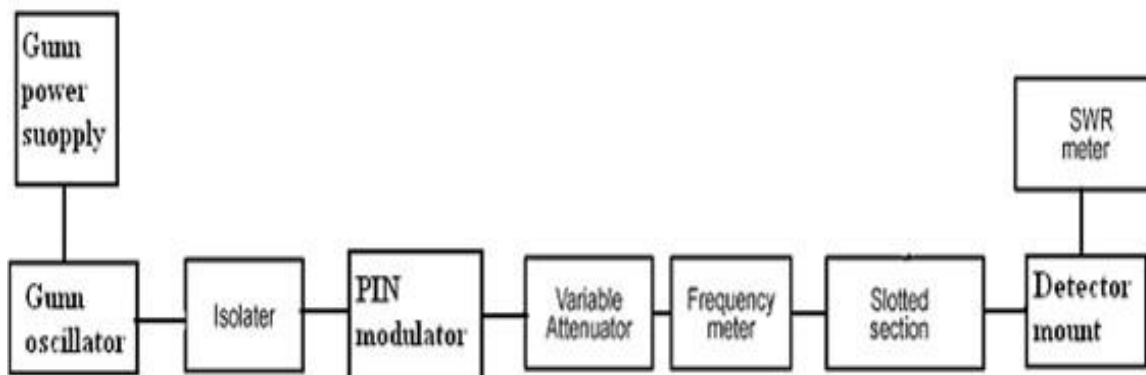
6. VIRTUAL LAB EXPERIMENT

Aim: To find H-plane Tee using HFSS

Description:
HFSS is a commercial finite element method solver for electromagnetic structures. The acronym originally stood for high frequency structural simulator. Not only by experimental set

up we can design H plane Tee by using this simulator 3 dimensionally and can see how the power is said to be divided.

(HFSS is the industry-standard simulation tool for 3D full-wave electromagnetic field simulation. HFSS provides E- and H-fields, currents, S-parameters and near and far radiated field results. Intrinsic to the success of HFSS as an engineering design tool is its automated solution process where users are only required to specify geometry, material properties and the desired output. From here HFSS will automatically generate an appropriate, efficient and accurate mesh for solving the problem using the proven finite element method.)

7. SUGGESTED TEXT BOOKS

TEXT BOOKS:

Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.

1. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS
2. Publishers and Distributors, New Delhi, 2004.
3. Principles of communication systems-Herbert taub,Donald L skilling,Goutham Saha,3rd edition,McGraw-Hill,2008.
4. Digital communications-john G proakis,Masoud Salehi-5th edition, McGraw-Hill,2008.

REFERENCES:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi, 1988.
6. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998.
7. Digital communications-simon haykin john wiley,2005
8. Digital communications-theory, techniques and applications –R.N.Mutagi,2nd Edition 2013.

8. WEBSITES (USEFUL LINKS)
1. www.iitk.ac.in
2. www.iitd.ernet.in
3. https://www.youtube.com/watch?v=TsBTI3tO5-8
4. https://www.youtube.com/watch?v=tXfdv37gTU8
5. https://www.youtube.com/watch?v=WcJnxBsESlM
6. https://www.youtube.com/watch?v=qT6EmMkKevY
7. https://www.youtube.com/watch?v=kp33ZprO0Ck
8. https://www.youtube.com/watch?v=BLa9e2sz5L8
9. https://www.youtube.com/watch?v=g9EUU7dYrok

10. http://www2.electron.frba.utn.edu.ar/~jcecconi/Bibliografia/Ocultos/Libros/
Microwave_Engineering_David_M_Pozar_ 4ed_Wiley_2012.pdf
11. http://www.microwave-eetimes.com/

9. EXPERT DETAILS

INTERNATIONAL:

1. Samuel Y. Liao, professor of electrical Engineering, California University.
2. Philip F.Ordung, professor of electrical Engineering, Yale University.

NATIONAL

1. Manojith Mishra prof. & Head, Deptt. Of Tele communication Engg. B.E College Howrah
2. Prof. S. Bhaskaran - Head, Dept of Electronics, Velammal Engg College Chennai

REGIONAL

1. Prof. N.S. Murthy , Dept. of ECE, NIT, Warangal
2. Mr. T. Subba Rao ,HOD, Dept. of ECE, University college Engineering.

10(A).LAB SCHEDULE:

The lab schedule should be planned once in a week. The week wise scheduled experiment should be completed.

CYCLE 1 (For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Demo	Exp.1	Exp.2	Exp.10	Exp.9	Exp.7	Exp.8	Lead1
B3, B4	Demo	Exp.2	Exp.10	Exp.9	Exp.8	Exp.1	Exp.3	Lead1
B5, B6	Demo	Exp.10	Exp.9	Exp.8	Exp.1	Exp.2	Exp.7	Lead1
B7, B8	Demo	Exp.9	Exp.8	Exp.1	Exp.3	Exp.10	Exp.2	Lead1
B9, B10	Demo	Exp.8	Exp.1	Exp.2	Exp.7	Exp.3	Exp.10	Lead1

CYCLE 2(For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1, B2	Exp.3	Exp.4	Exp.6	Exp.11	Exp.12	Exp.5	Hobby/lead2	Test
B3, B4	Exp.7	Exp.6	Exp.11	Exp.12	Exp.5	Exp.4	Hobby/lead2	Test
B5, B6	Exp.3	Exp.11	Exp.12	Exp.5	Exp.4	Exp.6	Hobby/lead2	Test
B7, B8	Exp.7	Exp.12	Exp.5	Exp.4	Exp.6	Exp.11	Hobby/lead2	test
B9, B10	Exp.9	Exp.5	Exp.4	Exp.6	Exp.11	Exp.12	Hobby/lead2	test

10(B).VIVA SCHEDULE

ROUND – 1 (For 30 students per session and 3 students per batch)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
B1,B2,B3	viva						
B4,B5,B6		viva					
B7,B8,B9			viva				
B10,B11,B12				viva			
B13,B14,B15					viva		
B16.B17,B18						viva	
B19,B20							Viva

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
SG1	Viva						
SG2		viva					
SG3			viva				
SG4				Viva			
SG5					viva		
SG6						viva	
SG7							Viva

ROUND – 2

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
B1,B2,B3	viva						
B4,B5,B6		viva					
B7,B8,B9			viva				
B10,B11,B12				viva			
B13,B14,B15					viva		
B16.B17,B18						viva	
B19,B20							Viva

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7
SG1	Viva						
SG2		viva					
SG3			viva				
SG4				Viva			
SG5					viva		
SG6						viva	
SG7							Viva

10 (C). SCHEME OF EVALUTION

LAB EXTERNAL

S no.	Write-up (by Internal	Final evaluation (Internal Examiner)	Viva (External
1	Aim Equipment needed Circuit diagram Procedure Precautions Tabular form Expected graph	Based on observation, how the student is connecting the circuit, usage of equipment and typical readings And based on correctness of the practical graph to the expected graph and results.	Based on understanding of Experiment and theoretical questions in the related subject.
	Marks: 20	**Marks: 20**	**Marks: 10**
	Total Marks:20+20+10=50 Marks		

LAB INTERNAL

Day to Day Evaluation ------ 15 Marks					Internal Exam ---10M Marks		
Uniform	Observation & Record	Performance of experiment	Result	Viva Voce	Write-up	Connections & Result	Viva Voce
Marks:3	**Marks:3**	**Marks:3**	**Marks:3**	**Marks:3**	**Marks:4**	**Marks:3**	**Marks:3**
Total Marks:15+10=25 Marks							

11. PROJECT/PAPER/PRODUCT BASED LEARNING:

Minimum Shift Keying used for satellite communications using MATLAB:

ABSTRACT:

        In digital modulation, **minimum-shift keying** (**MSK**) is a type of continuous-phase frequency-shift keying that was developed in the late 1950s and 1960s. Similar to OQPSK, MSK is encoded with bits alternating between quadrature components, with the Q component delayed by half the symbol period. However, instead of square pulses as OQPSK uses, MSK encodes each bit as a half sinusoid. This results in a constant-modulus signal (constant envelope signal), which reduces problems caused by non-linear distortion. In addition to being viewed as related to OQPSK, MSK can also be viewed as a continuous phase frequency shift keyed (CPFSK) signal with a frequency separation of one-half the bit rate.

        In MSK the difference between the higher and lower frequency is identical to half the bit rate. Consequently, the waveforms used to represent a 0 and 1 bit differ by exactly half a carrier

period. Thus, the maximum frequency deviation is = 0.25 *fm* where *fm* is the maximum modulating frequency. As a result, the modulation index *m* is 0.5. This is the smallest FSK modulation index that can be chosen such that the waveforms for 0 and 1 are orthogonal. A variant of MSK called GMSK is used in the GSM mobile phone standard. In addition to this MSK has advantages over other forms of PSK and as a result it is used in a number of radio communications systems.

Reason for Minimum Shift Keying, MSK:

It is found that binary data consisting of sharp transitions between "one" and "zero" states and vice versa potentially creates signals that have sidebands extending out a long way from the carrier, and this creates problems for many radio communications systems, as any sidebands outside the allowed bandwidth cause interference to adjacent channels and any radio communications links that May be using them.
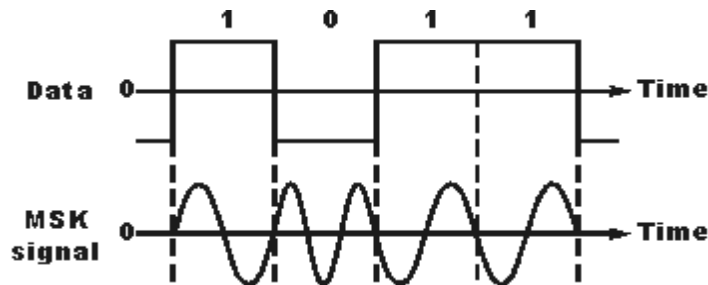
Signal using MSK modulation Algorithm: Initialization commands **MSK modulation:**

1. Generate carrier signal.
2. Start FOR loop
3. Generate binary data, message signal (on-off form)
4. Generate MSK modulated signal.
5. Plot message signal and MSK modulated signal.
6. End FOR loop.
7. Plot the binary data and carrier.

MSK Demodulation:

1. Start FOR loop
2. Perform correlation of MSK signal with carrier to get decision variable
3. Make decision to get demodulated binary data. If x>0, choose '1' else choose '0'
4. Plot the demodulated binary data.

12. MAPPING OF LAB WITH PROJECT/ CONSULTANCY/ R&D:

PROPOSALS 2: (An article/white paper from a magazine /journal)
Title: Characterizing the S-Parameters of 75Ω Circuits using 50Ω Lab Equipment

Abstract:

        RF engineers working with cable, terrestrial, or satellite TV applications are frequently required to make S-parameter measurements. Using a minimum loss pad to transform the conventional 50Ω test port impedance to the 75Ω device provides a cheap, easy way to get

reasonable measurements. For most general lab applications below 1GHz, a PCB-mounted minimum loss pad built from 1% 0402 similar resistors offers a quick and easy means to test a 75Ω circuit with 50Ω lab equipment. In most cases, the only correction factor required is the insertion loss of the MLP – 5.7dB plus any addition

FUNDED/UNFUNDED PROPOSALS (if any)

TITLE: Seminar on Advancement of microwave communication applications oriented approach.
OBJECTIVE:
   This seminar program is intended to bring down the awareness among all Students and staff in order to study the various applications of communication systems like satellite communication, RADAR and Television.

13. GUIDELINES FOR SHADOW ENGINEERING (VIP) AND INDUSTRIAL VISITS (IIP – INNOVATIVE INDUSTRIAL LEARNING PROGRAM)

INDUSTRIAL VISITS

S. No	Type of industry	Nature of industry	Date of visit	No. of students participated	Year/branch	Remarks
1	Medha Servo Drives	PCBs			IV/ECE	
2	Doordarshan kendra	Telecasting			IV/ECE	

TABLE 2: INDUSTRIAL TRAINING (SHADOW ENGINEERING)

S. No	Name of the Course	Nature of industry	Duration of Training	Authority	Date of Training/Certificate No.	remarks
1	OFC	Advanced Training Institute for Electronics and Process Instrumentation	1 Week	GM		

14. ACTIVITIES IN LIFT PROGRAM

CALIBRATION

S.no	Type of equipment	Certificate issued by	Date of calibration	Date of calibration due	Remarks
1	Microwave bench	NVIS Technologies			
2	Microwave bench	NVIS Technologies			

15. MAINTAINANCE AND TROUBLESHOOTING

Maintenance Schedules

S. No.	Name of the Equipment	Date of Maintenance	Type of Activity	Remarks
1	MICROWAVE BENCH SETUP		CHECKING WEATHER PROPERLY CONNECTED OR NOT	

Troubleshooting

S. No	Date of recording activity	Equipment Name	Type of Trouble	Remedial Activity	Remarks
1		MICROWAVE BENCH SETUP	Distortion	PROPERLY CONNECTED BY TIGHTLY CONNECTING ALL COMPONENTS WITH THE HELP OF SCREWS	

16. ASSESSMENT AND ACCREDITATION PROCESDURE AS PER NABL

Accreditation is the formal recognition, authorization and registration of a laboratory that has demonstrated its capability, competence and credibility to carry out the tasks. It provides the feedback to laboratories as to whether they are performing according to technical competence as per guidelines of NABL (National Accreditation Board for Testing and Calibration Laboratories)

The laboratory should carry out the following important tasks towards getting ready for accreditation from NABL.

1. Preparation of methodology in each experiment
2. Preparation of Standard Operating procedure for each equipment
3. Preparation of Laboratory Manual as per the guidelines specified by Combined Lab Team(CLT) headed by Principal/HOD/Dean/incharge
4. Ensure Effective environmental conditions(temperature, humidity,storage and placement) in the laboratories by implementing proper housekeeping and cleaning of the equipments from dust, dirt etc.
5. Ensure Calibration of instruments/equipment(Only NABL accredited authorized laboratories provide calibration.
6. All the details of Calibration should be included in the format specified exclusively for calibration procedure.
7. Ensure proper implementation of all the documents, formats to be included in the lab manual.
8. Impart training for all the technicians working in labs about the importance of documentation, log sheets, operating procedure of the lab.
9. Incorporate Internal Lab audits for effective functioning of the laboratories. Audits may be once in a month or 3 months or at the end of the semester. The audit schedule will be decided by the Chairman and Principal of the CLT team.
10. Auditors should submit the detailed report of each lab duly signed to the Principal.
11. Each lab should maintain all the bills/invoices of each instrument or equipment in a separate file.
12. All the stock registers either consumable or non consumable should be updated whenever any purchases of consumables or equipment takes place.
13. All the safety precautions are properly displayed in front of each lab.
14. All the Lead experiments should be maintained separately in a record /record in a separate folder.
15. Based on Pre Assessment report submitted by auditor, corrective actions should be carried out by each lab in charge and that must be forwarded to concerned HOD and Principal.

SUBJECTWISE LAB PLANNER

NAME OF THE LAB: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

1. **OBJECTIVE AND RELEVANCE:**

   This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

   - To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
   - Further, they would be required to communicate their ideas relevantly and coherently in writing.
   - Engage in debates.
   - Participate in group discussions.
   - Face interviews.
   - Write project/research reports/technical reports.
   - Make oral presentations.
   - Write formal letters.
   - Transfer information from non-verbal to verbal texts and vice versa.
   - To take part in social and professional communication.

2. **SCOPE:**

   The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

3. **PREREQUISITES:**
   - Basic knowledge of English grammar
   - Use of Parts of speech, basic sentence pattern and tense forms
   - Basic understanding of English vocabulary
   - Ability to write simple and good English
   - Have interest to learn the language

4. **JNTUH SYLLABUS:**
   LSRW Objectives:

   Listening skills:
   Objectives:

To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.

To equip students with necessary training in listening so that can comprehend the speech of people of different backgrounds and regions

Speaking skills:
Objectives:

To make students aware of the role of speaking in English and its contribution to their success.

To enable students to express themselves fluently and appropriately in social and professional contexts

Reading skills:
Objectives:
To develop an awareness in the students about the significance of silent reading and comprehension

To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc

Writing skills:
Objectives:
To develop awareness in the students about writing as an exact and formal skill
To equip them with the components of different forms of writing, beginning with the lower order ones

Exercise I
Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
Exercise II
Vocabulary building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.
Exercise – III
Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
Exercise IV
Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
Exercise V
Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.

Exercise VI

Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, and critical reading.

Exercise VII

Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.

LEAD Experiment1:

Exercise VIII

Exploring language through internet sources

www.readwritethink.org

My world of worlds: Building vocabulary lists

A biography study: Using role play to explore author?s lives

Analyzing famous speeches as arguments

And I quote: A punctuation proof reading mini lesson

A picture's worth thousand words: From image to detailed narrative

LEAD Experiment2:

Exercise-IX Seminar Presentations: under this exercise topics should be distributed to all students in advance. They should prepare a PPT presentation on given topic to present in the ELCS laboratory.

4. (A) LAB SCHEDULE:

The lab schedule is planned once in a week. The week wise scheduled experiment is as shown below.

CYCLE 1 (For 60 students per session and 1 student per system)

Batches	week-1	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1	Demo	Exp.1	Exp.2	Exp.3	Exp.4	Exp.5	Exp.6	Lead1
B2	Demo	Exp.1	Exp.2	Exp.3	Exp.4	Exp.5	Exp.6	Lead1
B3	Demo	Exp.1	Exp.2	Exp.3	Exp.4	Exp.5	Exp.6	Lead1
B4	Demo	Exp.1	Exp.2	Exp.3	Exp.4	Exp.5	Exp.6	Lead1

CYCLE 2(For 60 students per session and 1 student per system)

Batches	week-	week-2	week-3	week-4	week-5	week-6	week-7	week-8
B1	Exp.7	Exp.8	Exp.9	Exp.10	Exp.11	Exp.12	Hobby/Lead2	Internal Lab
B2	Exp.7	Exp.8	Exp.9	Exp.10	Exp.11	Exp.12	Hobby/Lead2	Internal Lab
B3	Exp.7	Exp.8	Exp.9	Exp.10	Exp.11	Exp.12	Hobby/Lead2	Internal Lab
B4	Exp.7	Exp.8	Exp.9	Exp.10	Exp.11	Exp.12	Hobby/Lead2	Internal Lab

(b) VIVA SCHEDULE:

The viva schedule is planned prior starting to the lab experiment as shown below.

ROUND – 1

BATCH	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK11	WEEK 12
B1	Viva			Viva			Viva		
B2		Viva			Viva			Viva	
B3			Viva			Viva			Viva

BATCH	WEEK 13	WEEK 15	WEEK 16	WEEK 17	WEEK 18	WEEK 19	WEEK 20	WEEK 21	WEEk 22
B1	Viva			Viva			Viva		
B2		Viva			Viva			Viva	
B3			Viva			Viva			Viva

ROUND - 2

BATCH	WEEK 23	WEEK 24	WEEK 26	WEEK 27	WEEK 28	WEEK 29
B1	Viva			Viva		
B2		Viva			Viva	
B3			Viva			Viva

(C). SCHEME OF EVALUATION:

INTERNAL LAB

Internal Lab Marks: 25							
Day to Day Evaluation 15 Marks					**Internal Exam 10 Marks**		
Observation	Record	Performance of experiment	Graphs & Result	Viva Voce	Aim, Apparatus, Program, Procedure	Execution & Result	Viva Voce
3M	3M	3M	3M	3M	4M	3M	3M

EXTERNL LAB

External Lab Marks: 50			
Aim, Apparatus, Program, Procedure	Execution	Calculations & Result	Viva Voce
20M	15M	5M	10M

5. SUGGESTED BOOKS:

1. CMOS Logic Circuit Design - John P. Uyemura, Springer, 2007.
2. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Design – A, Albert Raj, Latha, PHI, 2008.
4. Introduction to VLSI – Mead & Convey, BS Publictions, 2010.
5. VLSI Design – M. Micheal Vai, CRC Press, 2009.
6. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.
7. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
8. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
9. Digital Integrated Circuits - John M. Rabaey, PHI, EEE, 1997.
10. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.

6. WEB SITES (USEFUL LINKS):

Listening

1. Randall's ESL Cyber Listening Lab (http://www.esl-lab.com)
2. The English Listening Lounge (http://www.englishlistening.com)
3. The Academy of American Poets Listening Booth (http://www.poets.org/booth/booth.cfm/)
4. Speech Accent Archive: American accents *(Listen to regional differences in American English.)*
    a. (http://accent.gmu.edu/browse_maps/namerica.php)
5. English Listening Lab Online (http://www.elllo.org/)
6. The Bob and Rob Show*(podcast discussion and variety show on culture, language, vocabulary)*
    a. (http://www.thebobandrobshow.com/website/index.php)
    b. Speaking
7. ELEaston Pronunciation (http://evaeaston.com/)
8. 10 Tips for Successful Public Speaking from Toastmasters (http://www.toastmasters.org/MainMenuCategories/FreeResources/NeedHelpGivingaSpeech/TipsTechniques/10TipsforPublicSpeaking.aspx)
9. Allyn&Bacon Public Speaking Website (http://wps.ablongman.com/ab_public_speaking_2/)
10. McGraw-Hill Public Speaking Website (http://www.mhhe.com/socscience/comm/pubspeak_cmk_071307/)
11. McGraw-Hill Public Speaking Tutorial (http://www.mhhe.com/socscience/comm/new-home/tutorial/tutorial.htm)
12. Presentations and Public Speaking in English (http://www.englishclub.com/speaking/presentations.htm)
    a. Reading
13. Bartleby.com (http://www.bartleby.com/)
14. The Magazine Rack (http://www.magatopia.com/

15. Reader's Digest Magazine Articles (http://www.rd.com/
16. Reading Skills*(Using a Dictionary, Finding Main Ideas, Drawing Inferences, more from the AmLa Department of Mt. San Antonio College)*
    (http://vclass.mtsac.edu/amla-51/Skills%20Exercises/homework.htm)
17. Tips on Reading a Newspaper*(from the Bangkok Post)*
    (http://www.bangkokpost.com/education/rdtips.htmL)
18. ELC Study Zone *(http://web2.uvcs.uvic.ca/elc/studyzone/index.htm)*

Writing

19. Writing Tips: Sentence Builder (http://www2.actden.com/writ_den/tips/sentence/index.htm)
20. Writing Tips: Paragraphs (http://www2.actden.com/writ_den/tips/paragrap/index.htm)
21. Writing Tips: Essays (http://www2.actden.com/writ_den/tips/essay/index.htm)
22. Letter Writing Desk *(examples, samples, tips, formats)*
23. *(http://jobsearchtech.about.com/library/bl-business-letters.htm)*
24. Advanced Composition for Non-Native Speakers of English (http://www.eslbee.com/

7. EXPERT DETAILS

INTERNATIONAL

1. Kummaravadivelu
   Professor in Applied Linguistics
   San Jose State University
   U.S.A
2. Penny Ur
   Professor in english Language Education
   Oranim Academic college of education
   Israel

NATIONAL

1. Prof. Paul Gunashekar
   Dean School of English Language Education
   EFL-University-Hyderabad.

REGIONAL

1. A. Rama Krishna Rao
   Professor in english
   JNTUH