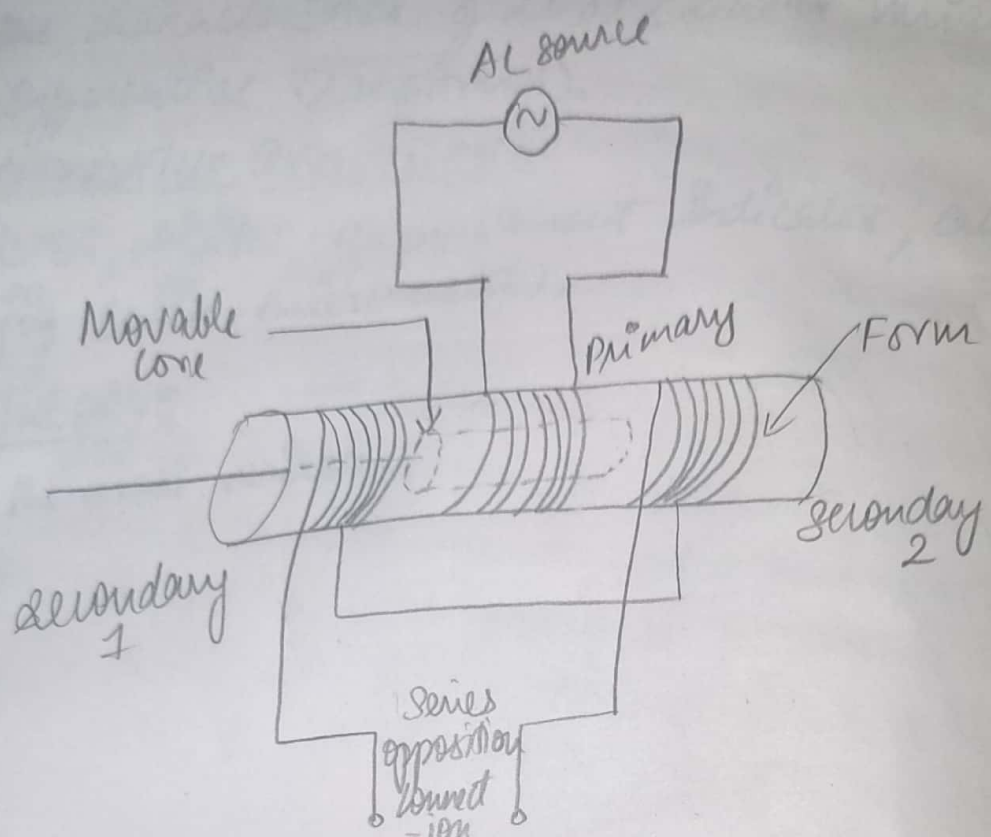


Linear variable Differential Transformer

Exp No

Displacement measurement using linear Variable differential Transformer

AIM:

To measure the displacement and to determine the characteristics of LVDT.

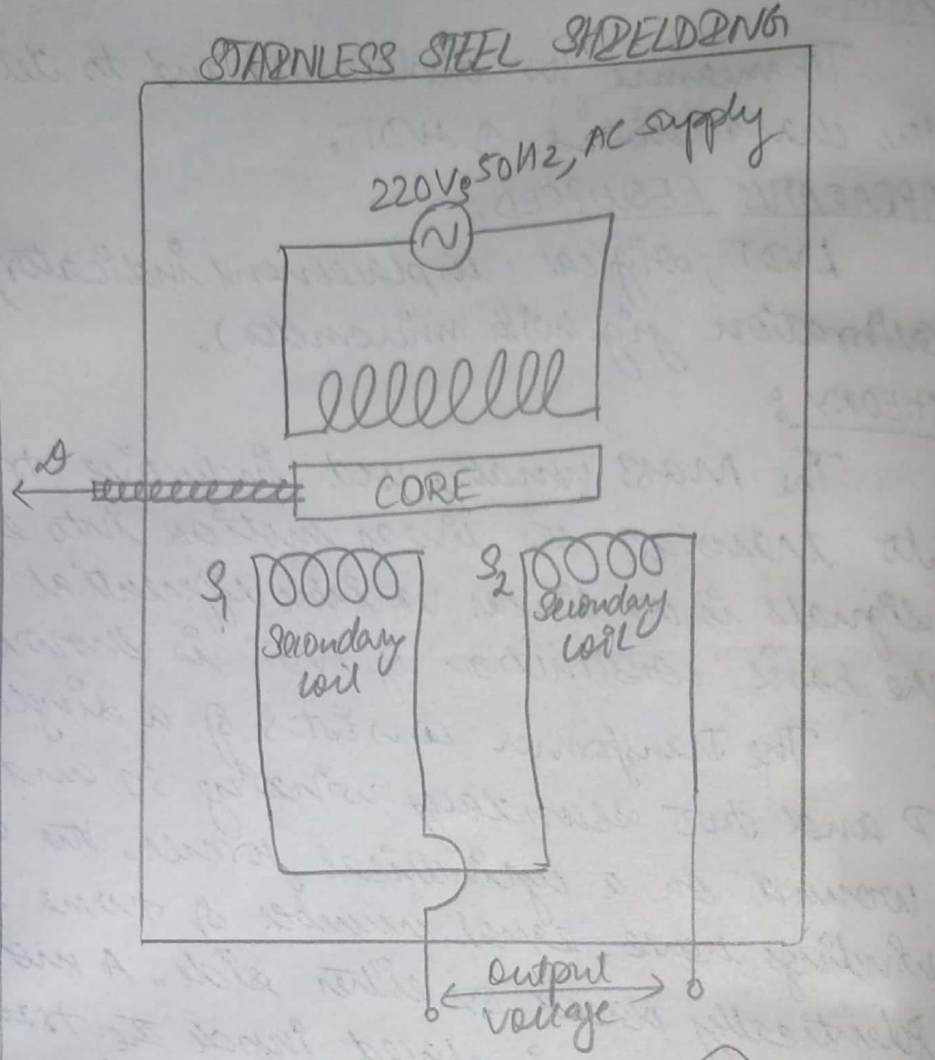
APPARATUS REQUIRED:

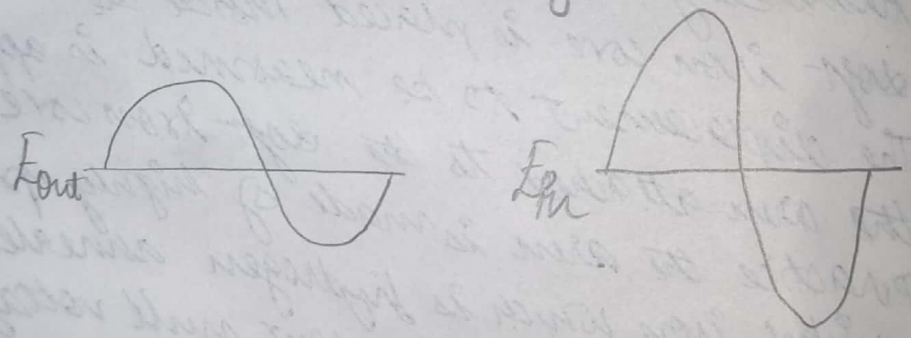
LVDT, digital displacement indicator, calibration jig (with micrometer).

THEORY:

The most usually used inductive transducer to translate the linear motion into electrical signals is the linear variable differential transducer the basic construction of LVDT is shown.

The transformer consists of a single primary P and two secondary winding S1 and S2 wound on a cylindrical former. The secondary windings have equal number of turns and are identically placed on either side. A movable soft iron core is placed inside the transformer. The displacement to be measured is applied to the arm attached to the soft iron core. In practice the arm is made of highly permeability nickel iron which is hydrogen annealed. This gives low harmonics low null voltage and high sensitivity. This is slotted longitudinally to reduce eddy current losses. The assembly is placed in stainless steel housing and end cap provides electrostatics & electromagnetic shielding. the pegueny of AC applied of AC applied to primary windings may be between 50Hz to 20kHz. Since the primary windings is excited by an alternating source, it produce an alternating magnetic field which in turn induces alternating current voltage in Two secondary windings.





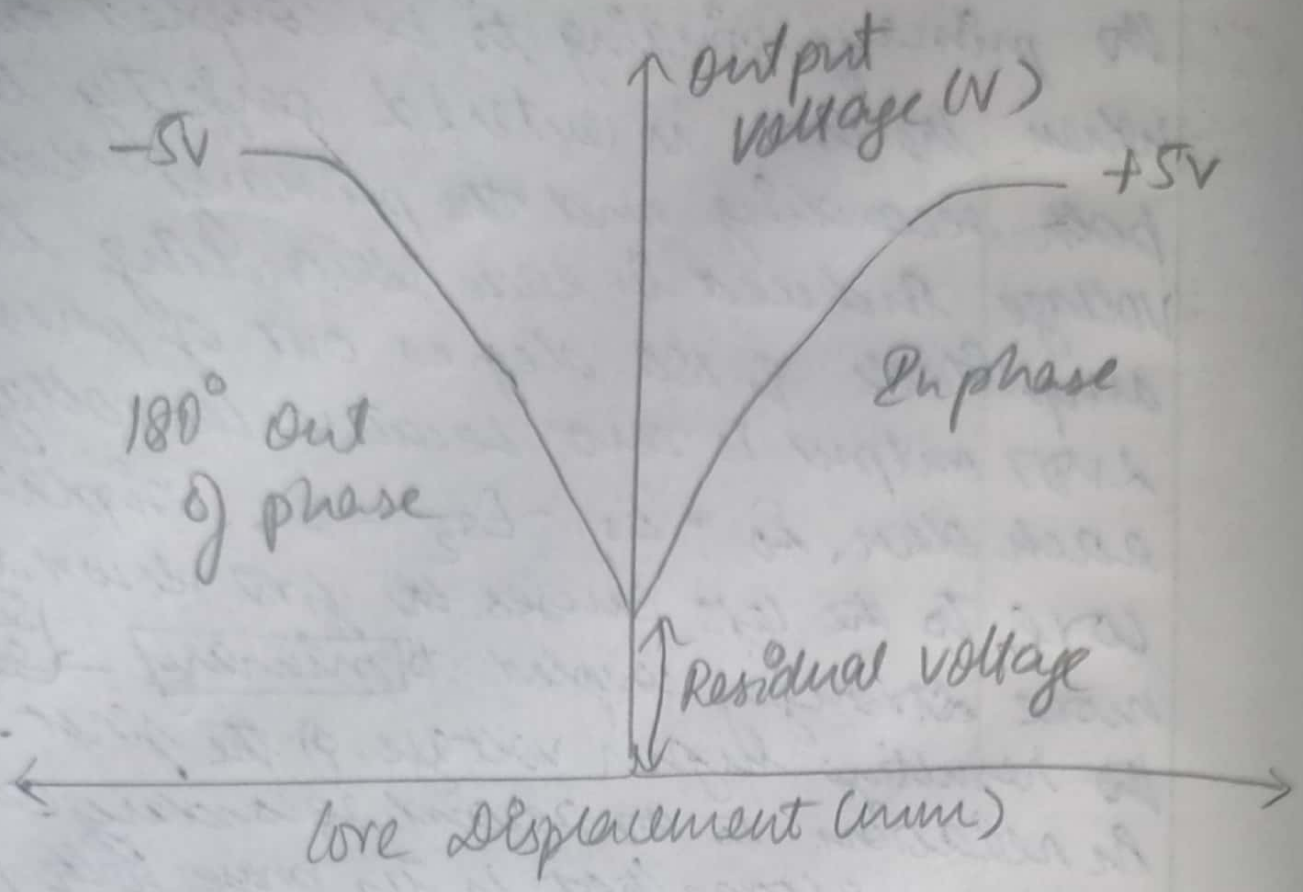
View of LVDT core and windings

Figure 2 depicts a cross-sectional views of an LVDT. The core causes the magnetic field generated by the primary winding to be coupled to the 2nd. When the core is centered perfectly between two both secondary and the primary as shown, the voltage induced in each secondary is equal in amplitude & 180 degree out of phase - thus LVDT output is zero because the voltage cancels each other. $E_0 = E_{S_1} - E_{S_2} = 0$. displacing the core to the left causes the first secondary to be more strongly coupled to primary than second secondary. The resulting higher voltage of the first secondary in relation to the second secondary causes an output voltage that is in phase with primary voltage. Likewise, displacing the core to the right causes the second secondary to be more strongly coupled to the primary than first secondary. The greater voltage of the second secondary causes an output voltage to be out of phase with primary voltage.

PROCEDURE:

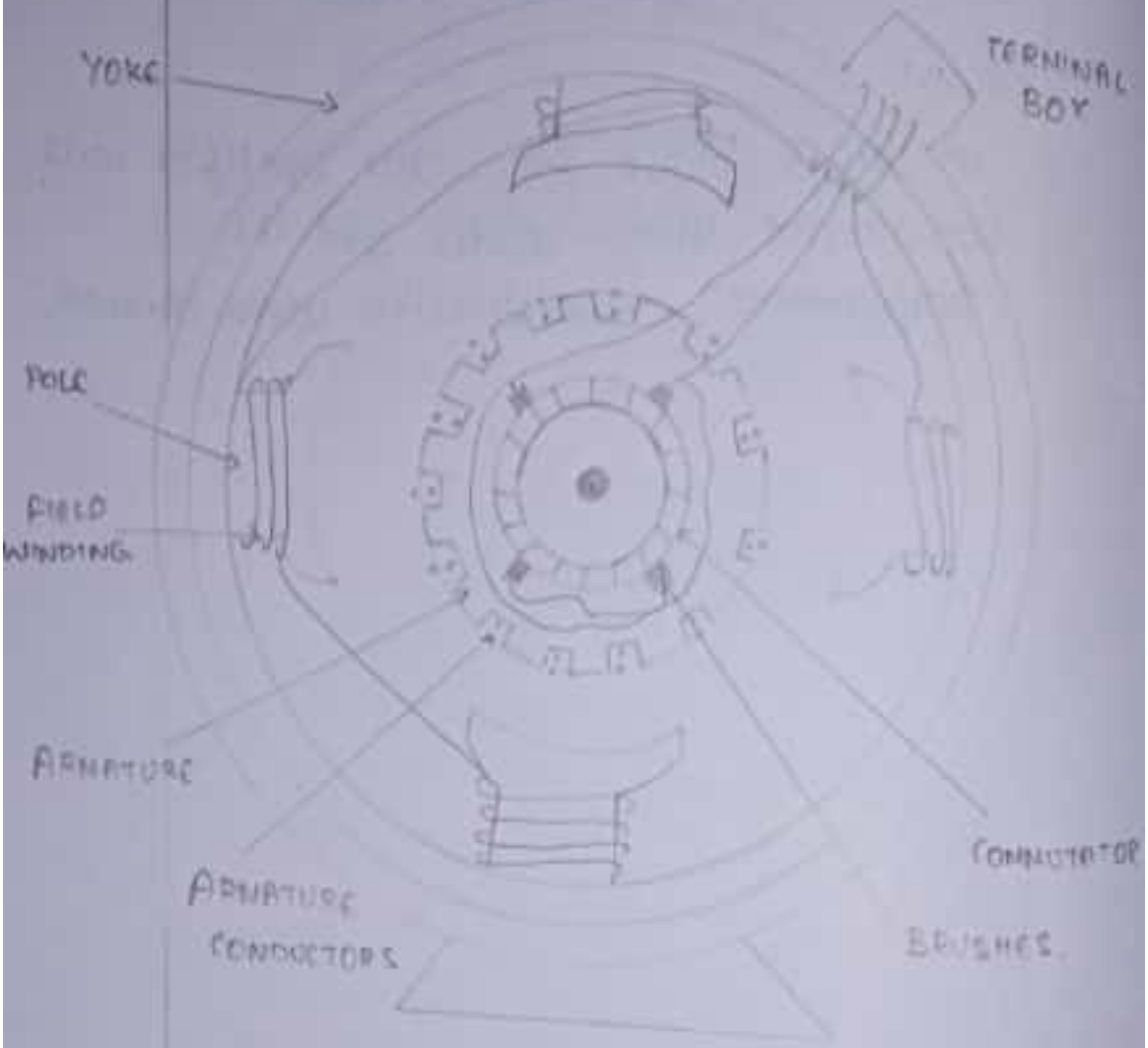
1) Plug power chord to AC mains 230V, 50Hz & switch on the instrument.
2) Place the READ/CAL switch at READ position.
3) Balance the amplifier with help of zero knot so that display should read zero with connecting the LVDT to instrument.
4) Replace the READ/CAL switch at CAL position.
5) Adjust the calibration point by rotating CAL knot so display should read 10.00 i.e., maximum calibration range.
6) Again keep the READ/CAL switch at READ position and connect the LVDT cable to measurement.

MODEL GRAPH:



7) Make mechanical zero by rotating micrometer. Display will read 00.00. this is null balancing.
8) Give displacement with micrometer & observe the digital readings.
9) Plot the graph of micrometer reading V/s digital reading.

CONSTRUCTIONS OF A DC MOTORS:



Expt 11

Demo of DC/AC machine & Parts

AIM:

To know the construction of practical DC, AC machine and identify the parts.

DC Generator:

A dc generator is an electrical machine which converts mechanical energy into direct current electricity. This energy conversion is based on the principle of production of dynamically induced emf. The following section outline basic construction and working of a dc generator.

Construction of a DC machine:

Note: A dc generator can be used as a dc motor without any constructional changes & vice versa is also possible. Thus, a dc generator or a dc motor can be broadly termed as dc motor. These basic constructional details are also valid for construction of a dc motor. Hence, let's call this point as construction of a dc machine instead of just 'construction of a dc generator'.

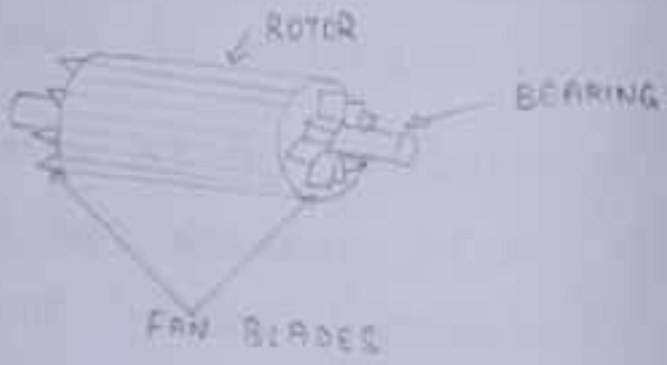
A dc machine consists of two basic parts: stator and rotor. Basic constructional parts of a dc machine are described below.

1) YOKE: outer frame of a dc motor/machine is used Yoke. It is made of cast iron or steel. It provide mechanical strength.

2) POLES AND POLES SHOES: poles are joined to the Yoke with help of bolts or winding. They carriers field winding and poles shoes are fastend to them. pole shoes serves two purpose.

3) FIELD WINDING: They are usually made of Cu. Field coils are formed wound and placed on each pole & connected in series.

PARTS OF AC MOTOR (3-PHASE INDUCTION MOTOR)



they are wounded in such a way that, when energized. they form alternate north & south pole.

4) ARMATURE CORE: It is the rotor of a dc machine. It is cylindrical in shape. It built up of thin laminated circular steel disks for reducing eddy current losses. It is keyed to the shaft.

5) ARMATURE WINDING: It is a former wound copper coil which rests in armature slots. they are insulated from each other. they are wounded by one of the two method. lap or wave winding. Double layer or wave lap windings are generally used. A double layer layer winding means that each armature slot will carry two different coil.

6) COMMUTATOR OR BRUSHES:

Physical connection of armature are made through commutator - Brushes arrangement. the function of a commutator, in a dc generator, is to collect the current generated in armature conductors. whereas, in case of a dc motor, commutator helps in providing current to the armature conductors. A commutator consists of a set of copper segments which are insulated from each other. the number of segments is equal to the number of armature coils. Each segment is connected to an armature coil & the commutator is keyed to the shaft. Brushes are usually made from carbon / graphite. they rest on commutator segment & side of the segments when the commutator rotates keeping the physical contact to collect (or) supply the current.

CONSTRUCTION OF AC MACHINES (THEORY):

It is widely used as electrical motor. Almost 80% of mechanical power used by Industries is provided by three phase induction motors because of its simple and Rugged construction, low cost, good operating characteristics, and the absence of commutator and good speed regulation. In this machine power is transferred from stator to rotor winding through induction. It is also called synchronous motor as it runs at speed other than the synchronous speed.

It has two parts:

1. Stator: It is stationary part of induction motor. A stator winding is placed in stator of induction motor & the three phase supply generally to it.
2. Rotor: It is a rotating part of induction motor. The motor is connected to mechanical load through the shaft.

Rotor of three phase induction motor as classified as:

- Squirrel cage rotor.
- Slip ring motor (or) wound motor (or) phase wounded rotor.

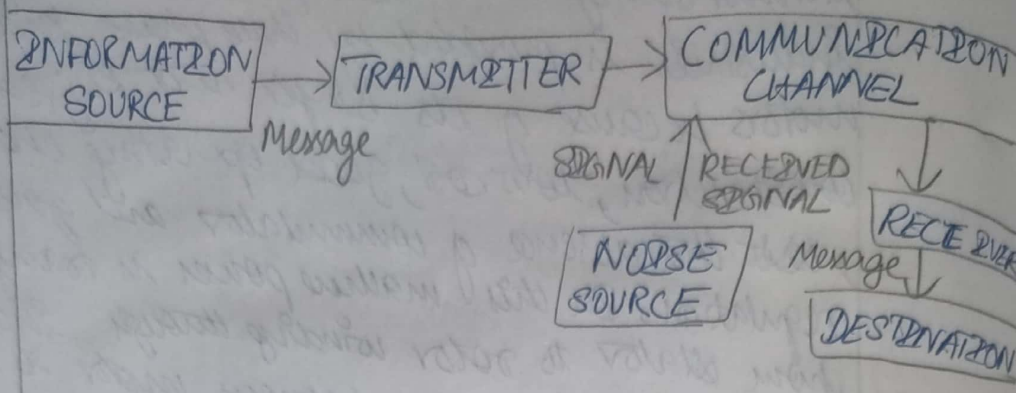
Stator of three phase induction motor:

1) Stator Frame.
2) Stator core.
3) Stator winding or Field winding.

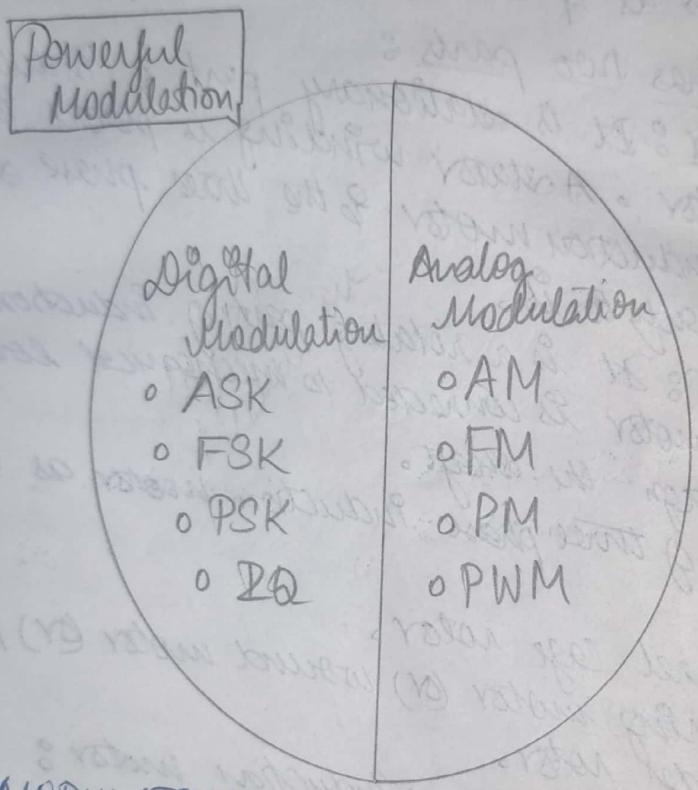
RESULT:

The practical part of AC & DC motor/machines are studied.

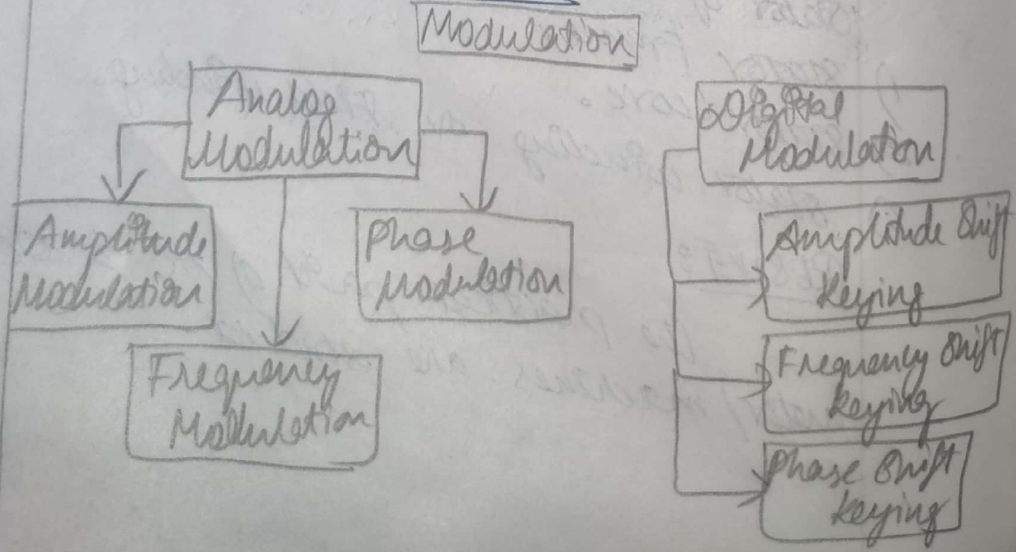
COMMUNICATION SYSTEM:



TYPES OF MODULATION:



MODULATION TECHNIQUE:



Expt 12

STUDY OF MODULATION AND DEMODULATION TECHNIQUE

AIM:

To study the different modulation and demodulation technique.

THEORY:

MODULATION AND DEMODULATION

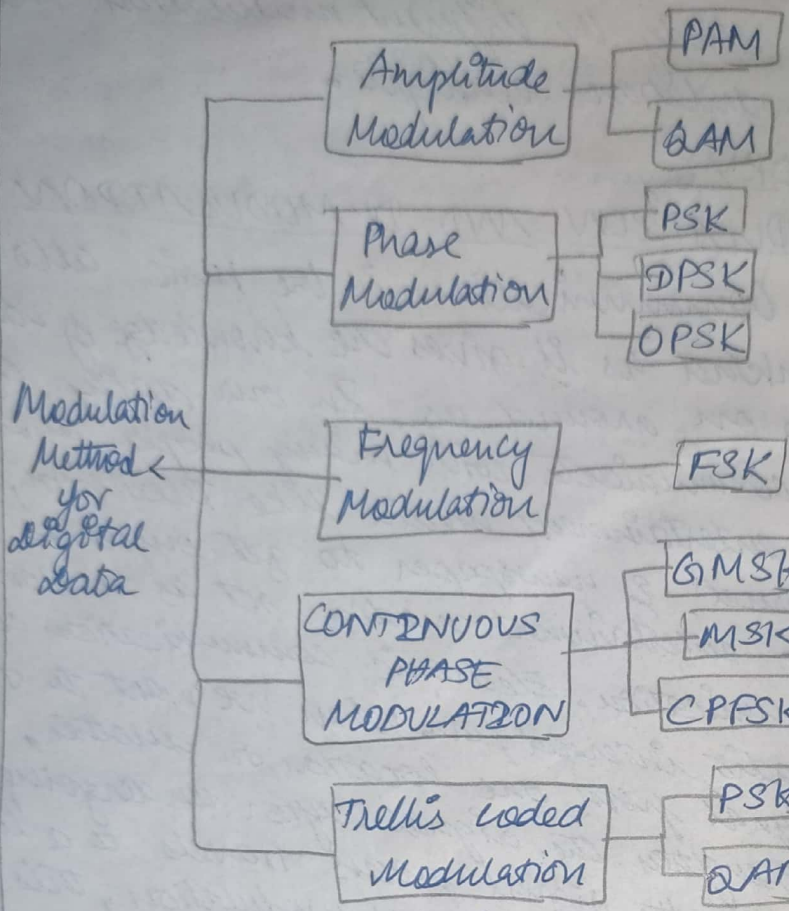
Communication is the basic attraction of mankind as it gives the knowledge of what is going on around us. In our daily life, we communicate with many people and use the entertainment media like television, radio, internet & newspaper to get ourselves involved. These entertainment media act as a source of communication. Electronic communication comprises TV, radio, internet, etc. When we want to transmit a signal from one location to another, we have to strengthen the signal. After undergoing strengthen the signal process travels to a long distance. This is called as modulation, this article gives an overview of the modulation & types of modulation techniques.

Communication is nothing but, the process of exchanging (two way communication) or passing (one way communication) information from one person to another. the Basic electronic system consists of three components: Transmitter, Receiver, and communication channel.

TYPES OF MODULATION:

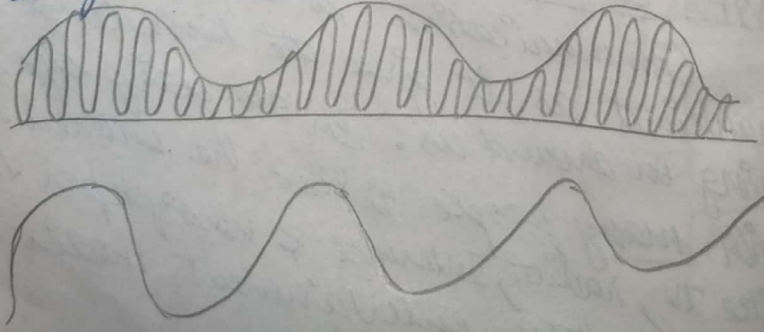
Communication is the basic attraction of mankind as it gives the knowledge of what is going on around us. In our daily life, we communicate with many people & use the entertainment media like TV, radio, Internet & newspaper to get ourselves involved. these entertainment media act as a source of communication.

TYPES OF DIGITAL MODULATION TECHNIQUES



The modulated signal is transmitted. The modulated signal is received by the aerial.

A diode is used to separate the high frequency audio signal (demodulation) by removing half the signal. This leaves the outline of the audio.



We communicate with many people and use the entertainment media like TV, radio, Internet and newspaper to get ourselves involved. These entertainment media act as a source of communication. Electronic communication comprises TV, radio, Internet, etc. When we want to transmit a signal from one location to another. we have to strengthen the signal. After undergoing strengthening process the signal travels to a long distance. this is called as modulation, and this article gives an overview of the modulation and types of modulation techniques.

the basic electronic communication system consists of these components: Transmitter, receiver and communication channel.

A transmitter is a group of electronic circuit designed to convert the information into a signal for transmission over a given communication medium. A receiver is a group of electronic circuit designed to convert the signal back to the original information. the communication channel is the medium which is designed to transmit the electronic signal from one place to another.

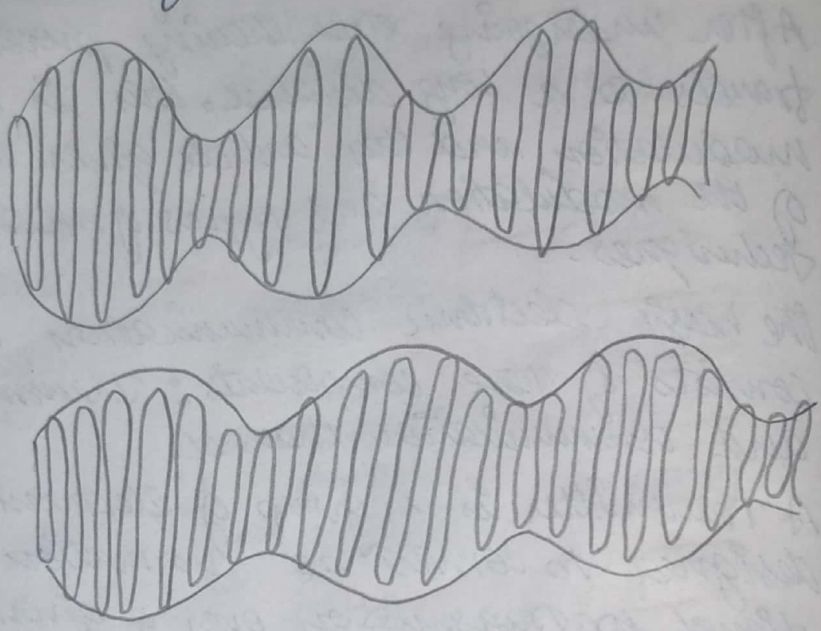
Modulation is a way of sending signals of low frequency over long distances without a huge loss of energy by the use of another wave of very frequency called a carrier wave.

Modulation is nothing but, a carrier the varies in accordance with the message signal. Modulation technique is used to change the signal characteristics. Basically, the modulation is of the following two types:

- Analog modulation.
- Digital Modulation.

This signal is now amplified and fed to a loud speaker.

The receiver is tuned to the carrier wave frequency. The following two diagram (figures) show two carriers waves of different frequency both modulated by the same frequency audio signal.



High frequency signals are more directional and because high frequency waves have a small wavelength. There is less diffraction. Also smaller aerials are needed because the size of the aerial has to be of the same sort of size as the wavelength of the signal to be transmitted.

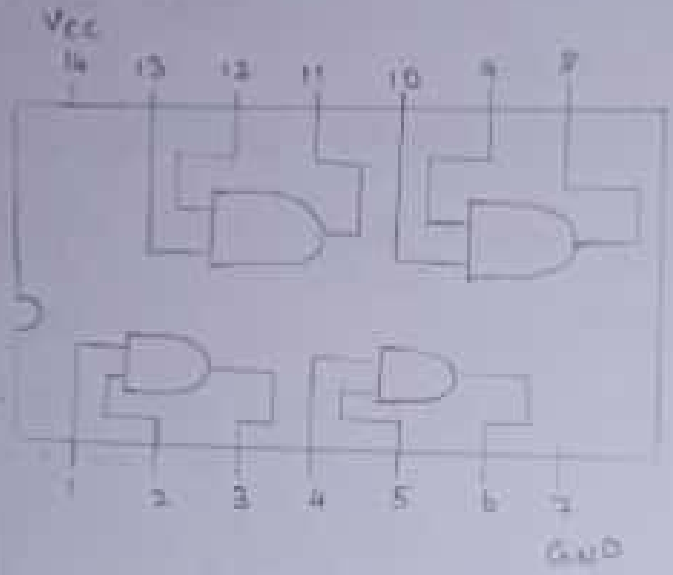
Therefore a sound with a frequency of 256Hz (middle c) received by a microphone, converted to a electrical signal and then transmitted would have a wavelength of 300000000/256 = 1170000m over 1000km! However a wave of frequency 100MHz has a wavelength of only 3m.

We can compare amplitude modulation with a long tube of soft clay on a conveyor belt. The clay moves but the hands of two people, one at each end of the belt.

Modulation - the person at one end moulds the clay by pressing on it as it moves by. Their hands. By squeezing and relaxing they make a tube of clay with a changing diameter. At the other end of the belt, there is a person with their eye shut and their hands on either side of the clay at the other end. As the clay move past their hands are forced in & out by the changing diameter of the clay cylinder. This is called detection. In reality, we start with a carrier wave of very high frequency and adds to it the audio signal (of relatively low frequency) by addition of the audio signal is called modulation. This can be done either by changing the amplitude of the carrier wave (amplitude modulation) or by changing it is frequency (frequency modulation).

RESULT:
The different modulation and demodulation techniques is studied.

AND GATE:



IC 7408

$Y = A \cdot B$

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

Expt 13

VERIFICATION AND INTERPRETATION OF TRUTH TABLES FOR AND, OR, NOT, NAND, NOR Exclusive OR (Ex-OR), EXCLUSIVE NOR (Ex-NOR) GATES

AIM:

To verify the Boolean expression using logic gates.

APPARATUS REQUIRED:

Logic trainer kit, logic gates / IC's wires.

THEORY:

Logic gates are electronic circuits which perform logical functions on one (or) more inputs to produce one output. There are seven logic gates when all the input combination is called truth table. The following logic gates & their working are explained.

AND GATE:

AND gate produces an output as 1, when all its inputs are 1; otherwise the output is 0. This gate can have minimum 2 inputs. but outputs is always one. It's output is 0, when any input is 0.

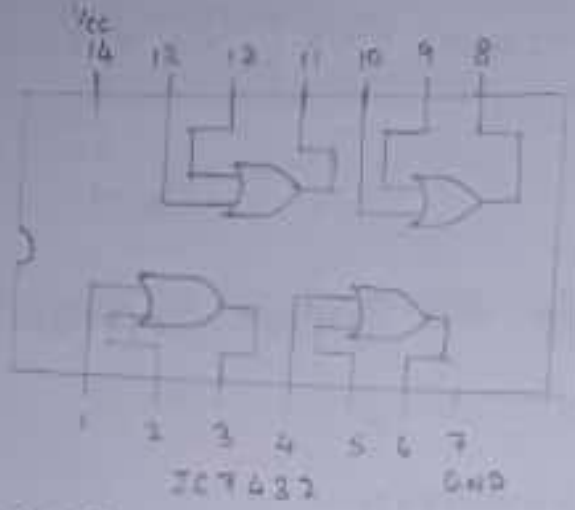
OR GATE:

OR gate produces an output as 1. when any or all its inputs are 1; otherwise the output is 0. This gate can have minimum 2 inputs but output is always one. It's output is 0 when all input are 0.

NOT GATE:

NOT Gate produces the complement of it's input. This gate is also called as Inverter. It always has one output. Its output is 0. when input is 1 and output is 1 when input is 0.

OR GATE:

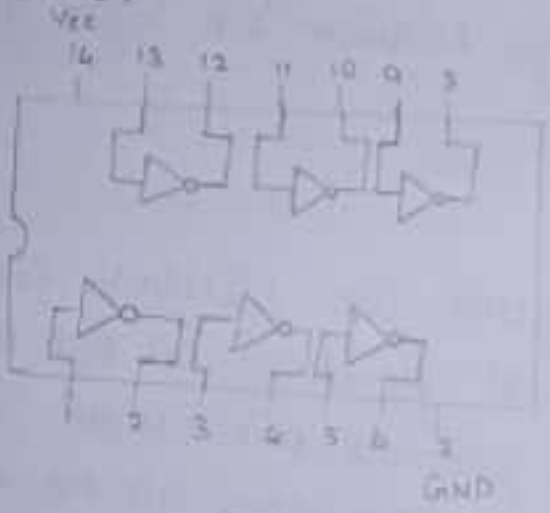


$Y = A + B$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

IC 7432

NOT GATE:

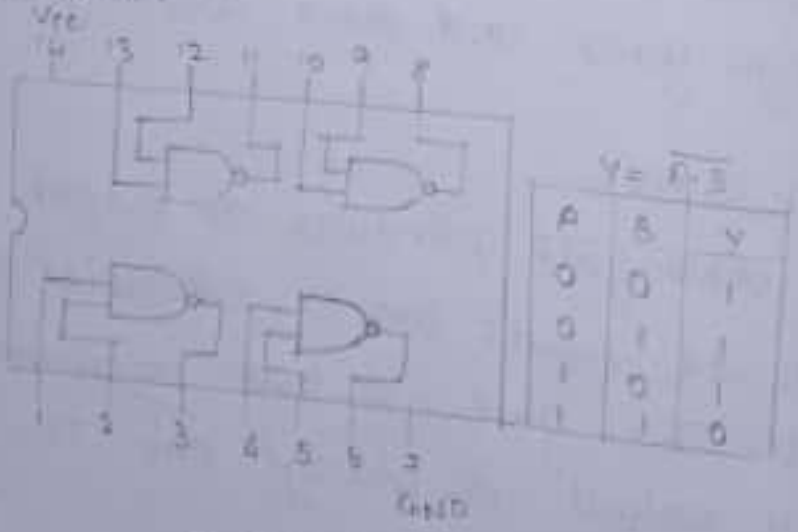


$Y = \overline{A}$

A	Y
0	1
1	0

IC 7404

NAND GATE:



$Y = \overline{A \cdot B}$

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

IC 7400

NAND GATE:

NAND gate is actually a series of AND gate with NOT gate. If we connect the output of an AND gate to the input of a NOT gate, this combination will work as NOT-AND or NAND gate. Its output is 1 when any OR all inputs are 0. otherwise output is 1.

NOR GATE:

NOR gate is actually a series of OR gate with NOT gate. If we connect the output of an OR gate to the input of a NOT gate. This combination will work as NOT-OR or NOR gate. Its output is 0 when any or all inputs are 1, other wise output is 1.

EXCLUSIVE OR (X-OR) GATE:

X-OR gate produces an output as 1. when number of 1's at its input is odd. otherwise output is 0. It has two inputs and one output.

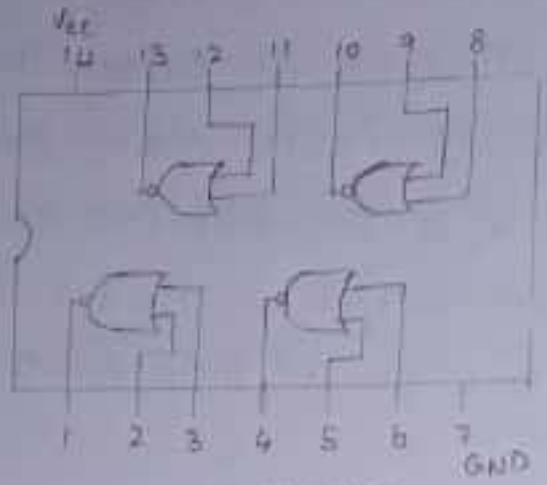
EXCLUSIVE NOR (X-NOR) GATE:

X-NOR gate produces an output as 1, when number of 1's as its inputs is not odd, otherwise output is 0. It has two inputs and one output.

PROCEDURE:

* connect the trainer kit to AC power supply.
* connect the inputs of any logic gate to the logic sources and its output to the logic indicator.
* Apply various input combination and observe output for each one.

NOR GATE:

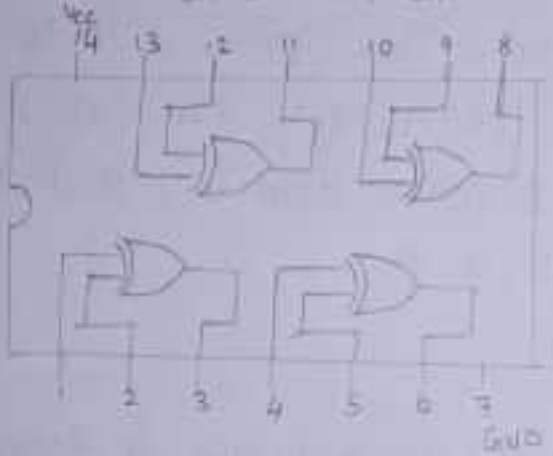


$Y = \overline{A+B}$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

IC 7402

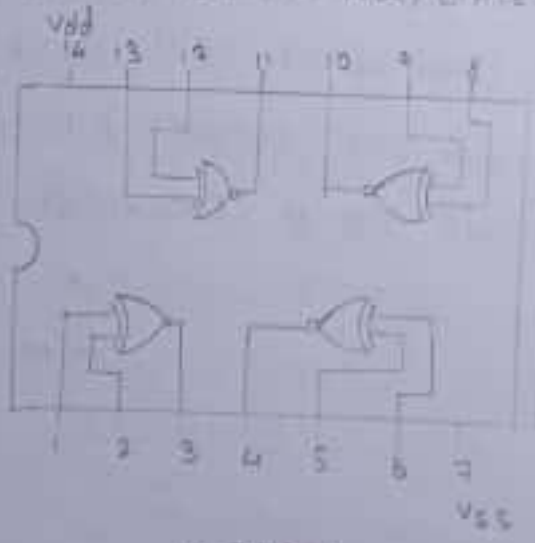
EXCLUSIVE OR (X-OR) GATE:



A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

IC 7486

EXCLUSIVE NOR (X-NOR) GATE:



A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

IC 74266

* Verify the truth table for each input/ output combination.
* Repeat the process for all other logic gates.
* Switch off the AC power supply.

RESULT:

The Boolean expression using logic gates are verified.