How to Maintain Electrical Appliances At Home

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ABSTRACT

There are various electrical home appliances are used in our country. Like Air conditioner, Washing Machine, Vacuum cleaner, Reverse Osmosis System (RO), Refrigerator, Air Water Cooler, Micro wave oven, Geyser, Toaster, Mixer Juicer Grinder, Hand blender, Air heater, Dish washer, Air purifier, Hair drier, Sewing Machine, Television, Radio, House fly killer, Cloth drier, Electric iron, Coffee Maker, Electric Kettle, Sandwich maker, Room heater, Water booster pump, Personal computer, Printer, Table lamp, Battery charger, Voltage stabilizer etc. Nowadays, in modern houses almost all these equipments are used but in middle class houses only few of them are used. Generally Reverse Osmosis System (RO), Refrigerator, Semi Automatic Washing Machine, Television; Air Water Cooler is most commonly used by all families. These are more power consuming and costly appliances; they need proper maintenance for reducing electricity bills and home budget. Also they requires major safety, so my aim to published this paper is to share information regarding maintenance of these home appliances at very low budget and with few efforts, one can maintain them at home only. By doing so these equipments will live long and the electricity bill will also be reduced.

Keyword: *- Routine, Preventive, Schedule and Break down Maintenance, electrical appliances*

1. INTRODUCTION

In today's world more than 80% of the houses consume electrical appliances. They are power consuming and make our life easy. The problem is that consumption of electrical energy is increasing rapidly, and production is not sufficient. Due to this the gap between demand and supply is increasing, making the electricity and maintenance of appliances very costly. In old days, there were no energy efficient equipments available, but nowadays after so many researches, many energy efficient equipments are available in market. Such as Air conditioner, Semi automatic washing machine, Refrigerator, Micro wave oven all are available under 5 stars rating as per Indian Bureau of Energy Efficiency Standards. These appliances are quite expensive.

It is not possible for a common family to buy these again and again. For example the current price of air conditioner (1.5 Tone) Rs 30000, Semi automatic washing machine (7 kg) Rs 14000, Refrigerator (200 L) Rs 15000, Micro wave oven (20 L) Rs 9000, Reverse Osmosis System (RO- 8 L) Rs 14000. Knowing these items to be purchased only once in a life time for a normal middle class family.

1.1 ELECTRICAL MAINTENANCE: -

The electrical maintenance means the care and check list of electrical equipments to avoid any breakdown of fault. Generally there are four types of electrical maintenance

(a) Routine Maintenance: -

It is defined as a small scale activities (usually requiring only minimal skills or training) associated with regular and upkeep of an equipment, machine, and building against normal wear and tear. This maintenance routine is done daily, weekly, and Monthly. For example,

[1] Brushing teeth every day.
[2] Regular cleaning all the items with clothes.
[3] Removed old food items from refrigerators.
[4] Wash spun filter of RO system with clean water once a month.
[5] Check pockets of cloths for metallic part like coin before washing in machine.

[6] Clean both the tubs after using the washing machine with a soft and dry cloth.
[7] Check earthing connections of each appliance before switched on it.

(b) Preventive Maintenance: -

Preventive maintenance tends to follow planned guidelines from time to time to prevent appliances breakdown. The work carried out on appliance in order to avoid malfunction or breakdown. It is also defined as systematic inspection, detection, correction, and prevention of incipient failures, before they become actual or major failure. This maintenance is done as per instructional manual given by the manufacturer. For example,

[1] Inspect refrigerator inner or outer surface regularly, look for any damage, leaks, cracks etc.
[2] Measure the TDS value of water in regular intervals.
[3] Clean the refrigerator coils and filters of Air conditioner in regular intervals.
[4] Lubricate moving parts of air cooler motor before using it.
[5] Check any water leakage in RO system.

(c) Scheduled Maintenance: -

It is also known as Planned Preventive Maintenance. Periodic prescribed inspection or servicing of equipment accomplished on a calendar, mileage, or hours of operation basis.

For Example,

[1] Air conditioner requires such maintenance in late winter or early springs. At least once in a year, this should be done by the service engineer. This service is provided by manufacture and service charges may apply inclusive of all taxes. At one time the cost of the service is about Rs 1500 plus cost of spare parts.
[2] Reverse Osmosis System requires such maintenance in every year. This maintenance can be done by a semi-skilled person or by a service engineer. At one time the cost of the service is about Rs 500 plus cost of spare parts (around Rs 2000) if service is done by an engineer. If the service is made by self, then the expenditure of about 1500 rupees.

(d) Break down Maintenance: -

Repairs of replacements performed after a machine has failed to return to its functional state following a malfunction or shutdown.

1.2 An Over view On Electrical Appliances:-

The following table no.1 shows the various appliances with their specifications, ratings, approximate present cost in market, applications, utility at home, and power consumption type of maintenance required. With the help of this table, we can see on which device the need for greater attention.

Table no.1 **Different Electrical Appliances**

Sr. no.	Name of appliances	Specifications	Present cost in INR	Utility at Home	Power consumption per day (KWh)	Applications	Type of maintenance required	Cost of maintenance
1	Air Conditioner	1.5 Tone, 240 V,50 Hz, A/C	30000	Used in Summer(8 Hrs in a Day)	14	Cooling	Scheduled Maintenance	Quite high
2	Semi auto matic Washing M/C	7 Kg, 240 V, 50 Hz, A/C	14000	Frequently used	0.16	Washing of Cloths	Routine Maintenance	Low
3	Refrigerator	200 L ,240 V, 50 Hz, A/C	15000	Regularly used	1 to 2	Keep fresh & cool food	Preventive Maintenance	Low
4	Reverse Osmosis System	8 L ,24V,D/C	14000	Regularly used	0.6	Drinking water Purification	Preventive , Routine, Scheduled Maintenance	High
5	Micro wave	20 L, 240 V, 50 Hz, A/C	9000	Frequently used	0.5	Cooking	Routine, Preventive	Little high

	oven						Maintenance	
6	Mixer Juicer Grinder	500 W, 240 V, 50 Hz, A/C	3000	Frequently used	0.25	Food Processing	Preventive , Routine, Scheduled Maintenance	Very Low
7	PC & Peripherals	70 W,240 V,50 Hz, A/C	30000	Regularly used	0.36	Networking & Learning	Preventive Maintenance	Very Low

1.3 Appliances Utility in Home: -

According to a survey, it is found that the utilization of Refrigerators, RO systems in our home is up to 21%, Washing machine is up to 18%, Computer is up to 15%, Oven is up to 11%, AC is up to 7%, Mixey is up to 5%, and others is up to 2%.The maximum utilization is of Refrigerators and RO system. Which are continuously operating at home? Therefore a attention is required to be given for their maintenance. This can be seen in chart no.1.

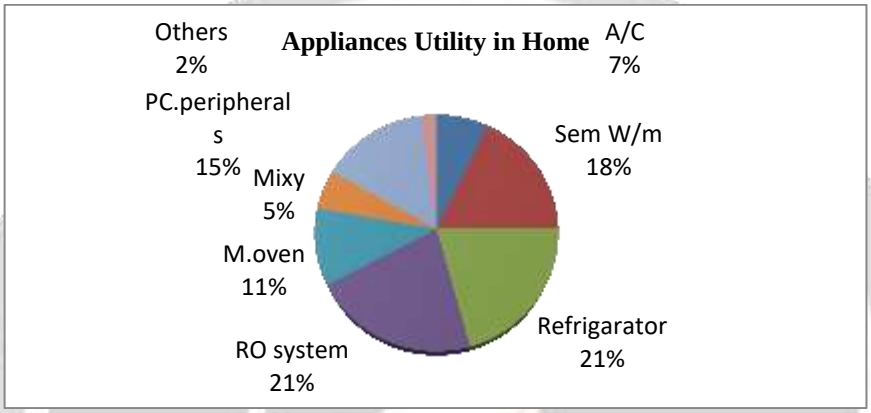

Chart -1:Appliance Utility in Home

1.4 Appliances V/S Cost in rupees: -

It can be seen from chart no.2 that there are some major electrical appliances and there cost at the time of purchase. The highest Price is of air conditioner and pc, peripherals which is around Rs.30000. Similarly the price of semi automatic washing machine, refrigerator, ro system is all most same, which is in between Rs 14000-15000 thousands, the cost of micro wave oven is around Rs 9000 and lowest price is of mixey which is around Rs 3000. Nowadays, these all appliances are found in a normal family except air conditioner and micro wave oven. Now we will talk about only normal families in next article.

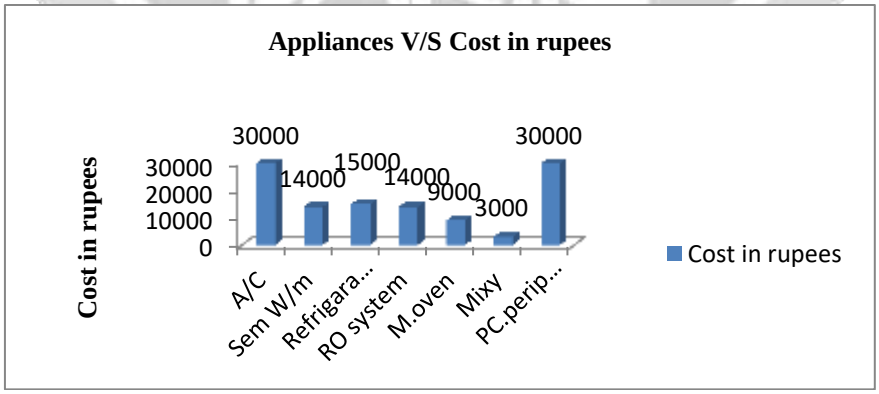

Chart –2: Appliances V/S Cost in rupees

1.5 Appliances V/S Energy consumption &Yearly Maintenance Cost: -

It can be observed from chart no.3 the behavior of large appliances with respect to their yearly power consumption and maintenance cost. The power consumption of air conditioner is quite high; their yearly maintenance cost may be around Rs.2000 inclusive of all taxes and cost of spare parts. As we are discussed

previously that this appliance is used only by modern families, they can easily afford this cost. Secondly power consumption of refrigerators is little high, which can be controlled by change in habits also. The maintenance cost of such is so high because ro system works with Spun filter, Pre & Post Carbon filter, Sediment filter, Membrane, Chlorine Ball etc. These are all consumables and costly. They must be replacing time to time. Our basic need is to drink pure water to stay healthy. Nowadays, all normal families have ro system to drink pure water but the problem is that the running maintenance cost of this is high (around may be Rs.2500-3000 per year). It's a big trouble for a normal family to bear the expenses on its maintenance. Therefore I am writing this paper to make it simpler for them by providing some simple methods of maintenance. By carefully understanding these methods, everyone can replace these consumables and save money up to Rs.1000-1500 per year.

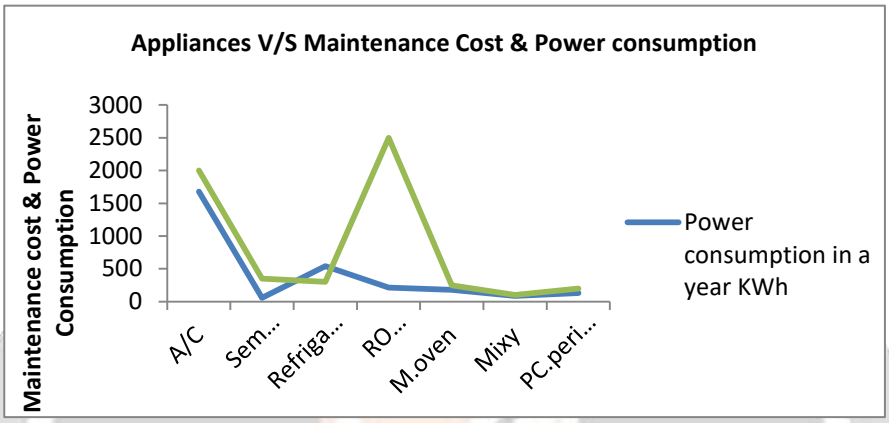

Chart-3: Appliances V/S Energy consumption &Yearly Maintenance Cost

2. MAINTENANCE TIPS FOR AIR CONDITIONER

In this article i am giving some simple tips for preventive maintenance of air conditioners. By follow these tips we can reduce maintenance cost as well reduce electricity bill and the life of appliance can also be increased.

[1] Cover up compressor unit during winters.
[2] Don't miss an AC service.
[3] Regular cleanup of air filters.
[4] Cleaning of Evaporator coils.
[5] Maintenance of condenser coil which is located outside the home in all types of AC.
[6] Cleaning Coil fins.

3. MAINTENANCE TIPS FOR REFRIGARATOR

[1] Clean off the condenser coils twice per year.
[2] Clean and replace the gasket (rubber door seal) as needed.
[3] Freeze must be kept clean from time to time, inside and outside.
[4] Fittings should be washed with light hot water or light soap.
[5] To save electricity the gate of the freeze should not be opened again and again.
[6] If there is more ice in the freezer, then you should defrost the freeze.
[7] If the long time to close the freeze then empty it completely and keep it clean.
[8] Keep removing old food items from time to time.
[9] Set the freeze temperature according to the need.
[10]Make full use of freeze capacity for high energy efficiency.

4. MAINTENANCE OF REVERSE OSMOSIS SYSTEM

Now we will discuss the complete maintenance and repair of a domestic reverse osmosis system**.** Like what tools, spare parts are needed. How to open them and how we can change spare parts. What should be the

precautions, where do the spare parts buy from? How does this system work? Its texture will also explain in detail.

[a] Accessories, Tools and Spare Parts required for RO System

The basic requirement for ro system is food grade plastic pipe ¼".Table no.2 and 3 shows the different accessories and spare parts required for a domestic ro system. These tables are shows specifications, uses and cost also.

Table no.2 Tools & Consumable Accessories required for RO System

Tools required for RO System				Consumable Accessories for RO System			
Name of Tools	**Use**	**Picture**	**Price INR**	**Name of Accessories**	**Use**	**Picture**	**Price INR**
Digital TDS Meter	For measuring the Total dissolved solids in water		**300-500**	**Spun Filter& Chlorine Balls**	Water filter		**50-60 Each ball @5/-**
Wrench Spanner	For Opening Pre filter bowl and Membrane housing		**30-50**	**Pre & Post Carbon filter, Sediment filter**	Water filter		**365**
Screw Driver	For opening back cover of RO system		**30-100**	**Membrane & FR-450**	Remove ions, molecules and larger particles from drinking water		**650 150**
Multi Meter	For measuring Voltage of Supply		**120-200**	**UV Filter**	Water filter		**180**

Table no.3 Spare parts for RO System

Name of Spare Part	Specifications	Picture	Price INR
DC Power Supply	24V, 2.5 Amp, Input 150-270V AC		**300**
Low Pressure Switch	Integrated with ¼'' quick fit Connector		**200**
Controller valve	Manual TDS controller		**100**
Solenoid Coil	Orifice 2.5 mm, 24V DC		**200**
Water booster Pump	24 V,75-100 GPD		**1200**

Water Tank float valve	Float valve with micro switch		**100**
Water Tap for Tank	Plastic ½" water tap with washers		**50**
UV Filter System	UV Lamp, UV Barrel, UV Choke		**500**

[b] Construction and Working:-

Circuit diagram of a domestic RO system has been shown in Figure 1. In this, the spun filter is connected to the pump by the pre carbon filter, solenoid coil with a ¼" plastic pipe. The output of the pump is given to the sediment filter. Its output is given to membrane in the form of input. Membrane has two outputs, one bottom and the second one upward. The bottom output of membrane is given as input of post carbon filter. The output of this is given to water storage tank. Where pure and filter water is stored for drinking. The second upward output of membrane is given to Flow reject valve. The garbage gets out of the water RO system. This waste water is then used for other purposes like washing clothes, giving water to plants etc.

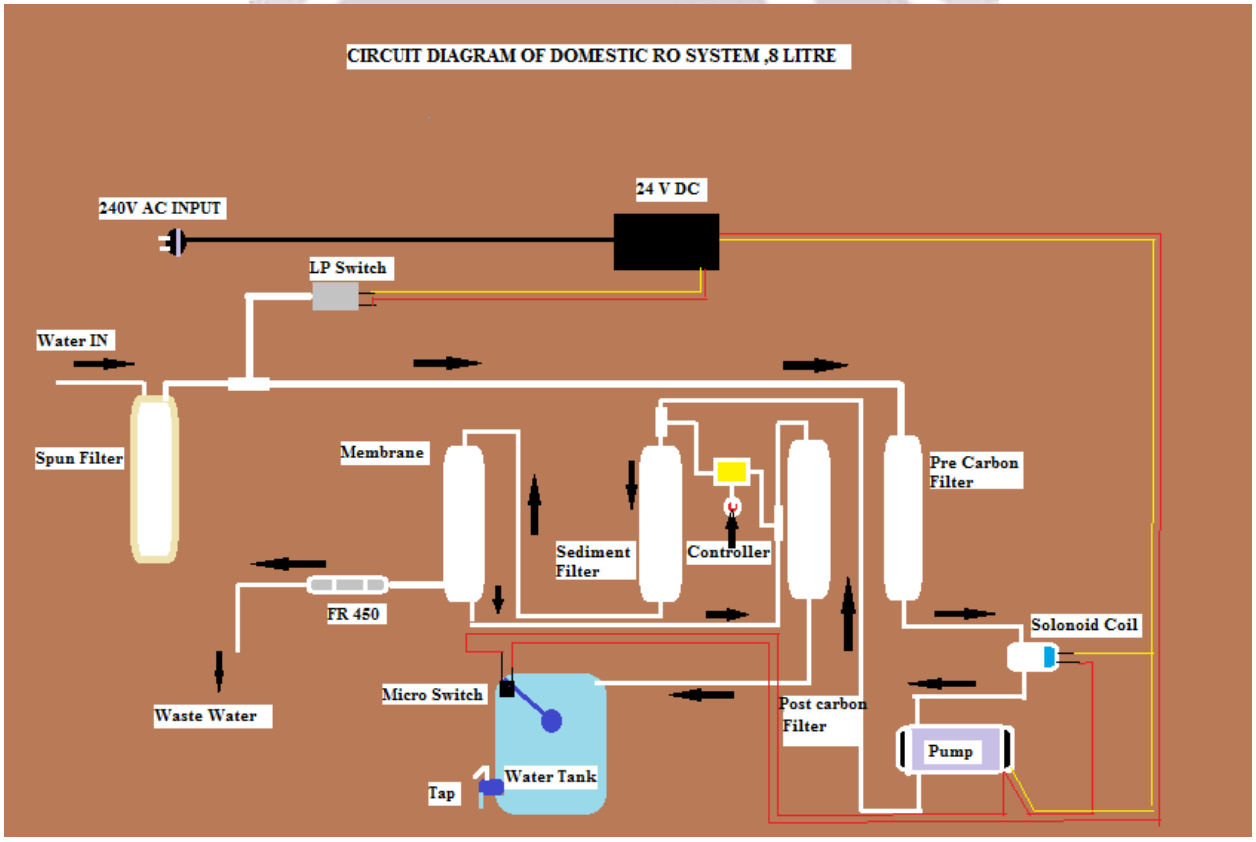

Fig.1

Basically RO system works on the pressure of booster pump. Booster pump requires 24 V DC supply and 2.5 Amp current. Hence there is a 230V AC/24V, 2.5 A DC power supplies which is connected to pump as well as low pressure switch, solenoid coil and micro switch. The low pressure switch is connected with water line as shown in circuit and gives signal when there is a low pressure of water in this pipe line. Similarly solenoid coil gives signal to operate booster pump when there is a sufficient pressure of water in pipe line. There is a micro switch in a water storage tank which is connected with dc power supply and input supply of booster pump. This switch controls water level in storage tank. When tank is filled with water then it give signal to stop the pump. There is a Controller valve between post carbon filter and sediment filter as shown in circuit diagram. Which is

used to controls the total dissolve solids in water. Also there is a tap in water tank to drain pure water for drinking.

[d] Maintenance Tips:-

[1] Wash Spun Filter and its holder with clean water every month.
[2] Replace Spun Filter after every three months and refill chlorine balls.
[3] To keep low wastage of water, check a water leakage from RO system time to time.
[4] Use proper tools to open membrane and spun filters.
[5] Wash water storage tank with clean water every month.
[6] Check TDS value of water time to time with TDS meter it should be in between 100-300.
[7] Replace all the filters together with membrane when required.
[8] To get the pipe out from any pipe elbow, press lock of pipe elbow in opposite direction by thumb and then pull the pipe

5. MAINTENANCE TIPS FOR MICRO WAVE OVEN

[1] One of the easiest ways to extend the longevity of microwave is by cleaning it regularly. Most foods and liquids can be removed with warm soap and water or a specialized microwave oven cleaner.
[2] Only use microwave-safe dishware and never put the Aluminum foil, Metal and dishware with Silver and Gold accents items into a microwave.
[3] Open the microwave door only by switching it off. Pulling the door open while the microwave is running, meanwhile, can result in a blown safety fuse. Closing the door carelessly may damage the switches.
[4] Running a microwave without anything inside it can cause serious damage. When a microwave is empty, the energy the microwave produces must be absorbed by its own components, such as the glass or the Magnetron that produces the energy. These components are not designed to withstand this kind of exposure, and repairing or replacing them can be expensive. If you like to use your microwave as a timer, most microwaves have separate timer functions that count the time without producing any internal energy.
[5] Try Preprogrammed Cooking Times.

6. MAINTENANCE TIPS FOR MIXER JUICER GRINDER (MIXEY)

[1] As the mixer grinder is used regularly for mixing dry and wet ingredients among other things, cleaning it after every use is very important. Always rinse the jars thoroughly in water and dry them upside down.
[2] Always lock the jar properly before every use to avoid damage to the blades.
[3] Ensure that the speed goes from low to medium to high instead of starting it at full speed in the beginning. This ensures reduced pressure on the motor.
[4] Clean the cord with a damp cloth to get rid of moisture completely.
[5] The mixer grinder is stored in a secure location. Keep it out of reach of children as far as possible.
[6] To avoid electric shock, avoid running the mixer near places where there is water around.

7. MAINTENANCE TIPS FOR PC AND PERIPHERALS (PRINTER)

[1] Clean the computer and its peripherals time to time with a cotton cloth.
[2] Computer and its peripherals should be keeping covered.
[3] Upgrade the computer time to time.
[4] Do not always keeping the computer turn on, only turn on power when needed.
[5] Clean the printer and cartridges time to time.
[6] Take a print every 15 days.

8. SUGGESTIONS

[1] Turn off the power instead of remote if the TV has to shut down for a long time.
[2] In the larger equipment such as washing machines, refrigerators, water booster pump sets, should be earthed.
[3] Always use the branded company's equipment which has ISI Mark and Energy Rating.
[4] Always use Energy efficient electrical Appliances as recommended by Indian Bureau of Energy Efficiency.

[5] If you go out of the house for a long time then the refrigerators should be switched off.
[6] Always follows the instruction manual as prescribed by manufacture otherwise warranty will be lost.
[7] Do not use mobile while charging.
[8] Do not overcharge such as mobiles, Laptops etc.

9. CONCLUSION

My paper's objective is to write, how we can save both money and electricity by using home tips. By proper maintenance of equipment, their life can be increased. At the same time, we can be tension-free. Similarly, the RO system can save up to 1500 rupees per year by maintaining it at home. Accidents can also be avoided by adopting small tips and precautions. So by keeping the above explained procedure in mind you can maintain your RO system on your own and can save your money and health. Other electrical appliances can also be maintained by using the suggestions and tips described in this paper.

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