

**INTERMEDIATE VOCATIONAL COURSE**  
**Second Year**

**DOMESTIC APPLIENCES LAB**

*For the Course of Rural Engineering Technician*



**State Institute of Vocational Education**  
**Directorate of Intermediate Education**  
**Govt. of Andhra Pradesh, Hyderabad.**  
**2005**

**AUTHOR**

***Sri Shali Habibulla***

M.Tech (Ref & A/c), Hons. C.H.E. M.I.S.T.E.  
Department of Rural Engineering Technician  
Govt. Junior College (Boys)  
New, Town, Anantapur

## **PREFACE**

The main objective of vocational education is to train the students at +2 level for meeting the demands for the skilled manpower in both organised and unorganised sectors and also to provide an alternative channel for those who aimlessly pursue higher education and to prepare them for self reliance. The State Institute of Vocational Education (SIVE) in collaboration with the Board of Intermediate Education, Andhra Pradesh has developed curriculum for 43 vocational courses in the field of

**Engineering & Technology**

**Agriculture**

**Health & Paramedical**

**Business & Commerce**

**Home Science and Humanities**

Accordingly the text books have been developed by SIVE as per the restructured curriculum by utilizing the services of various professional teachers in the respective fields. I am sure that this book will be immensely useful to the vocational students and teachers in understanding the concepts.

I wish to place my sincere thanks on record to Sri Shali Habibulla, Author of this text book for extending his support in developing this book for printing and publishing.

I shall be grateful to receive suggestions and observations from all the readers which would help in bringing out a revised and improved version of this book in future.

**Sri. Shashank Goel, I.A.S.,**  
Director & Secretary  
Board of Intermediate Education  
Andhra Pradesh, Hyderabad

## CONTENTS

	<b>Page No.</b>
1. STUDY OF COOLING SYSTEM OF A REFRIGERATOR	
2. MAIN FEATURES OF REFRIGERATOR	
3. REFRIGERATOR SERVICING	
4. AIR CONDITIONER SERVICING	
5. STUDY OF AIR-COOLER FEATURES	
6. OPERATION AND PRECAUTIONS OF AIR COOLER	
7. SERVICING AND MAINTENANCE OF AIR COOLER	
8. WASHING MACHINE	
9. GRINDER	
10. MIXER (OR) MIXY	
11. GAS STOVE	
12. PETRO MAX LIGHT	
13. GAS LIGHT	
14. BICYCLE	

## REFRIGERATORS AND AIR-CONDITIONERS

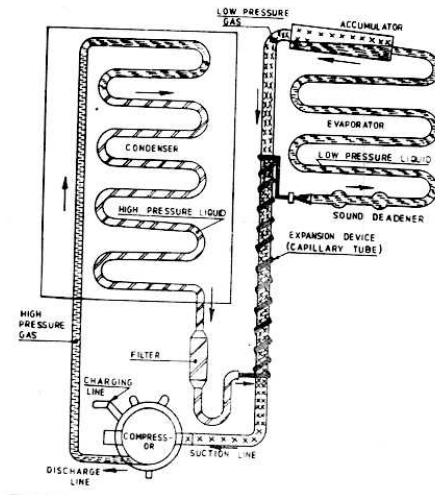
### STUDY OF COOLING SYSTEM OF A REFRIGERATOR EXPERIMENT – 1.1

**Aim:** To study the cooling system of a Refrigerator

#### Learning objectives

At the end of the practical class, the student should be able to:

1. Understand the parts of the refrigerator.
2. Understand the cycle of refrigeration.



#### Related Theory

We will more quickly understand refrigerator cooling systems. If we think of their action as “removing heat from the air in the refrigerator” rather than “cooling the air in the refrigerator”. All residential or domestic refrigerator work on the same principle for cooling.

They all have:

1. A Compressor
2. A Condenser
3. A Metering Device (Capillary Tube)
4. An Evaporator.

#### Compressor

The compressor is the motor (or engine) of the cooling system. Normally the compressor is located at the bottom of the refrigerator in the back. It is almost always black and about the size of a foot ball. It is considered as the heart of the vapour compression Refrigeration system.

It compresses the refrigerant vapour from low pressure and low temperature to the vapour at high pressure and high temperature.

### **Condenser**

The condenser is a series of tubes with fins attached to them, similar to a radiator. It is always some where on the out side of the refrigerator. It may be:

- ◆ A large black grid mounted to the back of the refrigerator.
- ◆ Folded and placed under the refrigerator.
- ◆ Coiled up and placed near the compressor.

The condenser tube is normally of 6mm to 8mm in diameter and 9 to 10 meter in length. The high pressure refrigerant gas, coming from the compressor, flows through the condenser. It condenses the vapour refrigerant at high pressure and at high temperature to the liquid refrigerant at high pressure and low temperature. The heat is rejected away from the tubes by the fins.

### **Metering Device (or) Expansion Device (Capillary Tube)**

The metering device in most domestic refrigerators is a capillary tube. Which is a tube 0.4 to 0.8mm in diameter and 2.5 meter in length. The capillary tube is attached from the end of the condenser to the beginning of the evaporator.

The capillary tube controls the pressure and flow of the refrigerant as it enters the evaporator. Once the liquid refrigerant has traveled the length of the condenser, it is forced through the capillary tube.

### **Evaporator**

The evaporator is always located on the inside of the refrigerator, usually inside the freezer compartment. This evaporator is a plate and tube type evaporator, the tube in the evaporator is of 6mm diameter and about 4.5 meter 5.5 metre in length.

When the liquid refrigerant comes out of the small capillary tube, it is injected in to the larger tubes of the evaporator causing a pressure drop. This pressure drop allows the refrigerant to expand back in to gaseous state. This change of state from liquid to gas absorbs heat. The gaseous refrigerant again pumped back by the compressor and the cycle is repeated.

## MAIN FEATURES OF REFRIGERATOR EXPERIMENT – 1.2

**Aim:** To study the main features of refrigerator.

### Learning objectives

At the end of the practical class the student should be able to:

1. Understand the parts of refrigerator.
2. Understand the features of refrigerator.

### Related Theory

#### 1. Automatic Defrost

Years ago, all the refrigerators had to be defrosted manually. You would turn the refrigerator off, open the door, and allow any frost build-up to melt. When the frost had completely melted away, you would turn the refrigerator back on.

Today, all the refrigerators are self-defrosting. Self-defrosting means, ice melts automatically. The self-defrosting system has three functional components.

- i. Defrost Timer:** The timer is like a clock. It continually advances, 24 hours a day. Every 6 to 8 hours, the timer turns off the cooling system of the refrigerator.
- ii. Defrost heater:** The defrost heater is similar to the burners on an electric stove. It is located just beneath the cooling coils, which are concealed behind a panel in the freezer compartment. The heater gets hot and ice melts.

As the frost and ice melt, the resulting water drips into a trough. The trough is connected to a tube that drains the water in to a shallow pan at the bottom of the refrigerator.

- iii. Defrost Thermostat:** All refrigerators have a thermostat to maintain the proper temperature. These are usually very simple devices. When the refrigerator reaches the set temperature, the thermostat interrupts the electricity flow to the compressor, which stops cooling.

#### 2. Lighting

Refrigerators with internal lighting normally have only one functional component that is the switch, which is usually a white push-button mounted inside the refrigerator near to door. When the refrigerator door closes, the door pushes the switch to turn the light off. When the door opens, the button automatically pops back out to turn “on” the light. The light bulb is usually a standard appliance bulb.

### **3. Door seals and hinges**

All refrigerator doors have a seal – a rubber like gasket attached to the door. Usually white, black or brown, the seal's job is to keep the cool air inside the refrigerator and the room air out.

The seal is lined with a magnet that runs its length and width. The magnet helps to hold the door closed and create a tight seal. The screws that hold the seal to the door also hold the door liner in and help to “square” the door.

The hinges allow the door to swing open. Some hinges also assist the door in closing. For the door to close properly, the hinges must be correctly adjusted.

## REFRIGERATOR SERVICING EXPERIMENT – 1.3

**Aim:** Servicing and installation of a Refrigerator.

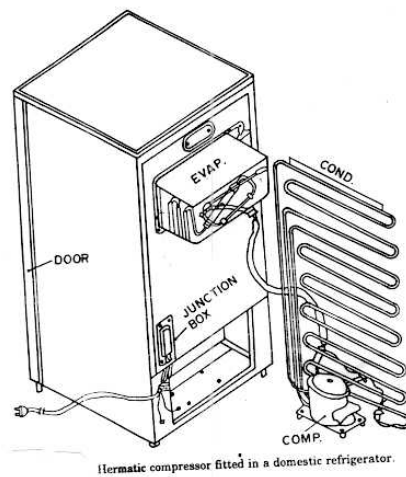
### Tools required

1. Screw Driver;
2. Tester;
3. Cutting player;
4. Spanner set;
5. Plastic wire brush;
6. Warm water;
7. Detergent water solution;
8. Dry cloth.

### Learning objectives

At the end of the practical class, the student should be able to:

1. Understand the parts of the refrigerator.
2. Understand the servicing and installation methods.



### Procedure

1. Switch off the refrigerator and disconnect the power card.
2. Remove the screws and take out the condenser coil.
3. Clean the condenser coil with plastic wire brush and dry cloth. After cleaning, refix the same.
4. Clean the compressor with dry cloth.
5. Check and tighten the electrical terminals and apply insulation tape where ever necessary.
6. Clean the freezer compartment with sponze or smooth cloth.
7. Clean the inner part of the refrigerator compartments with warm water.
8. Clean the outer surface or a body of refrigerator with detergent solution.
9. Open the refrigerator door for some time and make inner compartments dried up.
10. Re fix the compressor and tighten the nut and bolts with spanners.

**Installation procedure**

Proper installation of a refrigerator is both easy and important. The primary concerns are that the unit has sufficient clearance from the walls for proper ventilation, that it is not pinching or damaging and electrical cords or pipe lines, and that it is level. Many refrigerators must be tilted back slightly so that the doors self – close.

**Data required to be noted:**

<b><u>SERVICE REPORT</u></b>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service rendered</b>
<b>Servicing and installation of a Refrigerator</b> <b>Refrigerator make :</b> <b>Sl. No :</b> <b>Capacity :</b>	1. Condenser coil cleaning 2. Compressor cleaning 3. Freezer box cleaning 4. Inner compartments cleaning 5. Outer cabinet cleaning 6. Testing of electrical terminals
<b>Materials replaced :</b>	
<b>Customer's comments:</b> Reported problem and rectified to our satisfaction.	
Service Engineer Signature.	Signature & Seal of the Client

## **AIR CONDITIONER SERVICING EXPERIMENT NO : 1.4**

**Aim:** Servicing of an Air-Conditioner (Window type)

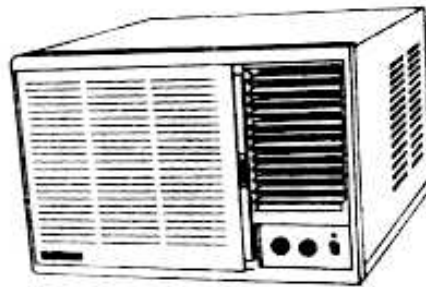
### **Tools required**

1. Electric blower; 2. Steel wire brush; 3. Screw drivers; 4. Tester; 5. Spanner set; 6. Oil can; 7. Water.

### **Learning objectives**

At the end of the practical class, the student should be able to:

1. Understand the parts of the refrigerator.
2. Understand teh servicing methods.



### **Procedure**

1. Switch off the Air conditioner and disconnect the power card.
2. Romove the front grill and take out the air filter.
3. Clean the air filter in running water.
4. Remove the screws and take out Top, front and side panels.
5. Clean the condenser coil and Evaporator Coil with wire brush and air blower.
6. Dismantle the fan motor and oiling is to be done.
7. After fan motor oiling, it is to be re-installed.
8. Clean the condenser coil, evaprator coil and base tray with water.
9. Check and electrical wiring system and apply insulation tape wherever necessary.
10. Refix the Top, front and side panels with screws.
11. Tighten the screws, nut and bolts.
12. Re-install the unit and Refix the front grill.
13. Connect the power card and switch on the A/C unit.

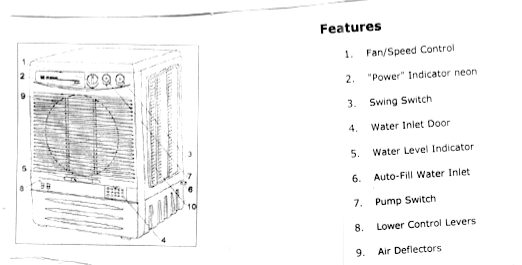
## AIR COOLER - STUDY OF AIR-COOLER FEATURES EXPERIMENT NO. 2.1

**Aim:** To study the air-cooler features.

### Learning objectives

At the end of the practical class, the student should be able to:

1. Understand the parts of Air Cooler.
2. Understand the functions of various parts.



### Main Features

- 1. Study Design:** It is an air cooler made of thermoplastic material having corrosion free life.
- 2. Four way air deflection system:** This feature enables uniform circulation of air by manual and motorised louver to maintain same cool temperature throughout the room.
- 3. Water Distribution on pads:** Water is distributed to wet the wood wool through a pump that delivers water to the shower pipes. Led indicator glows when the pump in in action.
- 4. Speed control:** Independent controls for three different air speeds. LED indicator for power 'ON'.
- 5. Special Wood Wool pads:** Himalayan pine wood wool provided for odourless and fresh cool air.
- 6. Auto water level controller:** The air cooler when connected by the water inlet to the over head tank maintains the required water level in the tank by the float valve arrangement.
- 7. Water level Indicator:** An easy to view water level indicator on the front panel lets you keep a check on the water level in the tank.

## OPERATION AND PRECAUTIONS OF AIR COOLER EXPERIMENT NO. 2.2

**Aim:** To study the operation and precautions of Air cooler.

### Learning objectives

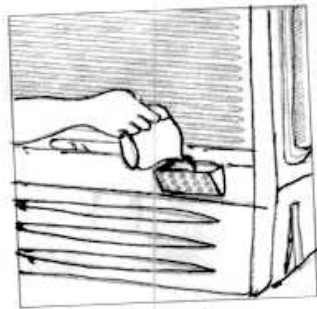
At the end of the practical class, the student should be able to :

1. Understand the parts of Air cooler.
2. Operations of Air cooler.
3. Understand precautions.

### Related Theory:

#### Operation

1. Installation:
  - a) For obtaining best results, mount the unit on a window exposing the back and sides of the cooler outside, preferably away from direct sun light. Ensure that the unit is placed on a support from angular frames.
  - b) Alternatively the cooler can also be placed on a trolley. Make sure that the unit has a clearance from any obstructions by at least 10 cms on every side.
2. **Filling water:**



#### a) **Manual Filling**

When water is to be filled in manually from the front of the cooler, avoid water spillage. The tank capacity is 40 liters of water that means about four average sized buckets are required to fill the tank. The water level indicator will show the level of water in the tank. Do not overfill the tank.

#### b) **Auto Filling:**

The tank can be connected to the main pipeline to an overhead tank. The float valve provided ensures that the tank remains full all the time.

3. **Power supply:** Simply plug the power cord in to the nearest power point (230 v, 50 Hz AC Supply only) and switch 'ON'. Ensure that your power point is properly earthed.

4. Operation of controls: The neon lamp under the “Fan” control glows as soon as the unit receives power.
  - a) **Fan Speed:** The fan runs on three different speeds and is switched ‘OFF’ as indicated.
  - b) **Swing:** This push button switch when depressed once started the swing motor which throws air sidewise automatically. Depressing this switch again stops the motor. The neon light indicates that the swing is in operation.

Do not try to adjust the oscillating vertical louvers manually. If a fixed flow in any direction is required, switch off the swing motor when the louvers are in that particular direction.

**Cool:** The pump starts automatically with the fan motor. By controlling the humidity or pump knob the quantity of water to the cooling pads is controlled. Adjust the water to the cooling pads to your personal cooling comforts.

**Louvers:** The front louvers can be moved up or down to direct air coming out from the cooler with the help of the lever provided.

### **Safety precautions**

- ◆ Do not open any panel/cover when the unit is in operation. Always disconnect the mains cord before opening the unit.
- ◆ Do not try to fill water manually in to the cooler while the unit is in operation. Fill water in the cooler only when it is in the power ‘OFF’ mode.
- ◆ Do not overfill the water tank.

## SERVICING AND MAINTENANCE OF AIR COOLER EXPERIMENT NO. 2.3

**Aim:** Servicing and maintenance of Air Cooler

### Tools required

1. Screw Driver;
2. Spanner set;
3. Testor;
4. Insulation tape;
5. Cutting player;
6. Lubricating Oil can.



### Procedure

1. Switch off the power and disconnect the power cord.
2. Remove screws and take out the side panels containing wood wool pads.
3. Remove the wire mesh by using cutting player and screw driver, take out the dusty wood wool pads.
4. Clean the pads in running water or replace new pads and refix in the panels.
5. Take out water pipings and clean them with soap water. Replace new pipes if necessary.
6. Dismantle the fan motor and pump. Lubricate both Fan motor and pump.
7. After lubrication re-install the same.
8. Clean the water tank, front grill with clean water and wipe the body of the cooler with dry cloth.
9. Check the electrical wiring system and replace the new wire if found necessary.

### Maintenance

1. Periodic maintenance helps to keep your Air Cooler in good condition.
2. It is recommended to drain the unit and clean the wood wool pads every month.
3. Replace the wood wool pads every month.
4. After a season of using the cooler ensure to drain the water from the tank completely.

**Data required to be noted:**

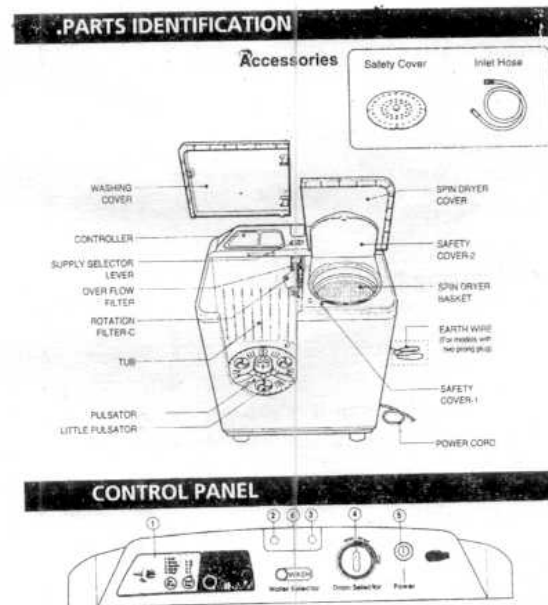
<b><u>SERVICE REPORT</u></b>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service rendered</b>
<b>1. Servicing of Air Cooler</b>	i. Dismantling Fan motor and pupm ii. Replacing wood wool pads iii. Fan motor and pump lubrication iv. Re- installation.
<b>Materials replaced :</b> Wood wool pads replaced	
<b>Customer's comments:</b> Reported problem and rectified to our satisfaction.	
Signature of Service Engineer	Signature and Seal of Client

## EXPERIMENT NO : 3 WASHING MACHINE

**Aim :** To study the working principle of a washing machine.

### Apparatus Required

1. Controller; 2. Hot water inlet; 3. Cold water inlet; 4. Drain selector; 5. Power switch



### Description

1. **Controller :** It provides total control of washing machine as per needs.
2. **Hot water inlet :** Hot water inlet is used to supply the hot water in washing machine.
3. **Cold water inlet :** Cold water inlet is used to supply the cold water in washing machine.
4. **Drain selector :** The function of a drain selector is to sent drain water through the drain pipe. Drain water is the dirty water which is formed after washing the clothes.
5. **Power switch :** Press this switch for connecting or dis-connecting your machine from main supply.

### Working

- i. **Tub :** The washing machine consists of Two Tubs. One is inner tub and the other is outer tub. In almost all washing machine the inner tub has hundred of small holes that allow the water to flow in an outer tub. The outer tub holds the water. At the center of the inner tub an agitator is provided.

- ii. **Central agitator:** The agitator rotates in both clock wise and counter clock wise direction about three fourth (3/4) of a revolution. It plunges the clothes through the water to wash them. The clothes keep moving from top of the tub to bottom of the tub. The motion allows the detergent and water to reach every part of the clothing and removes the dirt.
- iii. **Fill valve:** The fill valve which has shape as of a coffee cup. It is also called as water inlet valve. It controls the entry of hot and cold water in to the machine.
- iv. **Timer and selector switches:** The timer is an electronic device used to wash the clothes in a pre determined time. It provides the electricity to all the electrical components at the correct time.

Selector switch is used to select the different functions like starting or stopping the washing machine.

**Precautions**

- 1. The hose pipe should be checked time to time for any sign of wear or weakness and to be replaced for every 5 years.
- 2. Leveling should be done accurately to avoid vibrations.
- 3. Use only laborites tested detergents
- 4. Motor bushes, bearings and belts should be checked regularly.

**Data required to be noted :**

<u><b>SERVICE REPORT</b></u>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service Rendered</b>
<b>Servicing and repair of Washing Machine.</b> <b>Unit make :</b> <b>Sl. No :</b>	1. Dismantling 2. Cleaning 3. Motor oiling 4. Re installation

<b>Materials replaced :</b>	
<b>Customer's comments :</b> Reported problem and rectified to our satisfaction.	
Serviced by	Signature of Client

### Questions For Evaluation

**After performing the practical task, the students are required to answer the following questions :**

Q1. What are the main parts of a washing machine ?

Ans. 1. Controller; 2. Hot Water Inlet; 3. Cold Water Inlet; 4. Drain Selector; 5. Power Switch; 6. Water Selector.

Q2. What is the function of a motor and pump ?

Ans. The motor drives the agitator during the wash cycle and spins the clothes during the damp dry spin cycle. The pump removes the water from the tub and lifts it out to the drain.

Q3. Does washer really need to be level ?

Ans. Yest. It is very important for washing machines to be level for proper operation.

Q4. Why do items some times tear in the washer ?

Ans. If the unit is too full, or if the agitator happens to catch a piece of clothing in an unfortunate way, it may tear certain clothes.

Q5. Which detergent is best ?

Ans. All modern detergents work quite well. However, some have been tested.

Q6. Is it true a nail, accidentally put in the washer, can break it ?

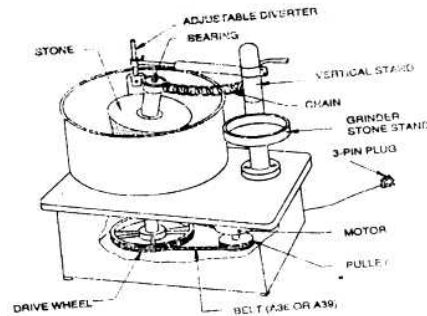
Ans. Absolutely, that's why it is important to always empty all pockets before laundering.

## EXPERIMENT NO : 4.1 GRINDER

**Aim:** To study the working principle of a grinding machine.

### Apparatus Required

1. Container; 2. Motor; 3. Stone; 4. Pulley; 5. Frame and stand.



### Description

1. **Container :** It is made up of stainless steel. All types of grains are stored in container. A hollow stone known as female part is attached to the container.
2. **Motor :** The motor used in the grinder is usually the capacitor start induction motor. It has two winding i.e., starting and running winding. The starting winding has less gauge with more number of turnings. The running winding has more gauge with less number of turning. The starting winding is connected in series with a capacitor and running winding is connected across the supply. After 70 to 80% of the rated speed is reached, the starting winding is switched off by the centrifugal switching system the motor then operates only on running winding.
3. **Stone :** The grinder stone consists of two parts. One male and other is female. The male stone grinds the grinding material during its rotation and the female stone keeps the grinding material inside. The grinding stones are manufactured with hand granite which is usually whitish black in colour.
4. **Pulley :** The drum speed is lower than the motor speed, normally 500 to 600rpm. The motor speed is normally 1450 rpm. The speed of the drum is reduced by using a larger diameter pulley.
5. **Frame and stand :** All the parts of grinder is housed in a rectangular frame with stainless steel covering or plastic moulding for decoration as well as safety. A separate vertical stand is provided on one side of the grinder for holding the male grinding stone in an idle running condition.

**Faults And Remedies**

<b>Problem</b>	<b>Causes</b>	<b>Remedy</b>
1. Motor does not start.	1. The switch is closed. 2. Motor winding grounded. 3. Broken wires from winding. 4. Defective capacitor. 5. Blowing of fuses.	1. Open the switch. 2. Rectify or Rewind the motor. 3. Solder the broken wires. 4. Replace the capacitor. 5. Check and replace proper fuses.
2. Motor starts but heats up rapidly	1. Defective centrifugal switch. 2. Short circuited winding. 3. Grounded winding.	1. Replace the centrifugal switch. 2. Rewind the winding. 3. Rectify or Rewind the motor.
3. Motor slows down.	1. Short circuited windings. 2. Shaft bend. 3. Worn out bushes.	1. Rewind the motor. 2. Replace the shaft. 3. Replace the bushes
4. Motor is noisy	1. Worn out bearing 2. Bend shaft. 3. Lose parts	1. Replace the bearing. 2. Replace the shaft. 3. Tighten the parts.

**Precautions :**

1. Do not touch bare wires.
2. Make sure power is turned off before working on electrical equipments.
3. Insulate the winding by applying varnish.
4. Check regularly belt tension and vibration.

**Data required to be noted :**

<b><u>SERVICE REPORT</u></b>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>

Problems Reported	Service Rendered
<b>Servicing of wet grinder.</b> <b>Unit make :</b> <b>Sl. No :</b>	1. Dismantling 2. Cleaning 3. Motor oiling 4. Re installation
<b>Materials replaced :</b>	
<b>Customer's comments :</b> Reported problem and rectified to our satisfaction.	
Serviced by	Signature of Client.

**Questions For Evaluation :**

**After performing the practical task, the students are required to answer the following questions :**

Q1. Mention the parts of wet grinder ?

Ans. 1. Grinder stone; 2. Container; 3. Vertical stand; 4. Grinder stone stand; 5. Adjustable diverter; 6. Bearing; 7. 3 – Pin plug; 8. Motor; 9. Pulley; 10. Drive Wheel

Q2. What are the different types of wet grinder ?

Ans. There are three types of wet grinders.

(i) Stone rotating type wet grinder.

(ii) Container rotating type wet grinder.

(iii) Tilting type or both stone and container rotary type wet grinder.

Q3. What type of motor is used in wet grinder ?

Ans. The motor used in the wet grinder is usually the capacitor start induction motor. It has two windings. One is starting and the other is running winding.

Q4. Which type of stone is used in wet grinder ?

Ans. The grinder stone consists of two parts. One male and other female. The male part actually grinds the grinding material during its rotation. The hollow or female stone actually keeps the grinding material inside. The above stones are manufactured with hard granite which is usually whitish black in colour.

## EXPERIMENT NO : 4.2 MIXER (OR) MIXY

**Aim :** To study the working principle of a mixy or mixer.

### Apparatus Required

1. Stopper; 2. Lid; 3. Blender; 4. Blade assembly; 5. Hexagonal nut; 6. Female coupling; 7. Rubber gasket; 8. Aluminium holder for blender.



### Description

This machine is used for crushing the “masalla” and taking out juice from fruits, or making milk shake or mango shake etc. In this machine universal motor is fitted and controlled with a push button.

### Different parts of mixy

- i. Motor :** Motor is with a rating of about 120 watts which operates on 220 volts. The motor whirls while working at a speed of 12000 rpm. It is a series motor called universal motor.
- ii. Blades :** Blades are made of good quality stainless steel and will, therefore, give high life.
- iii. Blender :** Blender is made up of steel or transparent plastic. This can make milk shakes, lassi or other drinks. It is also used for blending and stirring. The extent blender is to be filled depends on the substance. Liquids can be filled up to  $\frac{3}{4}$ <sup>th</sup> of the blender capacity.
- iv. Grinder :** Grinder is designed to grind small quantities of dry substances such as coffee, curry powder, nuts, etc.

- v. **Cleaning of blender :** Pour one cup of luke – warm water in the blender. Add ½ tea spoonful of soap powder. Run the motor for 30seconds. This self cleaning method is the best to ensure efficient operation
- vi. **Cleaning of grinder :** The grinder unit should be cleaned with a soft dry brush. Never use water.

**Operating Instructions**

1. Place the rubber sealing ring on the base of the blade assembly. Screw the plastic blender in to this assembly until light.
2. Place the ingredients in the bladder.
3. Place the lid on the blender. When the motor is running, only the centre stopper should be removed.
4. Switch on the motor by pressing the switch.
5. When the operation is complete, switch “off” the mixer. Wait till the motor stops completely and remove the blender.

**Precautions**

1. Motor should not be used continuously for more than two minutes in small mixy and 15 minutes in heavy duty. There should be a gap of 15 seconds between each operation.
2. Do not insert any metal part from centre stopper, when the motor is in motion.
3. Do not put big ice pieces while making cold drinks. Crush the ice and then put in to the blender.

**Data required to be noted**

<u><b>SERVICE REPORT</b></u>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man’s Name :</b>
<b>Problems Reported</b>	<b>Service Rendered</b>
<b>Servicing of a mixer or mixy</b>	<ol style="list-style-type: none"><li>1. Dismantling</li><li>2. Cleaning</li><li>3. Motor oiling</li><li>4. Re installation</li></ol>

**Materials replaced :**

**Customer's comments :** Reported problem and rectified to our satisfaction.

Serviced by

Signature of Client.

### Questions For Evaluation

**After performing the practical task, the students are required to answer the following questions :**

Q1. What are the main parts of mixer or mixy ?

Ans. 1. Motor; 2. Blades; 3. Blender; 4. Grinder

Q2. What is the use of mixer ?

Ans. It is used for crushing the "masalla" and taking out juice from fruits, or making milk shake or mango shake etc.

Q3. What type of motor is used in mixer ?

Ans. A universal motor is used in mixer.

Q4. Mention any two precautions ?

Ans. 1. Do not insert any metal part from centre stopper when the motor is in motion.  
2. Do not put big ice pieces while making cold drinks. Crush the ice and then put in to the blender.

Q5. How do you clean the grinder ?

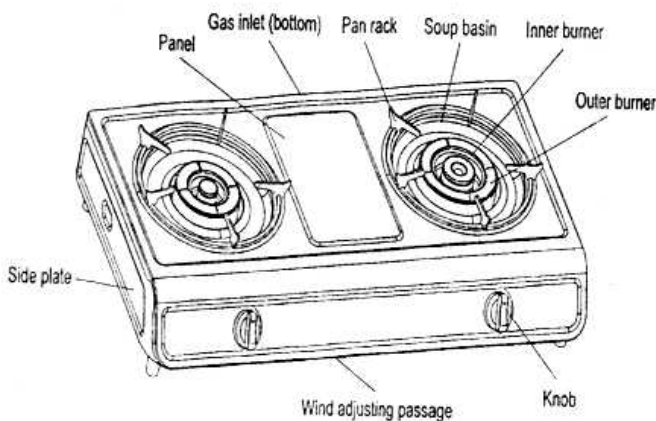
Ans. The grinder unit should be cleaned with a soft dry brush. Never use water.

## EXPERIMENT NO : 5 GAS STOVE

**Aim:** To study the working principles of a Gas Stove.

### Apparatus Required

1. Inner burner; 2. Outer burner; 3. Panel; 4. Gas inlet pipe; 5. Pan rack; 6. Side plate;
7. Knob; 8. Rubber tube; 9. Regulator.



### Operations

1. Keep all the knobs on the “OFF” position and open the regulator.
2. Press down the knob and turn it anti – clockwise to the “ON” position.
3. Ignite the gas with a spark lighter.
4. Adjust the fire by turning the knob slowly according to the flame requirement.
5. Turn the knob clock wise to the “OFF” position.
6. Adjust the wind plate if the flame colour is yellow.

### Installation

1. Put the gas stove in ventilated space.
2. Open the sealed cap on the gas cylinder.
3. Fix the regulator on the cylinder.
4. Connect the flexible rubber tube in between regulator tube and stove inlet tube.
5. The distance around the gas stove should not be less than 15cm and there should be 100cm space to the top.

### Faults & Remedies

<b>Trouble</b>	<b>Causes</b>	<b>Remedy</b>
1. Ineffective to ignite.	1. The gas switch closed. 2. The rubber tube is blocked or bended. 3. Air mixed in the tube.	1. Open the switch. 2. Remove the blockage or straight the tube or replace the tube. 3. Remove the air.
2. Gas leakage or Gas smell.	1. Cracks in the gas tube. 2. The switch is not well closed. 3. Defective regulator value. 4. Air adjusting is not correct.	1. Replace the tube. 2. Close it correctly. 3. Replace the value.
3. The flame is abnormal	1. Air adjusting is not correct. 2. Fire holes on the burner is blocked.	1. Adjust the wind plate correctly. 2. Remove the blockage.

### Maintenance

1. Clean the burner with dry cloth after it is completely cooked.
2. Use the wet cloth with detergent soap solution to remove the dirt and then clean with dry cloth.
3. Clean the gas carrying pipes to ensure correct igniting.
4. Tighten the rubber tube with clamp.
5. If cracks are found on the hose tube, replace it. It is recommended to replace the rubber tube once in a year.
6. Disconnect the regulator valve from the cylinder when it is not in use for long period.
7. Use only spark lighter to ignite.
8. Provide good ventilation during cooking.
9. Never put flammable objects near the rubber tube.

**Data required to be noted :**

<b><u>SERVICE REPORT</u></b>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service Rendered</b>
<b>Servicing of Gas Stove.</b>	1. Dismantling 2. Cleaning 3. Re installation
<b>Materials replaced:</b>	
<b>Customer's comments :</b> Reported problem and rectified to our satisfaction.	
Serviced by	Signature of Client.

**Questions For Evaluation**

**After performing the practical task, the students are required to answer the following questions :**

Q1. What are the main parts of Gas Stove ?

Ans. 1. Panel; 2. Gas inlet; 3. Pan rack; 4. Soup basin; 5. Inner burner; 6. Outer burner; 7. Wind adjusting passage; 8. Knob; 9. Side plate.

Q2. What are the requirements for installation of a gas stove ?

Ans. (a). Check the kind and pressure of the gas on the rating label.

(b). Check the fixing bolts and connection of the components to avoid the influence in transit.

Q3. What is the reason for gas leakage in Gas Stove ?

Ans. (i) The fit for gas inlet hose is not good or have crack.

(ii) The switch is not well closed.

(iii) The pressure valve of the cylinder is not sealed good.

Q4. If the flame is abnormal in gas stove what step do you take ?

Ans. (i) Air adjusting is not correct.

(ii) The burner caps are put slanting.

(iii) Fire hole on the burner.

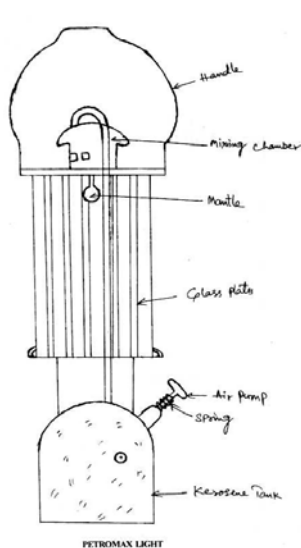
(iv) The gas source is wrong.

## EXPERIMENT NO : 6.1 PETRO MAX LIGHT

**Aim:** To study the working principle of PETRO MAX LIGHT.

### Apparatus Required

1. Kerosene tank; 2. Air pump with spring; 3. Glass plate; 4. Mantle; 5. Mining chamber; 6. Handle.



### Operations

- 1. Filling the container :** Unscrew the filling cap and pour in kerosene by using funnel. It should not be fill more than  $\frac{3}{4}$  full.
- 2. Fixing the gas mantle :** Loosen screws of frame and remove glass plate cover. Put mantle over the nozzle and tie it up with the threads provided in mantle. Cut off the ends of the string.
- 3. Pumping up air :** Close the filling cap tightly and pump the piston to put pressure in the tank.
- 4. Adjusting screws of Mining tube :** If the light flickers or appears not bright enough, turn the screw of mining tube with spanner or screw driver until the light appears bright.
- 5. Tight fit of nozzle and nipple :** In case if flame appears around the mantle and the mining tube, immediately put off the light by turning the hand wheel upwards. Cool down the lamp for some time and tighten the nipple with a spanner.
- 6. High temperature :** While putting the petromax light in to operation, it develops high temperature. Cool it down for atleast 10 minutes before doing repairs.

**7. Lighting the petromax light :** After pumping up the air in the tank, kerosene comes out from the nozzle. Then open the filling cap nut and warm up the burner for some time. Then close the filling cap nut and pumping up the air till the bright light comes.

### **Remedies**

- i. Replacing the gas mantle :** Loosen the screws of frame and remove glass plate cover. Remove all sidements of the old mantle and put the new mantle over the nozzle and tie it up with the threads provided in the mantle cut off the ends of the strings.
- ii. Replacing the leather washer :** Remove the pump position and unscrew pump piston nut and remove old leather washer. Apply the grease and refix the new leather washer and tighten the nut.
- iii. Replacing the nipple and needle :** Loosen the screws of frame and remove glass plate cover. Unscrew nipple with spanner. Remove needle with needle key. Replace nipple and needle and assemble again.
- iv. Replacing the Glass Cover :** Loosen the screws of frame and remove glass cover. Remove the broken glass piece and replace new glass plate and refix the glass cover.
- v. Replacing the mixing tube and nozzle :** Remove glass cover and unscrew mining tube and nozzle with the help of spanner.

### **Precautions**

- (a). Damaged gas mantles have to be replaced immediately.
- (b). Damaged leather washers have to be replaced immediately.
- (c). Damaged glass plates have to be replaced immediately.
- (d). Filling cap must be tightened during operation.
- (e). Kerosene should not fill more than  $\frac{3}{4}$  full.
- (f). Pumping up air should be limited.
- (g). Frequently by the nipple must be cleared.

**Data required to be noted :**

<b><u>SERVICE REPORT</u></b>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service Rendered</b>
<b>Servicing of Petromax light</b>	1. Dismantling 2. Cleaning 3. Re installation
<b>Materials replaced :</b>	
<b>Customer's comments :</b> Reported problem and rectified to our satisfaction.	
Serviced by	Signature of Client.

**Questions for Evaluation**

**After performing the practical task, the students are required to answer the following questions :**

Q1. How do you fix the gas mantle in a petromax light ?

Ans. Loosen screw of frame and remove hood with top inner casing. Put mantle over nozzle and tie it up. Cut off the ends of the string. Put inner casing on frame, being careful of the needle. Make sure that the screw of the mixing tube can be seen through the upper openings of the hood and that slit is vertical.

Q2. What are the main parts of a petromax light ?

Ans. 1. Handle; 2. Mixing Chamber; 3. Mantle; 4. Glass plates; 5. Air pump; 6. Kerosene tank.

Q3. How to fill the container ?

Ans. Unscrew the filling cap and pour in kerosene or other approved fuel, use filling funnel. Fill no more than  $\frac{3}{4}$  full.

Q4. How to replace a leather washer ?

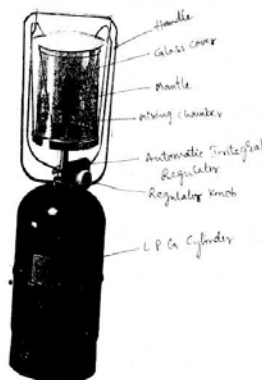
Ans. Remove pump piston unscrew pump piston nut and remove old leather washer. Grease and spread new washer for optimal function.

## EXPERIMENT NO : 6.2 GAS LIGHT

**Aim :** To study the working principle of gas light.

### Apparatus Required

1. L.P.G cylinder; 2. Regulator knob; 3. Automatic integral regulator; 4. Mining chamber; 5. Mantle; 6. Glass cover; 7. Handle.



### Construction Details

The use of gas light is similar to the petromax light. In the gas light, LPG gas cylinder will be used instead of kerosene tank. In gas lighting system no liquid fuels will be used. Fixing of the gas mantle is similar to the petromax light. Integral regulator is provided in this system. Integral regulator works as automatic lighter as well as gas controller.

### Working

Operation of gas light is very easy when compared with petromax light. Rotate the integral regulator knob slowly in clock wise direction. Then some part of LPG gas will be entered in to the mining chamber. Then rotate the regulator knob fully in clock wise direction till the spark produces, the gaseous fuel ignities and the brightness will come through the mantle. We can control the brightness by using regulator knob. If we want to put off the gas light, rotate the regulator knob in anti – clock wise direction completely till the light vanishes in the gas mantle.

### Precautions

1. Damaged gas mantle have to be replaced immediately.
2. Damaged glass plate have to be replaced immediately.

**Data required to be noted :**

<b><u>SERVICE REPORT</u></b>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service Rendered</b>
<b>Servicing of Gas light.</b>	1. Dismantling 2. Cleaning 3. Re installation
<b>Materials replaced :</b>	
<b>Customer's comments :</b> Reported problem and rectified to our satisfaction.	
Serviced by	Signature of Client.

**Questions for Evaluation**

**After performing the practical task, the students are required to answer the following questions :**

Q1. What are the parts of gas light ?

Ans. 1. Handle; 2. Glass cover; 3. Mantle; 4. Mixing chamber; 5. Automatic Integral Regulator; 6. Regulator knob; 7. L.P.G. cylinder.

Q2. What are the differences between petromax light and gas light ?

Ans.

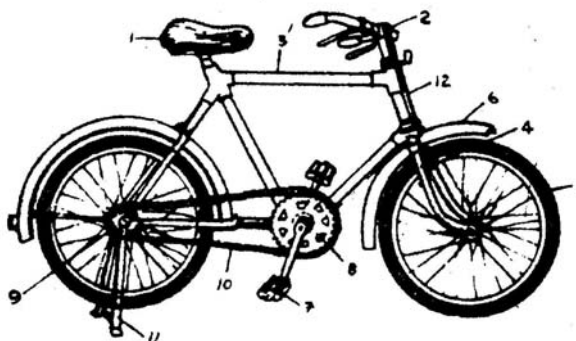
<b>Petromax light</b>	<b>Gas light</b>
1. Liquid fuel such as kerosene will be used.	1. Gaseous fuel such as L.P.G. will be used .
2. Operation is difficult.	2. Operation is simple.
3. Pumping up air is required.	3. Not required.
4. Integral regulator is absent.	4. Integral regulator is present.
5. Match box is required to ignite the fuel.	5. No match box is required.
6. Black smoke releases during the operation.	6. It is a smoke less system.

## EXPERIMENT NO : 7 BICYCLE

**Aim :** To study the working principle of a BICYCLE

### Apparatus Required

1. Seat; 2. Handle; 3. Frame; 4. Fork; 5. Wheels; 6. Mudguard; 7. Pedal; 8. Gear wheel; 9. Free wheel; 10. Chain; 11. Stand; 12. Brake.



### Description

1. **Seat :** The purpose of the seat is to sit the person comfortably and ride the bicycle. The material used for making the seat is leather.
2. **Handle :** The handle of a bicycle helps in keeping a proper balance of the vehicle while riding. We hold the handle with our hands and turn it in different directions.
3. **Frame :** The frame is in triangular and connects the two wheels, handle, seat and the gear wheel.
4. **Forks :** There are two forks in the bicycle. The front fork connects the handle with the front wheel, while back fork connects the seat and the back wheel.
5. **Wheels :** Steel spokes are fixed to the wheels. They keep the wheels in a circular shape and prevent the rim from getting bent.
6. **Mud guard :** It guards against dirt and mud to the rider.
7. **Pedal :** Two pedals are fixed to the two cranks. While peddling the bicycle, the gear wheel and free wheel rotates with the help of chain.
8. **Gear wheel :** It is toothed wheel having larger diameter is fixed to the bottom of the frame.
9. **Free wheel :** It is fixed at the centre of the back wheel. Compared to gear wheel the size of the free wheel is smaller.
10. **Chain :** It connects both gear wheel and free wheel. While peddling it first rotates the gear wheel then rotates free wheel.

11. **Stand :** Normally the stand is fixed to the back side of the bicycle. The bicycle rests on the stand.
12. **Brake :** Brake levers are provided near the handles. It is used to control the bicycle speed. Right hand brake controls the front wheel speed and left hand brake controls the rear wheel speed.

### **Working**

Bicycle is an easily available machine and riding it is also easy. It is a poor man's vehicle to travel quickly. A bicycle is a two-wheeler. Two wheels with rims are fixed to a frame. One in the front and the other in the rear. An axle is arranged at the bottom of the triangular frame. Two crank levers are fixed to the axle. The right crank lever is fixed to a gear wheel. A free wheel is provided at the centre of the back wheel. These two wheels are connected by a chain. Two pedals are fixed to the two cranks. While peddling the bicycle the gear wheel first rotates and then the free wheel rotates with the help of a chain which makes the bicycle move.

### **Precautions**

1. Use correct size spanners for removing or tightening the nut and bolts.
2. Most parts need to be tight but don't over-tighten.
3. When cleaning the chain or lubricating ensure that lubricant does not get in the rims.
4. Check and lubricate brake and gear cables.
5. Dismantle, clean and grease front and back hubs.
6. Bicycle should be serviced by a mechanic at least once in a year.

**Data required to be noted :**

<u><b>SERVICE REPORT</b></u>	
Date: _____	
<b>Name &amp; Address of the Client :</b>	<b>Service Man's Name :</b>
<b>Problems Reported</b>	<b>Service Rendered</b>
<b>Servicing of a Bicycle.</b>	1. Dismantling 2. Cleaning 3. Oiling & greasing 4. Re installation
<b>Materials replaced :</b>	
<b>Customer's comments :</b> Reported problem and rectified to our satisfaction.	
Serviced by	Signature of Client.

**Questions for Evaluation**

**After performing the practical task, the students are required to answer the following questions :**

Q1. What are the main parts of a bicycle ?

Ans. 1. Seat; 2. Handle; 3. Frame; 4. Fork; 5. Wheel; 6. Mudguard; 7. Pedal; 8. Gear wheel; 9. Free wheel; 10. Chain; 11. Stand; 12. Brake.

Q2. What is the purpose of the seat ?

Ans. The purpose of the seat is to sit the person comfortably and ride the bicycle.

Q3. What is the purpose of the handle ?

Ans. The handle of a bicycle helps in keeping a proper balance of the vehicle while riding.

Q4. What is the purpose of the brake ?

Ans. Brake is used to control the bicycle speed.

Q5. What is the purpose of the bell ?

Ans. Cyclist uses a bell to make the way clear.