EVALUATION OF PHYSICOCHEMICAL PARAMETERS OF VARIOUS SAMPLES COLLECTED FROM KAKINADA

Dissertation Submitted in Project for the degree of B.Sc., chemistry

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EVALUATION OF PHYSICOCHEMICAL PARAMETERS OF VARIOUS SAMPLES COLLECTED FROM KAKINADA

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आपो हि ष्ठा मयोभुवः

CERTIFICATE

This is to certify that the project work entitled **"Evaluation of Physicochemical parameters of various samples collected from kakinada"**, was done by **Ms. Madhavarapu Manipriya, B.Sc., Chemistry** with register number **1931010** in the Department of Chemistry, A.S.D.GOVT. DEGREE COLLEGE for Womens (A), kakinada.

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This is to certify that the project work entitled **"Evaluation of Physicochemical parameters of various samples collected from kakinada"**, was done by **Ms. Gullela Rajeswari, B.Sc., Chemistry** with register number **1931030** in the Department of Chemistry, A.S.D.GOVT. DEGREE COLLEGE for Womens (A), kakinada.

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Scientist- B

A GLANCE OF THE ACTIVITIES AND FACILITIES OF NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE, Uttarakhand

"Committed to the science of water resources development."

Mission:

Providing innovation and effective science and technology for hazard free sustainable development and management of water and water related studies.

With this Slogan, the National Institute of Hydrology is progressing in conducting Research and Management studies of the Nation.

Introduction:

The National Institute of Hydrology was set up in 1978 with its headquarters at Roorkee, Uttarakhand. It is an autonomous body under the Ministry of Jal Shakti, Govt. of India. It is the apex body for research and development in the area of hydrology in the country.

Regional centers:

To study hydrological problems of various agro climatic regions of the country, the Institute has established Six Regional centers as follows:

1 Hard rock Regional center, Belgaum, Karnataka
2 Western Himalayan Regional center, Jammu, Jammu & Kashmir
3 Northeastern Regional center, Guwahati, Assam
4 Center for Flood Management studies, Patna, Bihar
5 Deltaic Regional center, Kakinada, Andhra Pradesh
6 Central India Hydrology Regional center, Bhopal, Madhya Pradesh

The Scientific Divisions existing at Roorkee :

a) Environmental hydrology
b) Groundwater Hydrology
c) Hydrological investigations
d) Surface Water Hydrology

e) Water Resources systems
f) RMOD Division

Infrastructure and Facilities available at Deltaic Regional Center, Kakinada:

The Deltaic Regional Center of NIH located at Kakinada is having a lot of facilities in doing Basic and Advanced Research in Hydrology with Water quality laboratory, soil laboratory and Remote sensing laboratory with latest software.

Laboratories:

Remote Sensing Center
Water Quality Laboratory
Soil Laboratory
HM Observatory

Water Quality Laboratory Capabilities:

Assessment of surface water pollution
Groundwater quality and aquifer contamination
Monitoring of drinking water and irrigation water
Point and non point sources of pollution
Transport and deposition of pollutants
Specifications of major ions and Nutrients

Infrastructure of the Water Quality Lab:

Portable Water Quality Kit
Microprocessor conductivity meter
Micro processed thermometer
Mini current meters
Universal current meter
PH meter
Digital turbidity meter
Signal Tracking Resistivitymeter
Electronic balance
UV-Vis Spectrophotometer
Flame Photometer
DO meter

BOD incubator and
Compass, Clinometer etc. devices.

Remote Sensing and GIS Center Capabilities:

Estimation of soil erosion
Rainfall-runoff prediction
Soil salinity and water logging
Sedimentation in reservoirs
Inundation of flood plains
Water balance
Watershed management

Softwares available in the Remote Sensing Center:

ERDAS (Earth Resources Data Analysis System)
ILWIS (Integrated Land and Water Information System)
GIS Softwares: Arc view, Arc info and Map Info
Satellite Imageries –IRS, LISS II, FCC, (1: 2,50,000) –1989

Soil Water Laboratory Capabilities:

Evaluation of in-situ hydrological physical and optical properties of soils.
Soil textural classification
Estimation of physical chemical and spectral characteristics of soils
Soil moisture monitoring
Measurement of coefficient of permeability of undisturbed soils

Equipment of Soil Water Laboratory:

Guelph permeameter
Pressure plate apparatus
Soil moisture meter
Sieve Analysis
Infiltrometer

Hydrometeorological Observatory:

The Regional center has been maintaining the Hydrometeorological Observatory in the campus and measuring most of the weather parameters in Kakinada since 1996.

The Infrastructure available at the Observatory are:

Ordinary Rain Gauge
Self-Recording Rain Gauge
Pan evaporimeter
Wet bulb and dry bulb Thermometers
Anemometer
Wind vane
Minimum and Maximum Thermometers

The Weather Parameters measured in the observatory are:

Rainfall
Maximum and Minimum Temperatures
Wind velocity
Wind direction and
Relative humidity.

Library:

The institute has established a good reference library. A large number of textbooks, scientific journals, documented computer programs, technical reports on Hydrology etc are available.

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Firstly I would like to thank the Almighty, as he gave me the serenity to accept the things I cannot change, courage to change the things I can and wisdom to know the difference. I would like to render my gratitude to Dr.Y **R. Satyaji Rao, Scientist-G & Head at NATIONAL INSTITUTE OF HYDROLOGY, DELTAIC REGIONAL CENTRE, Siddhartha Nagar, Kakinada** for his esteem guidance in my work.

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- **SOURCES OF CONTAMINATION IN THE COASTAL AQUIFERS:**

In general, the sources and processes of contamination in the Coastal areas may be due to:

1. Land disposal of solid wastes
2. Sewage disposal on land
3. Agricultural activities
4. Urban runoff and polluted surface water bodies like- tanks, salt water creek, leaking drains etc.

Land disposal of solid wastes:

Solid wastes [mostly garbage and industrial waste] are disposed of in landfills where it decomposes and produces a leachate that can contaminate underlying groundwater. The amount of leachate produced in the landfill depends on the amount of distribution of rainfall, hydraulic conductivity of soil cover etc. If the soil is impermeable, percolation of leachate to underlying groundwater is retarded. Landfills are a point source of contamination and the leachate movement in the sub soil forms a narrow band or plume, unless of course, the groundwater is stagnant.

Sewage disposal on Land:

Sewage enters the ground intentionally from septic tank outlets, cesspools and systems where sewage is applied to land for crop irrigation, gardening etc. Unintentional entry of sewage into the groundwater may be due to leakage from sewers, sewage, lagoons, domestic waste water etc.

Agricultural activities:

Modern agriculture is based on extensive use of fertilizers and pesticides to obtain a high yield of crops. Some of the chemicals applied to farmland, however, move down with the deep percolating water from the root zone and can contaminate underlying groundwater. Manure piles, feedlots and similar concentrations of animal waste are other possible sources of groundwater contamination. Deep percolation water from irrigation fields in arid regions tends to have high salt concentration, which adversely affects underlying groundwater. In humid areas, the major contaminant is Nitrate.

Urban runoff and polluted surface water bodies:

Many streams receive municipal and industrial wastewater. Seepage of such water into underlying groundwater may adversely affect the groundwater quality. Urban runoff with dissolved contamination may infiltrate directly into the ground and reach the groundwater.

Sources of Pollution in the study area:

The mechanism of groundwater pollution is quite different from the surface water and is more complicated. The process of groundwater is much slower and the time lag between pollution discharge at land surface and reaching of pollutants into groundwater takes several years. According to the World Health Organization estimate, about 80% of waste pollution in a developing country like domestic waters and irrigation cause India to return flows. Especially the intrusion of saltwater into the aquifer system in coastal regions depends on the exploitation of groundwater. The intruding salt water makes large zones of the aquifer unsuitable for mankind.

The sources of pollution vary with time and space. Especially the groundwater in the coastal regions may be polluted mainly due to salt water intrusion, cyclonic storms, drainage congestion, backwater of the sea through river systems, aquaculture, age old unused tanks, industrial contamination etc.

The main source of pollutant in the study area may be due to the rapid development of built up areas in the city, and consequent release of domestic waste, seepage from septic tanks etc, are polluting the groundwater. Extensive pollution may be due to the nearby agriculture practices, which may be polluting the groundwater, as more and more fertilizers are being used for over irrigation.

Water Quality Training at Deltaic Regional Center

- **INTRODUCTION:**

The term water quality has an extremely broad spectrum of meaning since the desirable characteristic of water varies with its intended use.

Man has brought about changes in the water quality through urbanization and growth of population centers or by introduction of industries and employment of auxiliary means in agriculture, which has disturbed or even destroyed the natural healthy quality of water bodies in many regions.

There are three basic ways to evaluate the quality of water viz. the Physical, Chemical and Biological levels in the water. In many instances a combination of chemical analysis is needed to obtain a reasonably accurate picture of the quality of water.

The purpose of analysis is to know the exact composition of the sample at the particular point of time of sample collection and to assess the surveillance of quality and to assess whether the water is fit for basic needs or not.

Parameters:

The choice of parameters to be tested is closely linked to the objective of the water quality. Table No.1, lists the major ions and physical parameters which will provide considerable information on the quality. These parameters may be used for interpretive studies with respect to the chemical quality of water for domestic and industrial water supplies and other uses.

TABLE NO. 1: PHYSICAL CHARACTERISTICS AND SOME MAJOR IONS AND INSTRUMENTATION

Parameter PHYSICAL CHARACTERISTICS:	Method	Instrumentation/apparatus
pH		pH meter
Temperature		Thermometer
Color	Colorimetric	Spectrophotometer
Conductivity	Electrical	Conductivity Meter
Turbidity	Turbid metric	Turbid meter
Residue (TDS)	Gravimetric	Volumetric glassware
MAJOR CATIONS:		
Calcium	Titration	Volumetric glassware
Magnesium	Titration	Volumetric glassware
Sodium	Flame emission	Flame Photometer
Potassium	Flame emission	Flame Photometer
MAJOR ANIONS:		
Carbonate	Titration	Volumetric Glassware
Bicarbonate	Titration	Volumetric glassware
Sulphate	Turbidimetric	Turbidimeter/VIS-Spectro photometer
Chloride	Titration	Volumetric glassware
OTHERS:		
Nitrate	Color development with absorption measurement	UV-VIS Spectrophotometer
Silica	Color development with absorption measurement	UV-VIS Spectrophotometer

The accuracy of the analyses may be determined by comparing the sum of anions in equivalents per million (epm) with the sum of the cations in epm (ionic balance). The percent error may be calculated as follows:

$$\text{Percent error} = \frac{\text{sum of cations (epm)} - \text{sum of anions (epm)} \times 100}{\text{Total ions (epm)}}$$

Analytical results in mg/L are converted to epm by dividing the actual concentration of the ion in mg/L by the equivalent weight of the ion. Percent error should be within the limit of 10%.
Some Nutrients and Organic matter in the water bodies are listed in Table No. 2.

TABLE NO. 2 : SOME NUTRIENTS AND ORGANIC PARAMETERS

Parameter	Method	Instrumentation /apparatus
NUTRIENTS:		
Phosphate	color development with absorption measurement	VIS Spectrophotometer
Inorganic Nitrogen (Nitrate, Nitrite etc.)	color development with absorption measurement	UV Spectrophotometer
Nitrogen	titration	Nitrogen digestion
WASTES:		
Dissolved Oxygen (DO)	Fixation and titration	Volumetric glassware
Biochemical Oxygen Demand (BOD)	Incubation and titration	Incubator and volumetric glassware
Chemical Oxygen Demand (COD)	Refluxing and titration	Volumetric glassware
Total Organic	Ignition	Total Organic

Carbon (TOC)	carbon Analyser

These indicate nutrient concentration in water, thereby providing information on the potential or vegetation growth and oxygen depletion in the water source. These measurements provide essential information on nutrient loading from industrial, municipal and other sources to rivers, lakes and oceans. Bacteriological assessment of water should also be considered for water resources studies.

The Heavy metals, which are not at all required in water and they are nuisance to the human body, when gone through drinking water. Major Heavy metals are listed in Table No. 3

TABLE NO 3 : HEAVY METALS AND TRACE ELEMENTS

Parameter	**Method Instrumentation**
Cadmium	Atomic absorption Atomic Absorption
Calcium	measurements
Spectrophotometer	
Chromium	
Copper	
Iron	
Lead	
Magnesium	
Manganese	
Mercury	
Nickel	
Silver	
Strontium	
Zinc	

Table 4:

Indian 'Standard drinking water specification			
Sl.No	Substance or Characteristic	Requirement(Desirable)	Permissible Limit
ESSENTIAL CHARACTERISTICS			
1	Colour, Hazen units,max	5	25
2	Odour	unobjectionable	..
3	Taste	Agreeable	..
4	Turbidity, NTU, max	5	10
5	pH value	6.5 to 8.5	No relaxation
6	Total Hardness (as CaCO3)	300	600
7	Iron (as Fe), mg/l, max	0.3	1
8	Chlorides (as Cl), mg/L, max	250	1000
9	Residual, free Chloride mg/l, min	0.2	..
DESIRABLE CHARACTERISTICS			
10	Dissolved Solids, mg/l, max	500	1000
11	Calcium (Ca), mg/l, max	75	200
12	Copper (Cu), mg/l, max	0.05	1.5
13	Manganese((Mn), mg/l, max	0.1	0.3
14	Sulphate (SO4) mg/l , max	200	400
15	Nitrate (NO3), mg/l, max	45	100
16	Fluoride (F), mg/l, max	1	1.5
17	Phenolic Compounds (as C6H5OH),	0.001	0.002

	mg/l, max		
18	Mercury (Hg), mg/l, max	0.001	No relaxation
19	Cadmium (Cd), mg/l, max	0.01	No relaxation
20	Selenium (Se), mg/l, max	0.01	No relaxation
21	Arsenic (As), mg/l, max	0.05	No relaxation
22	Cyanide (CN), mg/l, max	0.05	No relaxation
23	Lead (pH) mg/l, max	0.05	No relaxation
24	Chromium (as Cr+5) mg/l, max	0.05	No relaxation
25	Zinc (Zn) mg/l, max	5	15
26	Alkalinity, mg/l, max	200	600
27	Aluminum (as Al), mg/l, max	0.03	0.2
28	Boran, mg/l, max	1	5

The following Parameters/ Nutrients measured at the Deltaic Regional Center, National Institute of Hydrology Laboratory as a part of the Project work.

Physical parameters: Color, Temperature, Transparency, Turbidity and Odour.

.Chemical Parameters : pH, Electrical Conductivity (E.C), Total Solids (TS), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Hardness, Calcium Hardness, Magnesium Hardness, Nitrates, Phosphates, Sulphates, Chlorides, Dissolved Oxygen (D.O), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Fluorides, Free Carbon-di-oxide, Potassium and Sodium.

Heavy metals: Lead, Copper, Nickel, Iron, Chromium, Cadmium and Zinc.

- SAMPLING AND ANALYSIS:

Sampling is the first, of the series of steps leading to the generation of water quality data and is a very important one. Care must always be taken to ensure a sample that is truly representative. Further, the integrity of the sample must be maintained from the time of collection to the time of analysis. If the sample has changed in chemical composition between sampling and analysis, due to delay, all care taken to provide an accurate analysis will be lost.

Sample handling and preservation

Thoroughly cleaned plastic or glass bottles fitted with screw caps may be used for water samples collected with depth integrating samples. Plastic containers are generally preferred for inorganic samples and glass for organic samples because they introduce interference and have sorption characteristics.

In general, the shorter the time that lapses between the collection of a sample and its analysis, the more reliable will be the analytical results. However some samples can be satisfactorily preserved by chilling or by adding suitable acid. Because for certain constituents immediate analysis is required, else the composition of the sample certainly will change.

Determination of Temperature, pH, Specific Conductance and dissolved gasses should be made in the field. Samples for metal analysis can be preserved by addition of nitric acid. Samples for organic constituent determination by chilling or freezing and samples for the determination for such biodegradable substances as nitrates, phosphates and surfactants by storing the sample in the dark at a temperature just above freezing until the analysis are made.

To determine concentration of dissolved inorganic constituents in a water system, the sample must be filtered through a 0.45μm average pore diameter membrane filter immediately after collection. It is advisable to discard the first 150

to 200ml of filtrate in order to rinse the filter and filtration apparatus of any contaminating substances

This technique minimizes the risk of alteration of the composition of the sample by the filtering operation. The filtrate collected in a suitable bottle is immediately acidified to pH 2.0 or less with nitric acid whose purity is consistent with the measurement to be made. Acidifying the filtrate minimizes the risk of precipitation of dissolved constituents and also inhibits adsorption of constituents by the walls of the bottle.

Total 9 samples were collected in and around kakinada and analyzed for various Physical and chemical parameters.

Table No.15: List of Observation samples in the study area

S.No	Sample No.	Sample Location and type
1	1	M.S.N Charties (Ground water)
2	2	Cholangi(Bore water)
3	3	Ghati (Municipal water)
4	4	Detail regional Centre, Siddarth nagar (Tap water)
5	5	Turangi (Ground water)
6	6	Jagannaickpur (RO water)
7	7	Penuguduru (Ground water)
8	8	Postal colony (Dug well)
9	9	College campus (Tap water)

PHYSICAL PARAMETERS:

pH:

Multi-parameter water quality checker enables to measure and indicate the monitoring result simultaneously up to 11 parameters with one unit. Auto-calibration feature provides hassle free calibration of pH, dissolved oxygen, conductivity, turbidity and depth.. Shock resistant cover designed for rough treatment in the field and is easily cleaned. Cable can be easily connected and disconnected with quick-connect fitting.

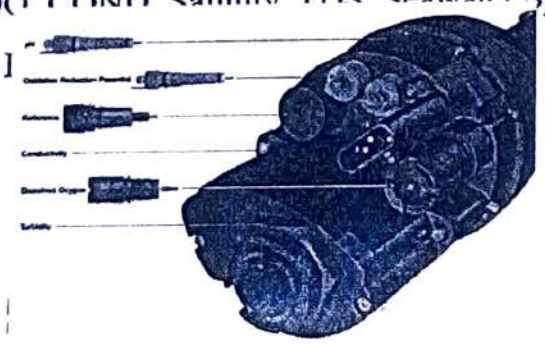
Data Management

Auto hold function freezes average data values on the screen to offer more time to verify or transcribe data. Diagnostic functions notify the user of errors. Integral USB connection for data transfer to a PC. USA cable is sold separately and includes software. Selectable measurement units allow the operator to report data without the need to convert data to desired units of measure.

Sensor Probe Unit

Multiple Sensors Housed in Each Probe

Multiple sensors allow for the measurement of 11 parameters simultaneously (pH, pH(mv), ORP, DO, COND, Salinity, TDS, Seawater Specific Gravity, Temperature, Turbidity, Water l



CHEMICAL PARAMETERS:

Total Alkalinity: Take 10ml of sample in conical flask then add 2 drops of phenolphthalein indicator. If the sample turns to pink (CO3 hardness) and then nitrate with N/50 sulphuric acids until it turns to colourless. and then add 2 or 3 drops of Methyl orange indicator(sample turns to yellow) then nitrate with N/50 sulphuric acids then sample turns to light orange . Then note down the burette reading and apply it in the formula.

Alkalinity=Burette reading ×1000/volume of sample taken

Reagent:

- **N/50 Sulphuric acids**: Take 1ml of Conc. H2SO4 and add 35ml of distilled water to make 1N H2SO4. Then take 1ml of 1N H2SO4 and make up to 50ml to prepare N/50 Sulphuric acids.
- **Phenolphthalein Indicator**:. Take 0.5grams of Phenolphthalein and dissolve in 50% Alcohol.

TOTAL HARDNESS(TH):. The calculation of hardness in water by EDTA titration can be found by adding a small amount of a dye such as Eriochrome Black T is added to an aqueous solution containing Ca++ and Mg++ ions at a pH of 10 ± 0.1, Ca++ and Mg++ form chelated complexes of wine red color with EBT.

But EDTA has a stronger affinity towards Ca++ and Mg++. Hence, if EDTA is added, the former complex (Ca-EBT and Mg-EBT)is broken and a new complex (Ca-EDTA and Mg-EDTA) of blue color is formed. When all the ions are complexed the solution will turn blue. This is the endpoint of the titration. The higher the pH, the sharper the endpoint.However, above pH 10 there is a danger of precipitation of CaCO3 and Mg(OH)2. Hence the pH is fixed to 10 ± 0.1. The

sample is diluted with distilled water to reduce the concentration of Ca++ and Mg++ ions.

. Alkalinity=Burette reading ×1000/volume of sample taken.

Reagent:

- **Buffer Ammonia**: Take 6.75 grams of Ammonium chlorides and dissolved in 57ml of Ammonium Hydroxide(Liquid Ammonia)and make up to 100ml with distilled water.
- **EDTA**(Methyl Diamine tetra acetic acid disodium salts):. Take 2 grams of EDTA and 0.05 grams of magnesium chlorides, dissolved in distilled water and make up to 500ml.
- **Eriochrome Black**:. Take 0.5 grams of Eriochrome black-T and 4.5 grams of Hydroxylamine hydrochloride and dissolved in 100ml of 70% Ethanol.

CALCIUM AND MAGNESIUM:

Calcium and magnesium can be determined by titration methods.

Procedure: Take 0.01M EDTA solution in burette then Take 10ml sample in conical flask and add 0.5ml NaOH solution and add a lunch of murexide indicator then solution turns link to purple. Note the burette reading.

Calcium hardness=volume of EDTA consumed ×Molarity of EDTA×100×1000/ volume of sample taken..

Calcium as Ca+2= volume of EDTA consumed ×Molarity of EDTA×40×1000/ volume of sample taken.

Magnesium as Mg +2=TH-Ca Hardness ×0.243

Reagent:

- **1N NaOH**:Take 4 grams of NaOH and make up to 100ml distilled water.
- **Muroxide indicator**:. Take 0.5 grams of murexide pure and mix with 100 grams of NaCl.
- **EDTA**:Take 3.723 grams of EDTA and make up to 100ml of distilled water.

CHLORIDES:

The presence of chlorides in natural waters can mainly be attributed to dissolution of salt deposits in the form of ions (Cl-). Otherwise, high concentrations may indicate pollution by sewage, industrial wastes, intrusion of seawater or other saline water. It is the major form of inorganic anions in water for aquatic life. High chloride content has a deleterious effect on metallic pipes and structures, as well as agricultural plants. They are calculated by the Argentometric method.

Principle: In alkaline or neutral solution, potassium chromate indicates the endpoint of the silver nitrate titration of chlorides. Silver chloride is quantitatively precipitated before the red silver chromate is formed..

Procedure: A known volume of filtered sample (50ml) is taken in a conical flask, to which about 0.5ml of potassium chromate indicator is added and titrated against standard silver nitrate till silver dichromate (AgCrO4) starts precipitating.

Reagents:

Potassium chromate indicator solution: 50g of potassium chromate is dissolved in a minimum amount of distilled water and silver nitrate is added drop

wise till a red precipitate is formed. The mixture is allowed to stand for about 12 hours and diluted to 1000ml with distilled water.

- **Silver nitrate solution (0.014N):** 2.395g of silver nitrate is dissolved in distilled water and made up to 1000ml.

The instruments used in the NIH Laboratory for measuring the Electrical Conductivity and the Nutrients (Nitrate, Sodium and Potassium) are discussed. They are:

1.Digital Conductivity meter

2.Flame Photometer

3. UV-VIS Spectrophotometer

Flame Photometer:

Flame Photometer is an instrument with which it is possible to estimate, with speed

and accuracy, minute quantities of sodium (Na), Potassium (K) in the water sample.

Principle:

Flame Photometer is an instrument with which it is possible to estimate minute

quantities of Sodium (Na), Potassium (K), and Calcium (Ca). The solution under analysis is sprayed as a fine mist into a non-luminous flame, which becomes coloured according to the characteristic emission of the metal. A very narrow band of wavelength corresponding to the element being analyzed is selected by a light filter and allowed to fall on a Photodetector whose output is a measure of concentration of the element. The output of the Photodetector connected to an electronic metering unit to provide the readout. Before analyzing the unknown solutions, the system is standardized with solutions of known concentration.

The total system consists of:

1. Burner unit 2. Compressor unit and 3. Electronic metering unit. The burner unit is really the main unit of the Flame photometer. It consists of any atomizer (for aspiration of solutions), mixing chamber, burner, optical lens, light filter photodetector and control valves.

Operation:

Compressed air from the compressor unit is applied to the atomizer. Due to a draught of air at the tip of the atomizer, the sample solution is sucked in and enters the mixing chamber as a fine-atomized jet. Liquid *Petroleum – Gas (LPG)/Laboratory gas from a suitable source is also injected into the mixing chamber at a controlled rate. The mixture of gas and atomized sample is passed on to the burner and is lignite. The emitted light from the Flame is collected by a lens and is passed through an appropriate filter (selectable for different elements). The filtered light is then passed on to energize a sensitive photodetector, the output which is applied to the electronic metering unit for readout.

UV-VIS SPECTROPHOTOMETER:

UV-VIS spectrophotometer works on the principle of spectrophotometry based on Beer – Lambert Law.

Operation:

Decide the spectrum depending on the wavelength at which the measurement is to be carried out. Then the light beam of selected wavelength in Ultraviolet or visible spectrum from the light source module gets focused on the entrance slit of the 'monochromator' module. The incident beam of light gets turned to push-button settable wavelength by motorized slewing of the holographic grating in Czery-Turner mount and reflecting optics and emerges as a monochromatic light of

narrow band width from the exit slit of the monochromator. Transmitted portion of this monochromatic light through the medium in the cuvets located in the sample compartment is detected by photodetector. The output of detector Preamplifier module is processed in the electronics module and the absorbance /concentration/ Transmission of the medium is displayed on the read out of the instrument.

ELECTRIC CONDUCTIVITY:

Conductivity is a measurement of water capacity for conveying electrical current and is directly related to the concentrations of ionized substance in the water.

Solutions of most inorganic acids, bases and salts are relatively good conductors. Conductivity measurements are commonly used to determine the purity of demineralized water and total dissolved solids in boiler & cooling tower water.

PRINCIPLE:

Specific conductance is a measure of the total concentration of ionized constituents of water. It is related to the sum of anions and cations specific conductance is reciprocal of the resistance between 2 electrodes 1-cm apart and 1 sq cm in cross section.

METHOD:

The method applied in the NIH Laboratory is conductivity cell potentiometric method to measure electrical conductivity of samples which are collected in and around the coastal aquifer of Kakinada.

APPARATUS:

A Conductivity meter which is capable of measuring conductivity with an error not exceeding 1% or 0.1ms/m is used.

REAGENT:

a) Conductivity water:

use distilled water boiled shortly before use to minimize CO2 content. Electrical conductivity must be less than 0.01ms/m

b) Standard potassium chloride solution, KCl (0.01M); Dissolve 0.7456gm anhydrous KCl in conductivity water and dilute to 1000ml at 25^0 C. This is the standard reference solution, which at 25^0 C has a conductivity of 1413 µmhos.

CONDUCTIVITY MEASUREMENT:

Rinse cells with one or more portions of the sample. Adjust temperature of a final portion to 25.0+_ 0.1c measure sample conductivity and note temperature. Calibrate the instrument with standard KCl solution by adjusting the conductivity to 1413 µmhos.

CALCULATION:

Conductivity at 25^0 C, µmho/cm $= \frac{Km \times C}{1+0.0191(t-25)}$

Where

Km = Measured conductivity, µmho at t^0 C

C = Cell constant, cm-1 and

t = temperature of measurement

Record the meter reading; the unit of measurement and the temperature of the sample at the time of reading report the electrical conductivity at 25^0 C.

POTASSIUM

Potassium is an abundant element and its common salts are highly soluble. It seldom occurs in high concentrations in natural water. Potassium concentrations in water are low partly because of the high degree of stability of potassium- bearing aluminosilicate minerals. Unaltered potassium feldspar grains occur in many sandstones.

The potassium ion is substantially larger than the sodium ion, and it would normally be expected to be adsorbed less strongly than sodium in ion-exchange reactions.

Potassium ions assimilated by plants become available for re-solution when the plants mature and die, or when leaves and other parts are shed at the end of the growing season. In the natural recycling that occurs in forests and grasslands, this potassium is leached into the soil by the gradual decay of the organic material. Some leakage of potassium to groundwater and runoff during these processes would be expected.

METHOD OF MEASUREMENT :

By means of Flame Photometric method trace amounts of potassium in water

samples are being measured by using a Flame Photometer.

REAGENTS:

(a). **Stock Potassium solution** : Dissolve 0.1907g of KCl dried at 110^0C and dilute to

100ml with deionized water.

(b) **Intermediate Potassium solution** : Dilute to 10.00ml stock solution with distilled

water to 100ml;

(c) **Standard Potassium solution** : Dilute 10 ml intermediate solution with distilled water

to 100ml.

PROCEDURE:

(I) Switch on the gas and maintain the gas fuel mixture so that the blue flame of

the saw tooth is seen through the viewing window.

(II) The sample is sprayed in to a gas flame and excitation is carried out under

carefully controlled and reproducible conditions. The intensity of light is measured by a phototube potentiometer.

(III) Prepare calibration standards of 2ppm, 5ppm and 10ppm ranges.

(IV) Prepare calibration curve from the above standards

(V) Measure the concentration of the water samples

(VI) Determine concentration of samples in ppm from the calibration curve.

Nitrate:

Nitrate is an anionic form of nitrogen that is strongly influenced by the vital importance of element plant animal nutrition.

Record the meter reading; the unit of measurement and the temperature of the sample at the time of reading report the electrical conductivity at 25^0C.

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Potassium is an abundant element and its common salts are highly soluble. It seldom occurs in high concentrations in natural water. Potassium concentrations in water are low partly because of the high degree of stability of potassium- bearing aluminosilicate minerals. Unaltered potassium feldspar grains occur in many sandstones.

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Nitrate:

Nitrate is an anionic form of nitrogen that is strongly influenced by the vital importance of element plant animal nutrition.

Nitrogen occurs in water as nitrite and nitrate (NO2 and NO3), in cationic form as ammonium (NH4) and at intermediate oxidation status as a part of organic solutes.

Sources of nitrate:

Concentrations of nitrate that approach or exceed 44 mg/L NO3 are present in many rural water supply wells. Most investigators have attributed this nitrate to drainage from nearby barnyards or septic tanks and cesspools. Farm animals produce considerable amounts of nitrogenous organic waste that tends to concentrate in places where large animals are confined. The occurrence of nitrate concentration in shallow groundwater is due to leaching from livestock corrals by rainfall. In past years, most investigators stated that high nitrate concentration. In ground water in extensive areas associated with animal feedlots.

The amount of nitrogen fertilizers used on agricultural land has increased greatly in recent decades and this has prompted considerable concern to possible resulting increases in nitrate in rivers and groundwater. The full import of leached fertilized nitrogen on ground water is slow to develop in many areas because transport of solutes through the unsaturated zone between the lard surface and the water table is low. In some soil profiles a substantial fraction of the transported nitrate was lost by denitrification

Adverse effects of high concentration of nitrate in drinking water:

Excessive concentration of nitrate in drinking water may cause methemoglobinemia in infants.. Concentrations in excess of 10 mg/L as N, equivalent to 44 mg/L of NO3 equidently causes this health hazard.

METHODS OF MEASUREMENT:

There are three methods available to measure nitrate concentration in water.

(1) Calculation from Ion selective electrode method.

(2) UV Spectrophotometric method.

(3) Sulphanilamide Spectrophotometric method.

By means of UV Spectrophotometric method trace amounts of nitrate present in water samples is measured, which are collected in and around coastal aquifer, Kakinada.

Reagents:

a. **Nitrate free water:** Use re-distilled or deionized water to prepare all solutions.

b. **Stock Nitrate Solution:** Dissolve 0.7218g KNO3, earlier dried in hot air oven at 105^{0}C overnight and cooled in desiccator, in distilled water and dilute to 1 L. Preserve with 2 ml of CHCl3 / L: 1mL = 100µg NO3 –N, stable for 6 months.

c. **Standard Nitrate Solution:** Dilute 100 ml of stock Nitrate solution to 1000mL with water, preserve with 2mL CHCL3 / I: 1mL = 10µg NO3 – N, stable for 6 months.

d. **Hydrochloric acid solution:** HCl,(1N): Cautiously add 83 ml conc. HCl to about 850ml of distilled water, cool it and dilute to 1 L.

Procedure:

a. Treatment of sample: Add 1ml HCl to 50-ml clear/filtered sample, mix.

b. Preparation of Standard Curve: Prepare calibration standards in the range of 0-7 mg NO3 – N/L, by diluting to 50 ml of the following volumes of standard solutions, add 1ml of HCl and mix it.

Nitrate Standard	1	2	4	7	10	15	20	25	30	35

Solution, ml

NO3 –N, mg/l 0.2 0.4 0.8 1.4 2.0 3.0 4.0 5.0 6.0 7.0

c. Spectrophotometric measurements: Read absorbance or transmittance against re-distilled water set at zero absorbance or 100% transmittance. Use a wavelength of 275 nm to determine interference due to dissolved organic matter

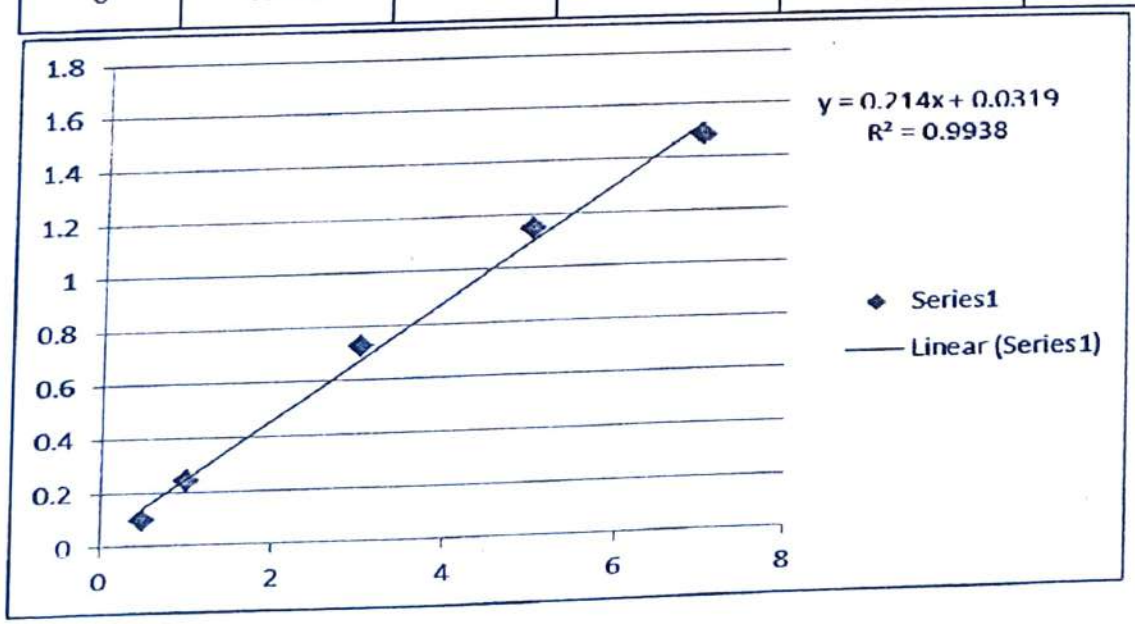
Calculation:

Measure absorbance of the Standards at 220 nm.. From a series of standards, plot a graph with absorbance versus standard nitrate concentrations. By using ORIGIN software draw the calibration curve and obtain the best-fit equation from the curve.

Now insert water samples in the Spectrophotometer and measure the absorbance at 220 nm. From the above calibration curve directly compute sample concentrations. If the sample absorbance values are exceeding the calibration limits, dilute the sample with distilled water and carry out the necessary correction while computing.

Nitrate calculation for Kakinada water samples Dt.6thMay,2022					
Standards	A at 220 nm	Dilution	N2 from graph	N2*Dil	NO3 ppm
ppm					
0.5	0.097	1	0.304205607	0.304205607	1
1	0.243	1	0.986448558	0.986448558	4

3	0.725	1	3.238785047	3.238785047	14
5	1.144	1	5.196723	5.196723	23
7	1.481	1	6.771495327	6.771495327	30
Sample Nos.					
1	0.616	1	2.729439252	2.729439252	12
2	0.439	1	1.902336449	1.902336449	8
3	0	1	-0.14906542 1	-0.14906542	0
4	0.69	1	3.075233645	3.075233645	14
5	1.046	1	8.944392523	8.944392523	39
6	0.207	1	0.818224299	0.818224299	4
7	1.767	5	8.107943925	40.53971963	178(OVR)
8	0.458	1	1.991121495	1.991121495	9



Results and Discussions:

:pH:.

pH is most important in determining the corrosive nature of water. Lower the pH value higher is the corrosive nature of water. The changes in pH of water is due to season, photosynthesis and respiration of aquatic plants, acid rains, increased Conc. of CO2 , dumping industrial range would be acceptable. In natural waters pH is governed by the equilibrium between carbon dioxide/bicarbonate/carbonate ions and ranges between 4.5 and 8.5 although mostly basic. It tends to increase during the day largely due to the photosynthetic activity (consumption of carbon-di-oxide) and decreases during night due to respiratory activity. Wastewater and polluted natural waters have pH values lower or higher than 7 based on the nature of the pollutant.

Salinity:

Freshwater from rivers has a salinity value of 0.5ppt or less. It is best to maintain Salinity of 1.026 for freshwater fishes. The marine water Salinity is about 35ppt. Evaporation of ocean water and formation of season ice both increase the salinity of the ocean.

Electrical conductivity(EC):

Electrical Conductance of water is a measure of its ability to carry Electric current as a RESUITS of dissolved salts in water. The conductivity measurements provide an indication of ionic concentrations. By introducing salts, chlorides, sulfides, carbonates, and other ions, the conductivity of water will increase as the concentrations of ions increase. Fresh water is usually between 0and 1,500µS/cm and typically season water has a conductivity value of about 5000µS/cm.

Total Dissolved Solids(TDS):

TDS values are also considered as important parameters in determining the usage of water. TDS is composed mainly of carbonates, bicarbonates, chlorides, phosphates and nitrates , calcium, magnesium, sodium, potassium, manganese , organic matter salts and other particles. High TDS values are not suitable for irrigation and drinking water is 600ms/ppm.

Water can be classified by the level of total dissolved solids (TDS) in the water:

Fresh water: TDS is less than 1,000 ppm

Brackish water: TDS = 1,000 to 10,000 ppm

Saline water: TDS = 10,000 to 35,000 ppm

Hypersaline: TDS greater than 35,000 ppm

Drinking water generally has a TDS below 500 ppm. Higher TDS Fresh Water is drinkable but taste may be objectionable.

Total Alkalinity(TA):.

Alkalinity is a measure of ability to neutralize acids. The value of total Alkalinity in water provides an idea of natural salts present in water.Total alkalinity (TA) is the measure of water's ability to neutralize acids. Alkaline compounds that are present in water, like hydroxides and carbonates, eliminate H^+ ions from the water,

which lowers the acidity of the water and results in a higher pH. Excess alkalinity gives bitter taste to water and reacts with cations farming precipitates, which can damage the pipes, values etc., A total Alkalinity of at least 20 mg/ L is necessary for good pond productivity. For drinking water the alkalinity should be 200 to 600 mg/L.

Total Hardness(TH):

Water hardness is a measure of the capacity of water to react with soap. Total Hardness of water is characterized by the content of calcium and magnesium salts. The carbonate hardness of pond or Take should ideally fall between 50 to 200ppm. The Standard values for drinking water of total hardness is 300 to 600 mg/l.

Dissolved Oxygen(DO):

Healthy water should generally have dissolved oxygen concentrations above 6.5-8 mg/L and between about 80-120 %.

DO present in drinking water adds waste and it is a highly fluctuating factor in water.

Ammonia and Nitrate:

Nitrates are essential plant nutrients but in excess amounts they can cause significant water quality problems. Together with phosphorus, nitrates in excess amounts can accelerate eutrophication, causing the types of plants and animals that live in the stream. The safe level for nitrate in drinking water is <10ppm and Ammonia is 0.25 to 32.5mg/L. The NIOSH Recommended Exposure Limit (REL) for ammonia is 25 ppm averaged over an eight-hour work day. NIOSH also says that there should be a Short Term Exposure Limit (STEL) of 35 ppm during any 15

minute period in the day. No worker should be exposed to more than that amount over any 15 minute period.

Calcium and magnesium:

The presence of calcium (fifth most abundant) in water results from passage through or over deposits of limestone, dolomite, gypsum and such other calcium bearing rocks. Calcium contributes to the total hardness of water and is an important micro-nutrient in aquatic environments and is especially needed in large quantities by molluscs and vertebrates. It is measured by the EDTA titrimetric method. Small concentration of calcium carbonate prevents corrosion of metal pipes by laying down a protective coating. But an increased amount of calcium precipitates on heating to form harmful scales in boilers, pipes and utensils.

Magnesium is a relatively abundant element in the earth's crust, ranking eighth in abundance among the elements. It is found in all natural waters and its source lies in rocks, generally present in lower concentration than calcium. It is also an important element contributing to hardness and a necessary constituent of chlorophyll. Its concentration greater than 125 mg/L can influence cathartic and diuretic actions.

Physical parameters							
sample No.	Location	Temp.	pH value	EC	DO	TDS	Salinity
1	M.S.N Charties (Ground water)	34.51℃	7.84	1779	5.93	891	0.89
2	Cholangi(Bore water)	33.84℃	7.71	4597	0.35	2299	2.42
3	Ghati (Municipal water)	34.46℃	7.54	2079	5.39	1039	1.04

4	Detail regional Centre, Siddarth nagar (Tap water)	35℃	7.57	1778	4.38	857	0.85
5	Turangi (Ground water)	34.71℃	7.47	2635	4.29	2635	1.37
6	Jagannaickpur (RO water)	34.41℃	7.95	74	2.56	34	0.03
7	Penuguduru (Ground water)	34.49℃	7.21	4716	2.68	2363	24.9
8	Postal colony (Dug well)	35.34℃	7.81	1088	1.42	544	0.53
9	College campus (Tap water)	35.51℃	7.44	6052	1.21	3028	3.23

Chemical parameters								
sample No.	Location	Total Alkalinity Mg/L	Total Hardness Mg/L	Chloride Mg/L	Ca Mg/L	Mg Mg/L	Na Mg/L	Nitrate
1	M.S.N Charties (Ground water)	520	384	240	32.08	7.387	165	12
2	Cholangi(Bore water)	492	600	1,020	16.04	136.08	685(OVR)	8
3	Ghati (Municipal water)	280	588	520	259.848	14.58	129	0
4	Detail regional Centre, Siddarth nagar (Tap water)	440	420	240	149.172	11.664	159	14
5	Turangi (Ground water)	548	408	420	232.58	41.796	211	39
6	Jagannaickpur (RO water)	52	80	60	8.02	14.58	7.5	4
7	Penuguduru (Ground water)	1,028	80	660	200.5	102.06	590(OVR)	178
8	Postal colony (Dug well)	320	600	132	120.3	72.9	84.3	9

9	College campus (Tap water)	600	188	1.428	184.46	34.02	945(OVR)	8

- **Conclusions:**

In and around kakinada, the pH value is about 7.21-7.95, EC is about 74-4597, DO values likely 0.35 to 5.93, TDS is about 34 - 3028mg/l, Salinity is 0.03 -24.9, the Alkalinity is about 52 -1,028 mg/l, Total hardness is 80 - 600 mg/l, Chloride ions is about 60 - 1,020, Calcium values present between 8.02 -259.848 mg/l, Magnesium values between 7.3872 - 136.08 mg/l , Sodium ions present between 7.5 - 945 mg/l.

Municipal water

Even though drinking municipal water isn't as healthy for you as drinking purified or filtered water, it's generally safe to drink. However, it's possible for certain contaminants to exist in the water, which can heighten your risk of developing certain health conditions and diseases. It's also important to understand that a small number of municipalities still send tap water through lead pipes, which can be highly damaging to a person's health. The main sources of municipal water include rivers, reservoirs, large wells, and lakes. The many different contaminants that can affect municipal water include:

Natural minerals and chemicals, Pesticides, Fertilizers, Wastewater releases, Sewer overflows, Various manufacturing processes. If there are too many contaminants within the water when you drink it, you could be at a higher risk of developing such health conditions as:

Reproductive issues, Neurological disorders, Gastrointestinal problems, Cardiovascular conditions.

Groundwater:

Over 50% of the United States population depends on groundwater for drinking water. Groundwater is also one of our most important sources of water for irrigation. Unfortunately, groundwater is susceptible to pollutants. Groundwater contamination occurs when man-made products such as gasoline, oil, road salts and chemicals get into the groundwater and cause it to become unsafe and unfit for human use.

Materials from the land's surface can move through the soil and end up in the groundwater. For example, pesticides and fertilizers can find their way into groundwater supplies over time. Road salt, toxic substances from mining sites, and used motor oil also may seep into groundwater. In addition, it is possible for untreated waste from septic tanks and toxic chemicals from underground storage tanks and leaky landfills to contaminate groundwater.

RO water:

Consuming reverse osmosis (RO) water for even a few months can create serious side effects, warns WHO. It has been scientifically confirmed that drinking reverse osmosis water causes more bodily harm and faster than most contaminants found in tap water. Reverse Osmosis (RO) systems to purify water are in use extensively. Besides the aqua companies that market RO water, personal water purifiers are also preferred by many households. The RO system of course removes water impurities. But they also remove 92-99% of beneficial calcium and magnesium!

After analysing hundreds of scientific studies concerning RO water, the World Health Organization states that such water has a definite adverse influence on the animal and human organism.

So, first preference is given to municipal water rather than ground water and RO water. Boiled municipal water is better to drink . If municipal water and Groundwater is not available, prefer RO water.

A PROJECT REPORT

on

WORKING OF AUTOMATIC ROOM LIGHT CONTROLLER

A Project Report submitted in partial fulfillment of requirement
for the award of degree of Bachelor of Commerce
B.Com., Computer Application

Submitted by

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2021-2022

A PROJECT REPORT
on
SMART BLIND STICK

A Project Report submitted in partial fulfilment of requirement for
the award of the Degree of Bachelor of Commerce
B.Com Computer Applications

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A PROJECT REPORT

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A PROJECT REPORT

On

ONLINE BAKERY SHOP

A project report submitted in partial fulfilment of requirement

for the award of the degree of Bachelor of Commerce

B.Com (Computer Applications)

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DEPARTMENT OF COMPUTER SCIENCE

A.S.D GOVT DEGREE COLLEGE FOR WOMEN

AUTONOMOUS

Affiliated to Adikavi Nannaya University, Rajamahendravram

JAGANNAICPUR, KAKINADA

2021-2022

A PROJECT REPORT

On

SMOKE & GAS DETECTOR

A Project Report submitted in partial fulfillment of requirement for the award of the Degree of Bachelor of Commerce
B.Com Computer Applications

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Affiliated to Adikavi Nannaya University, Rajahmahendravaram

Jegannaikpur, Kakinada

2021-2022

A PROJECT REPORT

ON

College webpage

A project report submitted in partial fulfillment of requirement

For the award of the degree of Bachelor of

B.Sc. Computer Science

Submitted by

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A.S.D GOVT DEGREE COLLEGE FOR WOMEN (A)

JAGANNAICKPUR, KAKINADA

2021-2022

A PROJECT REPORT
On

E-LIBRARY MANAGEMENT SYSTEM

A Project Report submitted in partial fulfilment of requirement
for the award of the Degree of Bachelor of Science
B.Sc. Computer Science

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2021-2022

A PROJECT REPORT
On

EYE BLINK SPECTS

A Project Report submitted in partial fulfilment of requirement
for the award of the Degree of Bachelor of Science
B.Sc. Computer Science

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2021-2022

A PROJECT REPORT
ON
SMART STICK

స్త్రీ విద్యా ప్రవర్ధతాం

A project report submitted in partial fulfillment of requirement
for the award of the degree of Bachelor of Science
B.Sc. Computer Science

Submitted by

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2021-2022

A PROJECT REPORT
On

HOME AUTOMATION

A Project Report submitted in partial fulfilment of requirement
for the award of the Degree of Bachelor of Science
B.Sc. Computer Science

Submitted by

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2021-2022

A PROJECT REPORT
ON
SMART STICK

స్త్రీ విద్యా ప్రవర్ధతాం

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2021-2022

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CERTIFICATE

This is to certify that the Project on **"SMART STICK"** was taken up by students of B.Sc. (Computer Science) under the able guidance of **Mrs. N.Naga Subrahmanyeswari**, Department of Computer Science, **A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)**, Jagannaickpur, Kakinada. The project work is completed in a systematic way.

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Project Guide
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Head of the Department

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External Examiner

ABSTRACT

The main aim of the project is to implement a simple method of detecting the obstacle by using an ultrasonic sensor that can detect an object with in a maximum range about 2 meters. As, blind people can't see, they face many problems while doing their daily life routines. This project will help the blind people and people with vision related problems to live their life freely. The Smart Stick has several features that surely can help this kind of people to detect the obstacles in an easier manner. The user just need to use the stick which is embedded with Ultra sonic sensor used to detect the obstacles. This stick detects the objects which are in the way and gives response to the user through a beep sound with the help of Arduino.

CHAPTER 1

INTRODUCTION

1.1 Smart Stick

The smart blind stick for the blind as the name suggests is a device for the visually impaired to guide the user to respective destination and avoiding to collide with the obstacles.it uses two ultrasonic sensors HC SR 04 to detect the depth below or the obstacles in between.

1.2 Introduction

Nowadays, visually impaired person suffer from serious visual impairments preventing them from travelling independently. Accordingly, they need to use a wide range of tools and techniques to help them in their mobility. One of these techniques is orientation and mobility specialist who helps the visually impaired and blind people and trains them to move on their own independently and safely depending on their other remaining senses. Recently, many techniques have been developed to enhance the mobility of blind people that rely on signal processing and sensor technology.

According to the literature, the mainly classified into two major aspects: sonar input (infrared signals, or ultrasonic signals). The way these devices operate just like the radar system that uses ultrasonic fascicle or sonar to detect the obstacle of fixed and moving objects. The distance between the person and the obstacles is measured by the time of the wave travel. However, all existing systems inform the blind of the presence of an object at a specific distance in front of or near to him. Information about the object characteristics can create additional knowledge to enhance space manifestation and memory of the blind. To overcome the abovementioned limitations, this work offers a simple, efficient, configurable electronic guidance system for the blind and visually impaired persons to help them in their mobility regardless of where they are, outdoor or indoor.

The originality of the proposed system is that it utilizes an embedded vision system of three simple ultrasonic sensors and brings together all reflective signals in order to codify an obstacle through PIC microcontroller (Arduino Uno R3).

1.3 Objective

A. To develop a prototype hardware for modern blind stick.

B. To help the blind people navigate the route at their best.

C. To reduce the risk of injuries and lost for the visually impaired person.

D. To creating a suitable software for the visually impaired person.

1.4 Problem Statement

a. Blind people can't easily recognize obstacles or stairs while using normal blind stick.

b. No safety features on the normal blind stick.

c. Can't locate the location of the normal blind stick user when they are having an emergency problem or lost in a public area.

1.5 Significance of Project

- To prevent and reduce the risk of injuries and lost of the visually impaired person.

1.6 Scope of Project

- Visual impaired person that having trouble to navigate.

1.7 Overview

The purpose of this project is to detecting the obstacle and route by using ultrasonic sensor that can detect a stair with maximum range about 2 meters. With our idea, we want to help this kind of people to live their life freely. This modern blind stick have a several feature that surely can help this blind people to navigate and detect an obstacle that surely can make their life routines easier. The user just need to use the blind the normal blind stick, the different is, visually impaired person can detect a stair more faster and easily.

1.8 IOT Definition

The Internet of things is a system of interrelated computing devices, mechanical and digital machines are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

The definition of the Internet of things has evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building

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Submitted by

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N.N.S. Eswari
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Abstract

The project presents the overall design of Home Automation System (HAS) with low cost and wireless system. It specifically focuses on the development of an IOT based home automation system that is able to control various components via internet or be automatically programmed to operate from ambient conditions. Is designed the development of a firmware for smart control which can successfully be automated minimizing human interaction to preserve the integrity within whole electrical devices in the home. Node MCU, a popular open source IOT platform, to execute the process of automation is used. Different components of the system will use different transmission mode that will be implemented to communicate the control of the devices by the user through Node MCU to the actual appliance. The main control system implements wireless technology to provide remote access from smart phone. The project using a cloud server-based communication that would add to the practicality of the project by enabling unrestricted access of the appliances to the user irrespective of the distance factor. It provides a data transmission network to create a stronger automation. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation. The status of the appliance is available, along with the control on an android platform. This system is designed to assist and provide support in order to fulfil the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home.

1.1 INTRODUCTION

Internet of Things (IOT) is a concept where each device is assigned to an IP address and through that IP address anyone makes that device identifiable on the internet. The mechanical and digital machines are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Basically, it started as the "Internet of Computers." Research studies have forecast an explosive growth in the number of "things" or devices that will be connected to the Internet. The resulting network is called the "Internet of Things" (IoT). The recent developments in technology which permit the use of wireless controlling environments like, Bluetooth and Wi-Fi that have enabled different devices to have capabilities of connecting with each other. Using a WIFI shield to act as a Micro web server for the Arduino which eliminates the need for wired connections between the Arduino board and computer which reduces cost and enables it to work as a standalone device. The Wi-Fi shield needs connection to the internet from a wireless router or wireless hotspot and this would act as the gateway for the Arduino to communicate with the internet. With this in mind, an internet based home automation system for remote control and observing the status of home appliances is designed. Due to the advancement of wireless technology, there are several different type of connections introduced such as GSM, WIFI, and BT. Each of the connections has their own unique specifications and applications. Among the four popular wireless connections that are often implemented in HAS projects, WIFI is being chosen with its suitable capability. The capabilities of WIFI are more than enough to be implemented in the design. Also, most of the current laptop/notebook or Smartphone come with built-in WIFI adapter. It will indirectly reduce the cost of this system.

HARWARE MODELLING AND SETUP

4.1MAIN FEATURES OF THE PROTOTYPE

The features of the developed prototype are:

- The prototype establishes a wireless remote switching system of home appliances.
- The prototype uses Wi-Fi to establish wireless control, which gives an indoor range to about 150 feet.
- The command to switch on and off an appliance can be given from radio buttons on the
- application from one's smartphone.
- There is also a provision developed to use voice commands on smartphone to remotely switch home appliances
- Any device capable of Wi-Fi connectivity can be used to control the prototype.
- The control over home appliances is obtained over secure connections, by SSL over TCP, SSH.
- Simple design easy to integrate into a verity of appliances and extend on further range.
- Displays the status of each appliances on the application in smartphone
- Cost effective.

A PROJECT REPORT
On

EYE BLINK SPECTS

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B.Sc. Computer Science

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ABSTRACT

Road accidents became a matter of concern due to the huge increase in traffic. The primary cause of accidents is due to the drowsiness of drivers in the night-time. Fatigue and drowsiness are some of the leading causes of major accidents on Highways. The only solution to this problem is detecting the drowsiness and alerting the driver.

Accidents due to driver drowsiness can be prevented using eye blink sensors. The driver is supposed to wear the eye blink sensor frame throughout the course of driving and blink has to be for a couple of seconds to detect drowsiness. Any random changes in steering movement leads to reduction in wheel speed. The threshold of the vibration sensor can be varied and accordingly action can be taken.

Drowsy detection using a camera based approach has a limitation of illumination, as the normal cameras do not work well at night when monitoring is more important. To overcome this limitation, an IoT based solution is proposed for this problem, which is called as an Eye Blink Sensor. The Eye blink sensor is an infrared sensor which continuously looks for variations in the reflected waves from the eyes and intimates that the eye has blinked. Through this Eye Blink Sensor, accidents caused due to Driver's drowsiness can be decreased to a considerable extent.

CHAPTER-1

INTRODUCTION

Road accidents became a matter of concern due to the huge increase in traffic. The primary cause of accidents is due to the drowsiness of drivers in the night-time. Fatigue and drowsiness are some of the leading causes of major accidents on Highways. The only solution to this problem is detecting the drowsiness and alerting the driver.

Drowsy driving is defined as operation of a motor vehicle while being cognitively in paired by a lack of sleep. According to the National Sleep Foundation, some of the drowsy driving signs are: difficulty focusing, yawning repeatedly or rubbing eyes, trouble keeping head up and drifting from lane. In recent years, driver drowsiness has been one of the major causes of road accidents and can lead to severe physical injuries, deaths and eco deaths and economic losses.

Accidents due to driver drowsiness can be prevented using eye blink sensors. The driver is supposed to wear the eye blink sensor frame throughout the course of driving and blink has to be for a couple of seconds to detect drowsiness. Any random changes in steering movement leads to reduction in wheel speed. The threshold of the vibration sensor can be varied and accordingly action can be taken.

Annually and worldwide, over 1.3 million people die each year on the road and 20 50 million people suffer non-fatal injuries due to road accidents According to National Sleep Foundation surveys, half of American adults consistently report that they have driven drowsy and 20% admit that they have actually fallen asleep at the wheel in the previous year. These statistics suggest that driver drowsiness is one of the most dominant causes for car accidents, injuries, deaths and economic losses. Hence, developing a system for monitoring drivers' drowsiness and alert the driver when he/she is not paying enough ttention to the road is a fundamental way to prevent accidents. However, drowsy detection sing a camera based approach has a limitation of illumination, as the normal cameras do ot work well at night when monitoring is more important. To overcome this limitation, Eye link sensor is proposed using IoT.

3.4 What is Arduino Nano?

Arduino Nano is a small, compatible open-source electronic development board based on an 8-bit AVR microcontroller. Two versions of this board are available, one is based on ATmega328p, and the other on Atmega168.

Arduino Nano can perform some functions similar to other boards available in the market, however, it is smaller in size and is a right match for projects requiring less memory space and fewer GPIO pin too connect with.

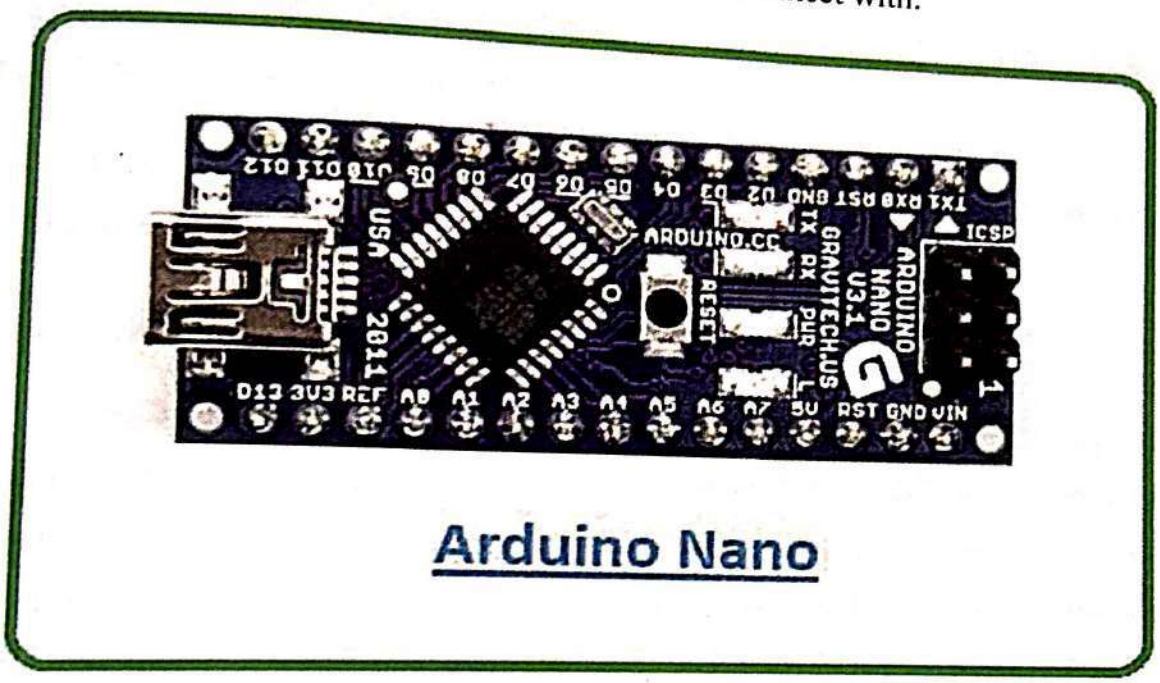

Fig-3.2 Arduino Nano

This unit features 14 digital pins which you can use to connect with external components, while 6 analog pins of 10-bit resolution each, 2 reset pins, and 6 power pins are integrated on the board.

Like other Arduino boards, the operating voltage of this device is 5V, while input voltage ranges between 6V to 20V while the recommended input voltage ranges from 7V to 12V.

The clock frequency of this unit is 16MHz which is used to generate a clock of a certain frequency using constant voltage.

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FINANCIAL MARKETING DEVELOPMENT

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the degree in

BACHELOR OF ARTS

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This is to certified that main project titled **"THE PROBLEM OF UNEMPLOYMENT IN INDIA"** is a benefited record of the main project done by **KUDELU SWATHI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

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This is to certified that main project titled **"AGRICULTURE SECTOR IN INDIA IMPORTANCE AND CHALLENGES"** is a benefited record of the main project done by **SETTI DEVI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

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CERTIFICATE

This is to certified that main project titled **"GOODS AND SERVICES TAX IN INDIA:ADVANTAGES AND CHALLENGES"** is a benefited record of the main project done by **YADALA KOWSALYA** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

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DEPARTMENT OF PHYSICS

CERTIFICATE

This is to Certified that the Project Work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" is a Bonafidework Carried out by. A: Akhila.., S. Karuna.. Regd No. 1931021,, 1931041 ... Year. III. BSC. MPCS

in partial fulfilment for the Award of Undergraduation in PHYSICS, of **Adikavi Nannayya university, Rajamahendravaram** during the Year 2021-22.

It is certified that all Corrections/ Suggestions indicated for Internal Assesment have been incorporated in the report .This project report have been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor Degree in PHYSICS.

K. Kranthi
Signature of the Guide

K Venkata 27/6/22
Signature of the HOD

Signature of the Principal

Signature of the Examiners

30 June 2022

ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

CERTIFICATE

This is to Certified that the Project Work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" is a Bonafidework Carried out by D.Kaveri, D.Lavanya, P.Tejaswini Regd No 1932024, 1932025, 1932027 ...... Year...III BSc. MPCS

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Signature of the Guide

27/6/22
Signature of the HOD

Signature of the Principal

Signature of the Examiners
30 June 2022

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This is to Certified that the Project Work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" is a Bonafidework Carried out by M. Divya Bharathi, P. Chandana, T.V.V. Satya durga Regd No....1932049, 1932053, 1932055.........Year. IIIrd ....B.Sc (M.P.Cs) 2021 - 2022

in partial fulfilment for the Award of Undergraduation in PHYSICS, of **Adikavi Nannayya university, Rajamahendravaram** during the Year 2021-22.

It is certified that all Corrections/ Suggestions indicated for Internal Assesment have been incorporated in the report .This project report have been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor Degree in PHYSICS.

Signature of the Guide

Signature of the HOD 27/6/22

Signature of the Principal

Signature of the Examiners

30 June 2022

ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

CERTIFICATE

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K. Ilayantha
Signature of the Guide

27/6/22
Signature of the HOD

V. [illegible]
Signature of the Principal

Signature of the Examiners

30 June 2022

ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

A

PROJECT REPORT

ON

PERFORMANCE EFFICIENCY OF

SOLAR COOKER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT

FOR THE AWARD OF DEGREE OF

BACHELOR OF SCIENCE IN PHYSICS

Submitted to the

ADIKAVI NANNAYYA UNIVERSITY, RAJAMAHENDRAVARAM

By

B. Bhanusri, B. pavitra, K. Sukeerthi

REGD NO 1932038, 1932040, 1932047

Under The Guidance of

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&

Smt K.KRANTHI M.SC, M.Phil

DEPARTMENT OF PHYSICS

ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

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30 June 2022

ACKNOWLEDGEMENT

We are the Students of III B.SC (M.P.CS) PHYSICS Cluster in ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN(A),KAKINADA are preparing a finalyear **project "PERFORMANCE EFFICIENCY OF SOLAR COOKER".We whole heartedly express our Sincere Gratitude to** SRI K.VENKATESWARA RAO & **Smt. K.KRANTHI who guided us for the completion of this final year project. We are also thankful to our principal Smt V.ANANTHA LAKSHMI garu for giving us an opportunity to do this project.**

1) B.Bhanusri(1932038)
2) B.Pavitra(1932040)
3) K.Sukeerthi(1932047)

DECLARATION

We B.Bhanusri(1932038), B.Pavitra(1932040), K.Sukeerthi(1932047)

students of 6 Semester B.SC(MPC) PHYSICS CLUSTER , ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A) , KAKINADA here by declare that the project work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" Submitted to the Adikavi Nannayya university, Rajamahendravaram during the academic year 2021-22 , is a Record of original work done by us under the Guidance of Sri **K.VENKATESWARA RAO & Smt. K.KRANTHI, Department PHYSICS,** ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A),KAKINADA .

This project work is submitted in partial fulfillment of the requirement for the Award of Degree of **BACHELOR OF SCIENCE IN PHYSICS. This results and works Embodied in this Thesis have not been submitted to any other University(or) Institute for the award of any Degree.**

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Date: 27/06/2022

Place: Kakinada

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Introduction

Cooking food with free, decentralized and non-emitting solar energy helps break the cycle of poverty.

Women, children and community members breathe cleaner air, save trees and soil, save money for food and education, and stay safe from violence. Solar cooking improves the quality of life and allows you to adapt to a changing world.

Up to 1.3 billion USD = Total potential cash saved by reducing CO_2 emissions with solar cookers.

Solar cooking helps to reduce social, economic, high iron environmental costs such as black soot, and fossil fuel emissions that affect all human beings and all current environments.

History of Solar Cooking

A strange antecedent of the current solar cooking movement is the story of what Buti and Perlin call "the MiroBurning IR "(1980, Chapter 3). The Greeks, the Romans and the Chinese all explored the use of curved mirrors, which they said could concentrate the rays of the sun so as to detonate almost all the burning objects.

It is interesting to note that the use they perceived for this aircraft was military-could they focus the mirror on fire, for example, on an enemy warship? Hot mirrors were also used for less dollar purposes, such as that the lighting of altar lights and torches for sacrificial parades, but almost no other applied use was found. The idea, which is now seen in the concentration of solar cooker, is today used in countless regions of the world.

A more direct route to solar cooking is the result of intensive efforts to harness the sun for horticulture. Although found in Roman times in wealthy households, it was only in the sixteenth century (Buti and Perlin, pp. 41) that glass became common and cheap enough to be used for horticulture. Global travel and trade have led to the transport of tropical plants and fruits to the

northern countries, which has led to a desire for these products, which could not be grown in northern climates. First the Dutch and the Flemish, then the French and the English built greenhouses for this purpose, heated only by the sun. A substrate horticultural activity concentrated on tropical flora and food crops, all high under glass, in huge greenhouses. Using South exposure and insulation as needed, the greenhouse movement later inspired the use of "conserve random "or" rooms of sunshine" in the houses.

The principle of the greenhouse, the so-called "Solar Heat Trap", was used in what is considered the very first attempt to use solar energy to cook. Many Scientists of the time knew the use of glass to trap heat, but Horace de Saussure, a Franco-Swiss scientist, wondered why this phenomenon generally understood had not led to a user's Extra N. In 1767, he built a miniature greenhouse with five cans of glass * One in the other, placed on a black plateau. The fruits placed in the deepest box cook well-and a new technology is born (Buti and Perlin, p. 55). De Saussure continued his experimentation, using other materials, adding insulation, cooking at different altitudes. This European scientist, exploring solar energy almost 250 years ago, is widely regarded as the Pre Era of the movement of solar cooking. Others followed his example, including the British Sir John Herschel and the American Samuel Pierpont Langley, who later led the Smithsonian, who both conducted experiments with the hot box, Precursor of today's cooking box. .

A French mathematician named Augustin Mouchot, working almost a century later, was eager to ensure that the learning of the past was not lost. He was more interested in practical application than in the number of ground devices, interesting but not very useful areas that appeared, using the newly discovered potential of the sun (whistles, watercrafts, talking statues, etc.). He started a search to use the energy of the sun in a sufficiently efficient way. He boiled water for steam engines, a company that has not succeeded. His second project was more successful. He combined the idea of thermal trap with that of the burning mirror, creating an efficient solar cooker from a box which later modified by the addition of reflective mirrors. Eventually he created an efficient steam engine, but it was too big to be practical. He turned to the challenge of cooking and has developed a number of solar cookers, pumps and even electricity. However, his work was short-circuited by the advent of improved coal extraction methods and, therefore, by the use of Carburant Less expensive. His work has also been caught up by the replacement of cheap fuels, making the use of solar energy useless and therefore inconvenient at the moment.

At the end of the nineteenth century, Aubrey Eneas, an American formed the first solar energy company. He had built a giant parabolic reflector in the Southwest of the United States. Frank Shuman founded the Sun Power Company in Cairo to promote a water pumping system powered by solar power, then a parabolic concentrator generating electricity. Other solar innovations have followed: engines and motors, water heaters, photovoltaic lighting and even crematoriums. However, throughout history as in Greece and in Rome progress has been repeatedly interrupted by fluctuations in the availability or low cost of alternative fuels.

In recent decades wealth of billions has been created with polluted fuels and destroying our planet. The sun can provide ways to live with income of renewable energy that will give a better future for our planet and health. It continues to indicate that countless previous experiences of decrease in fuel resources was then forced to rediscover previous knowledge about solar energy. Hoping this new generation will practice clean energy usage for a better future. We

should have been practicing clean renewable energy available to all human being but creating wealth seems to be our priority.

At the beginning of the years 1900, a number of Buildings designed to take advantage of solar energy were built using the principles of the thermal trap, but they were quickly forgotten and then resumed in the 1930s when several office buildings the double-glazed glass helps with the heat retention. The Second World War took place, but after the war, the need for housing exploded, resulting in new attempts, including solar collectors on the rooftops.

The Solar cooking movement began seriously in the middle of the century, with some isolated attempts to arouse an interest in technology. At the end of the years 50, Maria Telkes , MIT scientist Worked on solar cooking her interest led her to build a classic built-in oven, an insulated plywood case with an inclined top of two layers of glass and four large flared reflectors. The design is used, in infinite variation, until today. George Praise , former director of the Institute of Industrial Research at the University of Denver, Colorado was also a pioneer of the Solar technology, including solar cooking. In the years 1950, he experimented with a model of Parabolic Solar Cooker The name "Umbroiler" because of its structure in the form of an umbrella. He marketed the design, but it was a commercial failure for the time.

After this period, the years of the second half of the 20th century show a number of individuals and groups experimenting, demonstrating the potential realizing small and large projects using solar cooking appliances. From 1955, a group of individuals in Phoenix organized in Association for Applied Solar Energy and held its first Conference: the American Solar Energy Society and its international counterpart, the International Solar Energy Society. In the 70's, the growing scarcity of fuelwood and other energy shortages coupled with the expansion of the population in China and in India , encouraged government research on alternatives. The first seminar on solar Cooking was organized in 1981. The oil shortage of that time was the source for study of potential of solar energy, with considerable experience in Europe and the United States, as well as in Asia. The ULOG Group In Switzerland And EG Solar In Germany , and that Solar Cookers International In the United States, originated in the years 1980.

A woman from Arizona, Barbara Kerr , along with other colleagues, also has continued to develop models of solar cookers and test their effectiveness. She experimented with various materials and promoted the technology. In 1980, Barbara Kerr and a neighbor, Sherry Cole, designed a "kit" of cardboard cooker that could be largely built by a customer and that was very much appreciated by those who had bought one. This work of these two women has inspired the formation of Solar Cookers International . A few years later, the organization, again with the technical assistance of Barbara Kerr, was the first to introduce another type of cooking apparatus, the panel cooker, a hybrid between the box and the parabolic. This invention was a decisive step forward because it was less expensive. Now solar cookers are affordable to meet the needs of the poorest inhabitants of the world.

It could be said that the foundation of Solar Cookers International, On July 11, 1987, was the beginning of an effort to connect the promoters of solar cooking everywhere in the sense of networking, because its intention was largely educational and networking. Coincidentally, the United Nations has declared that day the world's population had reached five billion people (only 13 years after reaching 4 billion). The new organization said that at least one billion people could benefit from knowing how to cook with the sun. Obviously, the organization has

been forced to steadily increase its targets, while the world's population has continued to grow at more than six billion in 2004, which means that today the target group exceeds the two Milliards.

It is interesting to note that before the creation of SCI In 1987, a major demonstration of solar-powered cooking was carried out in the highlands of Bolivia, a region where Wood was already Rare. Two organizations, at the time Pillsbury Corporation and a non-governmental organization called Meals for Millions, jointly sponsored cooking demonstrations and later taught the villagers how to build cookers with Local materials. In 1988, Pillsbury, in cooperation with Foster Parents (now Save the Children sponsored a project similar to Guatemala . These projects it appeared are one of the first nation-to-nation projects, initiating a long series of projects of this type worldwide, which continue to develop today.

Since then, Many other organizations were created to sponsor projects and promote solar cooking activity. Their work, as known by the written documentation, is detailed in the following chapters. This vignette is only a small part of the story, even unknown to supporters of solar cooking, the many men and women who have glimpsed the potential of the sun to cook food and have tried over the centuries to disseminate this knowledge oo others who can benefit from it.

Solar Cooking Basics

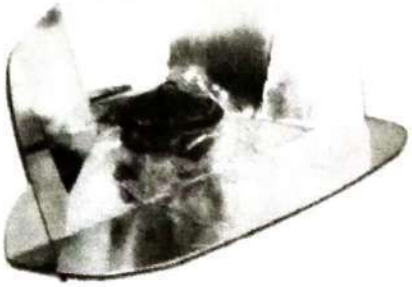
According to the Place where you live and how you cook, solar cooking can save you time, effort and fuel. It is also a fun way to prepare your meals. All foods can be cooked in a type of solar cooker.

Solar cooking is often associated with slow cooker or slower cooking. Cooking times are usually twice as long as conventional cooking methods, but slower cooking also has advantages. Less water is used than conventional cooking and foods retain more flavor and nutrients, instead of being steamed or boiled. These slow solar cookers do not need to stir food during cooking. By placing the solar cooker a little ahead of the current position of the sun on its passage through the sky, the cookers and cookers can be left unattended.

The parabolic solar cooker offers another approach to solar cooking by being able to achieve higher temperatures compared to the box solar cookers and panels, but they require more attention during cooking to avoid overheating of the food. They must be redirected to the sun every fifteen minutes or so. This can be done automatically if they are equipped with a Solar monitoring . They are also able to fry and grill the food, which cannot be done by the box and panel solar cookers.

For the regions of the world facing the Deforestation and limited access to Drinking water , solar cooking turns out to be an element precious or the solution. It offers an alternative without Smoke or boiling water in open fires, and safe for cooking.

Building a solar oven



If you want to try solar cooking for the first time, you may be wondering if you need to Build your own Solar cooker or Buy one from a manufacturer . Both options have advantages:

1. Building your own solar cooker can be a fun and profitable way to start.
2. Buying a solar oven is simple and YOU will often receive a higher quality solar cooker than you could build yourself.

If you want to build a cooker, go to the Construction of a solar cooker to choose a model that suits you. You will find information comparing the Pros and cons of each style of Solar Cooker.

If you want to buy a solar cooker, see the list of manufacturers and sellers on the SCI page: Buy a solar cooker . Commercial solar cookers are generally durable and efficient and offer new users an easy way to experience solar cooking. Solar Cookers are manufactured worldwide; consider potential shipping costs when choosing a model.

Solar Cookers Working

Most solar cookers operate according to the basic principle: sunlight is converted to thermal energy. Most of the Panel Solar Cookers Base and Box Solar Cookers Can reach 150 °c (300 °f). The captured solar radiation crosses a greenhouse enclosure containing a dark-colored pot. By reaching the dark surface, the solar radiation is converted into heat, which is not allowed to escape the enclosure and the Temperatures are reached. The same principle is often encountered by drivers who return in a hot car parked in the sun.

Below you will find the basic science for Panel Solar Cookers and Box Solar Cookers. Another type of solar cooker is a Parabolic Solar Cooker . They usually require more frequent

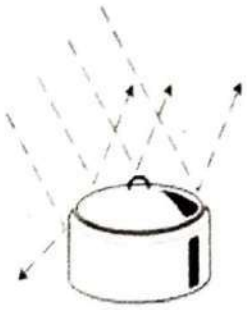
reorientation to the sun, but cook more quickly at higher temperatures and can fry food. Vacuum Tube Solar Cookers use a highly insulated double-walled glass tube for the baking chamber and do not require large reflectors.

Fuel: sunlight

Sunlight is the fuel. A solar cooker needs an outdoor spot that is sunny for several hours and protected from strong wind, and where food will be safe. Solar cookers don't work at night or on cloudy days.

Convert sunlight to heat energy

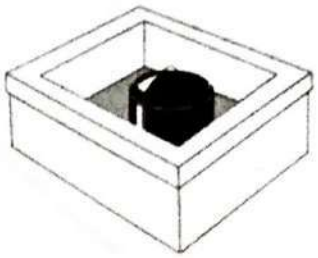
Dark surfaces get very hot in sunlight, whereas light surfaces don't. Food cooks best in dark, shallow, thin metal pots with dark, tight-fitting lids to hold in heat and moisture.



A solar cooker needs a sunny outdoor location for several hours, protection from strong winds and clean/safe cooking conditions in places where the food will be healthy. Solar Cookers do not work at night or in cloudy weather, but during the best sun conditions. Some solar cookers can cook foods under intermittent clouds.

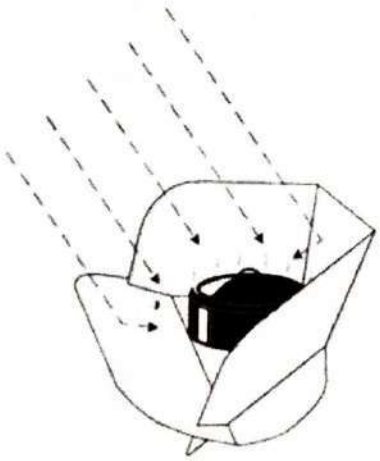
Retain heat

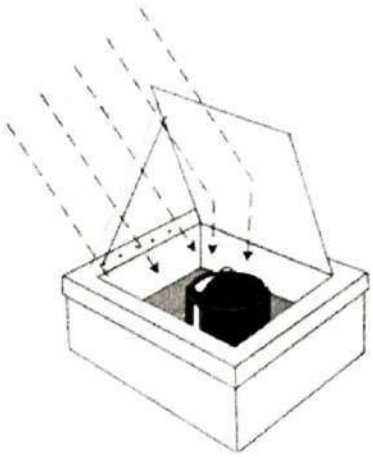
A transparent heat trap around the dark pot lets in sunlight, but keeps in the heat. This is a clear, heat-resistant plastic bag or large inverted glass bowl (panel cookers) or an insulated box with a glass or plastic window (box cookers).



Capture extra sunlight

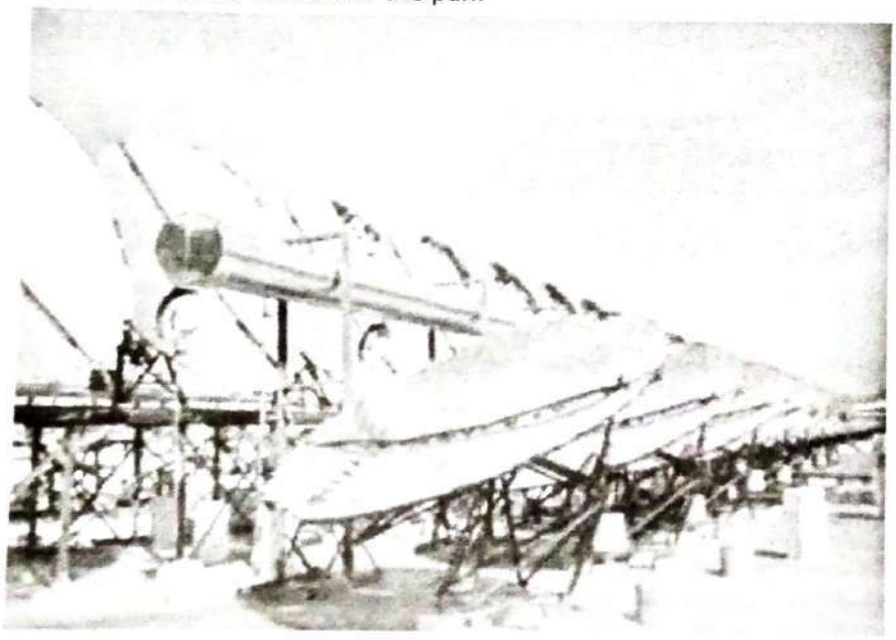
One or more shiny surfaces reflect extra sunlight onto the pot, increasing its heat potential.





- The Parabolic Solar Cookers Use a bowl-shaped reflector to concentrate the light more directly on the pot, usually from the bottom, and generally do not require a greenhouse to hold the heat. They can also fry and grill the elements.

SolSource is an example of Parabolic Solar Cooker presented with a cooking utensil. The light is concentrated at the bottom of the pan.



The institutional solar Cooking Can use many large reflectors Parabolic For general Steam and cook daily for thousands of people. Many of these systems are used in India . This example was built with the technology of Solar Bridge .

Converting solar light into thermal energy

In its simplest form, light/heat conversion occurs when photons (light particles) moving through the light waves interact with molecules that move in a substance. Rays emitted by the sun have a lot of energy in them. When they hit the material, whether solid or liquid, all this energy makes the molecules of this matter vibrate. This activity generates heat and cook.

Dark surfaces become very hot in the sun, unlike clear surfaces. Also food cooks better in Pots that are thin, shallow, dark metal with well-fitting lids. There are many other containers that can also be used in a solar oven.

Keep the Heat

A glazing (transparent heat trap) around the dark pot or over the cooker opening allows the sunlight to penetrate and prevents the heat from escaping. The glazing is resistant to heat, for example, oven bag, inverted bowl, sheet of glass, sheet of plastic, etc.

Sun rays pass through the glazing into the cooking chamber (solar cooker) via relatively short wavelengths. The sun ray is absorbed by the dark colors of the pots and converted to a heat ray which has a longer wavelength and does not easily escape out of the cooking chamber. This explains why cars left in the sun, especially those with a dark interior, will become very hot even on days when the temperature is low.

Parabolic Solar Cookers do not usually require a thermal trap, as the reflector's light is tightly concentrated on the pot. They bake at higher temperatures, but require more frequent reorientation with the Sun than box or panel solar cookers

Capturing additional solar energy

Shiny surfaces (reflectors) reflect the extra sunlight on the pot, increasing its thermal potential. Mirrors, aluminum foil, Mylar, mirror-finish metals, chrome-plated vinyl and other shiny materials have all been used with success for solar cooking, depending on the type of cooker and the environment in which it will be used.

Types of Solar Cookers

The most common types of solar cooker are:

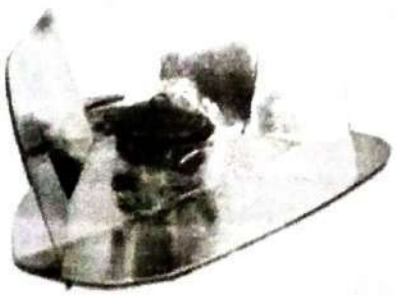
Panel Solar Cookers, Box Solar Cookers, and Parabolic Solar Cookers. Hundreds or even thousands of variants of these basic types exist. PANEL, BOX, PARABOLIC, VACUUM TUBES,

In addition, several large-scale solar cooking systems have been developed to meet the institutional use in places around the world: INSTITUTIONAL SOLAR COOKERS.

Box Solar Cookers

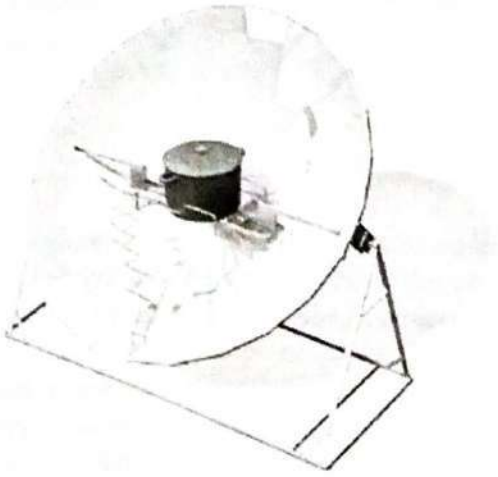
Box Solar Cookers cook food at moderate to high temperatures and often accept more than one pot. They usually cook food of many varieties between one and three hours of time. All over the world, they are the most common. There are several hundred thousand in India only.

Panel Solar Cookers



Panel Solar Cookers incorporate box and parabolic concentrator units. They are simple and relatively inexpensive to buy or produce. The Cookit Of Solar cookers International is the solar cooker most used.

Parabolic Stoves



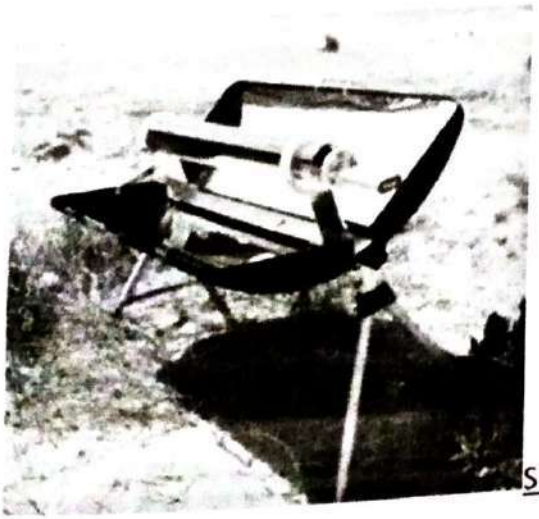
COUPLE OF OTHER MODELS

The Cooker Dish AlSol 14 Shows how the pan is supported to receive the light focused from the bottom of the reflector.

The parabolic solar cooker uses a bowl-shaped reflector to concentrate light more directly on the pot, usually from the bottom, and generally does not require Greenhouse to hold the heat. The parabolic name refers to the shape of the curve of the reflector section.

They require a more frequent reorientation to the sun, possibly every 10 minutes, but they bake more rapidly food at higher temperatures than other solar cookers, often reaching more than 200 °c (400 °f). They also have the ability to fry food. In general, parabolic solar cookers will have to be stirred more than box or panel solar cookers to avoid burning food at the bottom of the pot. They are particularly useful for large-scale institutional cuisine.

Vacuum Tube Solar Cookers



SLiCK SM70

Vacuum Tube Solar Cookers use a double glass tube wall for the baking chamber. The space between the glasses is created in the form of a vacuum, offering excellent heat retention. Although vacuum tubes are effective, glass technology somewhat limits the size of the glass tube opening.

Solar Cooking Tips and Tricks . . .
Main Article: Cooking instructions and tips

The golden rule for solar cooking is to prepare your food early and not worry about overcooking for box and panel solar cookers. Most people who start solar cooking will use a panel solar panel cooker or a box solar cooker. These solar cookers are sun-oriented and generally do not need to be turned to follow the sun during a period of solar cooking for 3 to 4 hours. Less water is added to the recipes than baking with more conventional ovens.
Once you have chosen a cooker, you will need to find suitable cookware. The enameled metal pans (thin-walled) work well. They warm up quickly. Cast iron pans also work and are usually preheated in the solar oven before cooking. The advantage of heavier pots is that they will help maintain a regular cooking temperature if the sun is sometimes blocked by clouds. Many solar cooks use the enamel pots. Because dark pots work best in the solar cooker, it is important to remember to use a non-toxic paint for the outer surface of the pot if you choose to paint your own pots.

Pots for Solar Cooking

The best pots for solar cooking are those made of thin and dark metal with a lid. Most times when people have trouble cooking in a solar oven, we often find that they use pans in finishes that reflected the sunlight away from the pot instead of absorbing it. Unless you are cooking with a parabolic solar oven where the light is focused on the bottom of the pot, it is very important to use dark colored pots that absorb the sunlight and turn it into heat.

Light colored pots can also work but generally do not work as well as dark colored. The pot lids can be dark or clear. Dark lids are better if your food to be cooked is light colored.

It is important to always cook with the lid in place so that the moisture of the food does not escape and condense on the plastic bag or other Glazing.

The material from which the pot is manufactured will also affect the speed with which it will warm up and its ability to retain the heat. Here are a few things to keep in mind:

- Pots made of thin materials heat faster than thicker pots
- Metal pots heat faster than ceramics or earthenware
- Ceramics and earthenware are slow to heat initially, but will hold the heat better than the thinner metals. The cast iron should only be used in good solar cooking conditions as it requires strong sunshine to obtain the best results.

It is generally not recommended to use a sheet to wrap food in solar cooking; however, temporary pots or lids can be formed from a painted (non-toxic paint) layer in the absence of other equipment. Foods packaged in a conventional way under unpainted aluminum foil **bake very slowly. if not at all**, because the glossy film, especially in several layers, insulates the food from sunlight and warmth. The food won't cook.

Glass Jars

Solar cooking food in jars to put in solar ovens

Solar Cooking with glass jars

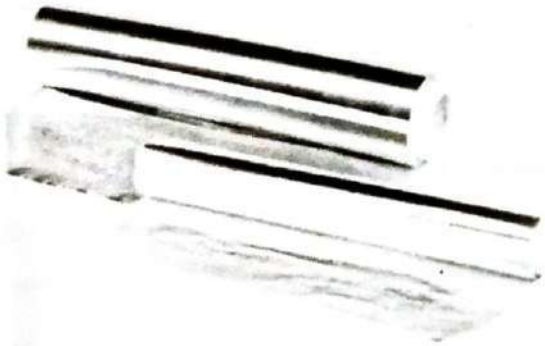
Glass jars make good pots although they cook better if they are darkened rather than left clear. In addition, the darkening of the outside of the food containers will protect some of the B vitamins. When you Paint Jars , you can apply a strip of tape from top to bottom before painting. When the paint is dry remove the tape to leave a transparent strip of glass clean for visual inspection to the inside of the jar.

When you use jars for baking, **make a hole in the lid** of any canned jar, such as mayonnaise jars, peanut butter jars, etc., to prevent steam buildup. Be careful! Non vented jars can explode!

Earthenware Pots

Some clay pots with slow cooking does not cook well at first, although dark colored earthenware pots that are wood fired and/or have glazing, work very well. Perhaps the poor performance of some earthenware is due to the fact that liquids are soaked into the earthenware and can evaporate outside. Perhaps it is due to the thickness and porous nature of the poorly cooked terracotta walls. Unglazed earthenware pots can be saturated with food oil, grease or natural resin that closes the pores and changes the surface. The oil will heat well and this could be part of what improves cooking in low-cooking terracotta pots. The Light-colored terracotta must be darkened outside only, perhaps by rubbing a black food, a non-toxic black powder or soot from clean wood in the oil layer. Despite this, some forms of low-fire terracotta can be difficult to use for some solar box cookers.

Reflector Material



Aluminum foil

Standard kitchen aluminum foil can work well as **Reflective material** for solar cooking. It can be stuck with white paste or Wheat dough. Some folds may result from the bonding process. In addition, although the surface of the aluminum foil is not hot to touch in the sun, there will be differences in the rate of expansion between the sheet and the material unto which it is glued. This can cause wrinkles. As a general rule, a slight folding of the sheet does not create a problem for cooking.

Solar cooker design continues to evolve and offers better cooking efficiency. There is an increased interest in finding more low cost reflective materials in order to better reorient the sunlight. Polished Metal surfaces have been tried and, although effective, tend to be costly solutions. Metallized polyester Film properly glued to plastic Coroplast sheets are an even more

economical approach for users who want to create their own reflectors. Michelle Dean , professor and researcher in solar energy at Brazil , explains one of these approaches in the Realization of the petals of the solar cooker with Mylar and D.

Components of Solar Cookers

Glazing

Two transparent Pyrex bowls can be assembled to enclose the pot, creating an effective greenhouse enclosure.

Two Pyrex bowls, or one with a Pyrex tray, are an excellent greenhouse enclosure for Panel Solar Cookers . This example worked well, even without a cover on the Porcelain cooking bowl.

Glazing is the term used in this article and in the solar industry to describe the glass or plastic coatings used in a cooker or solar collector. (In other industries, glazing may concern only glass products.)

The glazing creates a Greenhouse effect "trapping" solar energy and increases the efficiency of cooking.

Glazing partially blocks the sunlight, but the overall efficiency of solar cooking increases with use of glazing, especially in windy weather. Thicker glazing blocks usually more sunlight than the thin. In theory and in most situations, two layers of glazing work better than one in most solar cooking applications. A single layer of glazing will perform and is much simpler to construct.

Pyrex bowls (of assorted sizes) are transparent and work well as a glazing. There is little refraction of the light, because the rays can penetrate directly unto the black pots. In 2018, Alan Bigelow , Scientific Director of SCI , led the protocol test PEP on the solar panel cooker CooKit , comparing two types of greenhouse enclosures. Alan found that the use of the double-hulled Pyrex enclosure was 25% more effective in generating heat than the use of a Plastic Roasting Bag . More information...

John Roche, retired 3M research and design engineer and solar expert, states that the effectiveness of the sun is reduced approximately 15% for every layer of glazing.

Sport solar oven

Acrylic has good uv stability for use in the sunshine. It also has lower softening and melting temperatures. The Sport solar oven adds a sheet of UV stabilized polyester to the molded acrylic lid to provide for excellent insulation for the oven.

Plastic oven roasting bags have been widely used to create a greenhouse enclosure for the Panel Solar Cookers. However, they are much less effective than the Pyrex bowl approach. Their advantages include, inexpensive to buy and easy to use. They are also difficult to clean if they are contaminated with spilled food, especially in areas where the water supply is limited. There is a problem of removing plastic bags, which do not decompose when discarded.
The **cumulative cost of continuously replacing plastic oven roasting bags is more costly than a Pyrex bowl and/or some commercial solar cooker models that can last for 10+ years. The average life of oven roasting bags of fifteen uses was previously documented by SCI.**

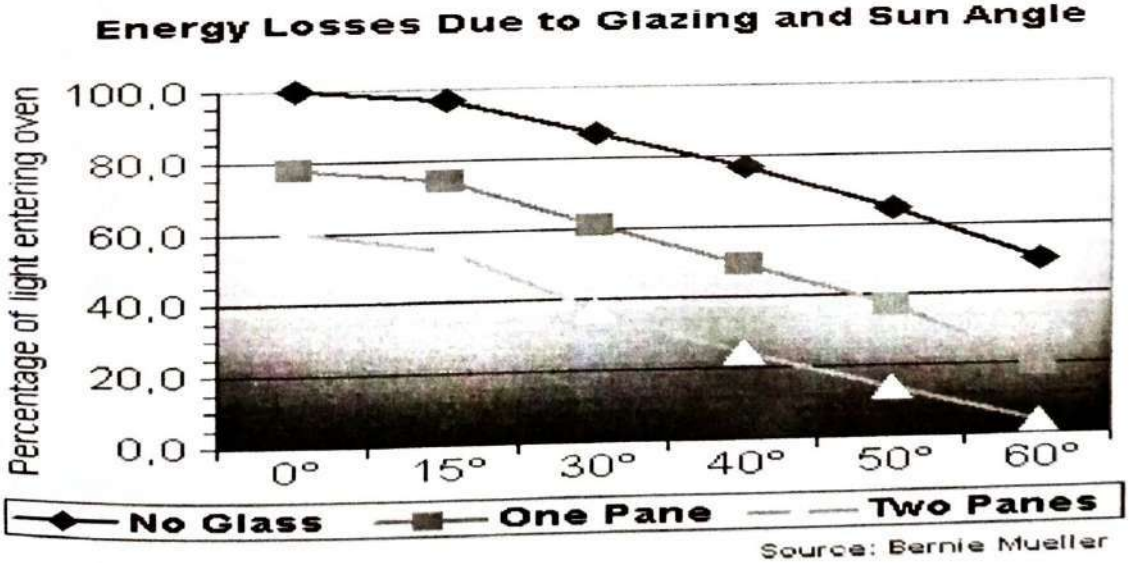
Are plastic bags always harmful to the environment when they are not burned?

Considerations

Different aspects of a ' greenhouse ' must be taken into account. Take these points into account:

1. **Proposed design:** Cooker, hotplate or dish? A box cooker is normally closed with a glass lid. The parabolic solar cookers sometimes operate without glazings, but the glazing improves the performance considerably. The panel solar cookers are well served by domes.
2. **Material:** Glass can withstand high temperatures, not all plastics can.
3. **Size:** Does the intended pan fit in the glazing without touching the sides? How easy can the glazing be stored? A plastic bag can be bent, the glass cannot.
4. **Availability:** If you want to build more stoves or replace a damaged solar cooker, can the glazing be easily obtained?
5. **Cost:** Always a challenge. Solar cooking and a small budget go together for wide spread acceptance.
6. **Robustness:** Glass can break when used, transported or stored. Plastic is more flexible than glass. High temperature oven roasting bags are a practical product. In Refugee situations, it can be difficult to get water to wash the bags if food has spread over them. Long term use of oven roasting bags can be very expensive.
7. **Life Cycle:** Discarded plastic bags can be distasteful in the environment and they can be

Glass Plates



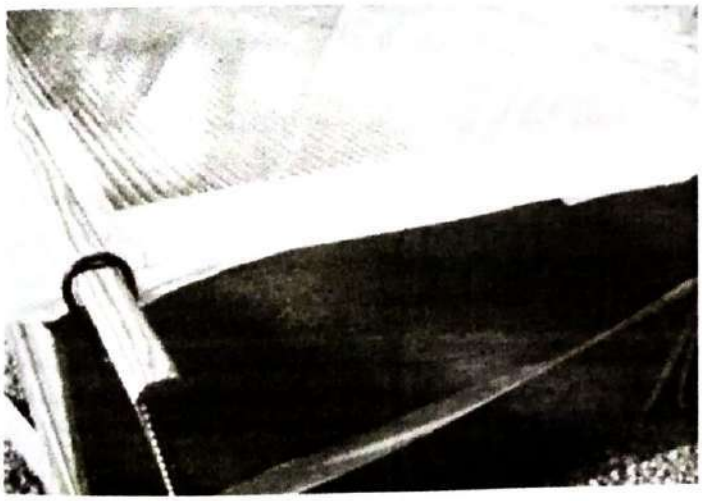
For the box cookers, the transparent glass, simple standard thickness (2.5 mm), proved to be very satisfactory. Thinner glass is less prone to cracking heat than thicker panes, probably because it heats more rapidly and evenly, reducing thermal stresses. The flat glass is very heavy and was only satisfactory when it was soaked. Some Solar Cooker designers choose simple glazing for portable models with a second Temporary option in bad weather. Permanent double glazing is often chosen for all-season solar cooking, which is probably ideal when materials are available.

Glass, although fragile, is generally available in major metropolitan areas around the world, while tempered glass and synthetic glazing are specialty materials requiring unique supply lines. The glass does not degrade in the sun. If it is protected from thermal stresses and shocks, it is more durable long-term than most plastic glazing, even those that are treated against degradation by ultraviolet rays. Glass is excellent as long as it does not break.

Glass with small iron content allows more radiation to penetrate the box and makes a hotter oven but is not essential. One-way glazing was found to reduce the function of a baking oven. Recycled automotive glass, especially flat parts of the side windows of the vans, has been used successfully, but even parts that seem clear can be tinted to some extent to reduce heat in the vehicle or to add safety glass. Both tented glass and all the added materials block the solar radiation.

Glass can be tempered if desired, although the cost of hardening is so high that occasional replacement of the glass may be less costly in the long term for the artisanal Solar Cooker. Glass with simple thermal cracks can be held in place by a silicone sealant or a non-toxic glue or a narrow band of tape.

Plastic Plates



Transparent plastic double wall polycarbonate glazing, Seattle 2009 Mikeand Martha Port used similar material as pictured above in Nicaragua. The underside of the material (warmth of the oven) expanded the lower level more quickly while the topside of the material expanded at a slower rate. This resulted in significant open gaps at the corners defeating the performance of the oven. (The wood pictured above may

be present captured inside of a metal ring attached to the side wall of the solar cooker might overcome the warping. Double wall glazing is much more effective!

Polyester film

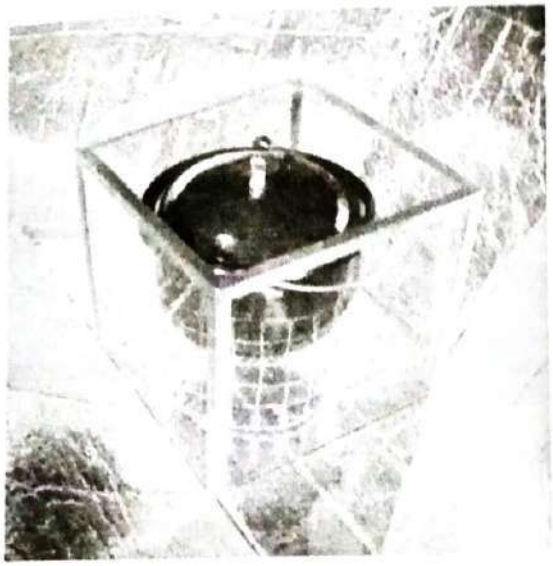
Prasanta the Solar Cooker Workgroup Sliedrecht NL , reported in 2014 having successfully tested a polyester glazing material for use as an alternative to glazing. He has featured in various weather conditions. The contact cement was used to attach the material to the wooden frames. Because the glue was not UV-resistant, the exposed glue areas were painted white with the edge of the frame. The polyester film is as follows: It is almost weightless, it is cheaper and less fragile than glass, and the mounting of the material and its transport are simple. Two rolls of 10 kg each will be 150 transparent windows of 65 X 65 cm and 4 mm thick, sufficient to make 75 double-glazed solar cookers..

Cookers to Panels

A Panel Solar Cooker Typical differs from a Box Solar Cooker in two aspects:

1. The enclosed space is much smaller (usually it is a bag around the pot or a sheet of plastic wrapped in a circle on which the pot rests -
2. It allows the light to enter not only from the top, but from all sides (this is well suited for the use of panel reflectors).

Sharon Cousins , who cooks in northern Idaho at 47 degrees north, on a ridge exposed to the southwest swept by prevailing winds, has developed several rigid covers that are not likely to be damaged with use as a solar cooker. One of her favorites is a one-gallon transparent Pyrex bowl/casserole for the bottom and a large transparent acrylic bowl for the opening. These are large enough to hold her black one gallon painted enamel jar, a round granite roaster, and various other pots. This works much better under cold or windy conditions than an oven bag. It also gives easy access to food, which is particularly useful if foods are improved by stirring them from time to time (for example, rice to milk) or if food will be added later during cooking. The most difficult ones began to soften.



glass baking box.

Daniel Joseph, a soldier stationed in Kuwait, experimented with a CooKit and a larger glass enclosure. The glass box offers a good view of the pot, well supported on a grate. Can an explanation of how he made the glass box be added? I suspect this used extruded right angle metal which he cut to size with beads of silicone caulking insulating the metal from the glass and the interior of the cooker.

Cooking directly in glass containers

Sometimes a glass container is used without a pot. The food inside is heated directly by the sun.

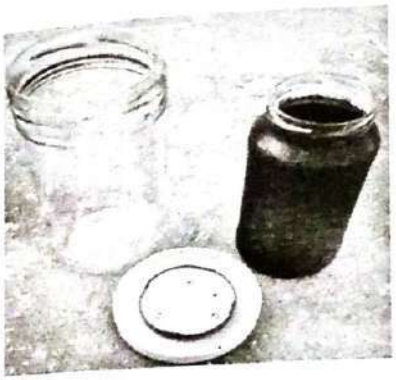
Juan Urrutia Sanz has several recommendations when using glass bottles or containers:

1. You can Cook Foods of all colors except the green pepper, which becomes colorless and hard.
2. The black-skinned fish is simply cooked by exposing the skin to the sun. For frozen fillets – place the fish in a net suspended in a jar or other small container secured by the lid. It

is not necessary to cut the net. After three quarters of an hour in the sun around noon, the fish is cooked.

3. With light colored food, add such things as: paprika, food coloring, laurel leaves, red peppers . . .
4. You should always cook with a little liquid, at least one layer of water at the bottom of the jar. Glass containers can be of all sizes, from smallest for single portions to large, and you can cook several in containers at once. The lids must be black or painted black. I do ~~It does~~ not recommend corks, rubber or other materials that degrade in the sun or heat.
5. In general, follow the same guidelines as other pots for solar cooking, such as the size of parts, etc.

Pot Cooking Chamber



Glass jar inside another glass pot baking chamber

If you place a Pyrex bowl, which is larger than the pot underneath, there will be a good chance that the condensed moisture can run downwards. This could damage the base of a cardboard solar oven. Consider placing a flat glass dish under the pot (not pictured).

Dr. Steven Jones Used a black jar in a Pyrex dish instead of a bag Plastic.

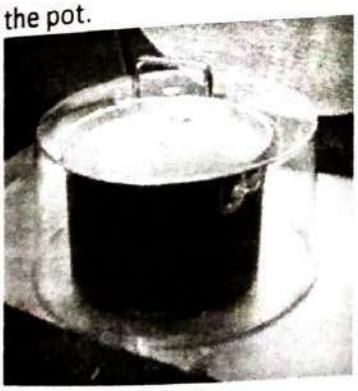
Two bowls can be assembled to enclose the jar.

Two Pyrex bowls containing a porcelain cooking bowl without lid

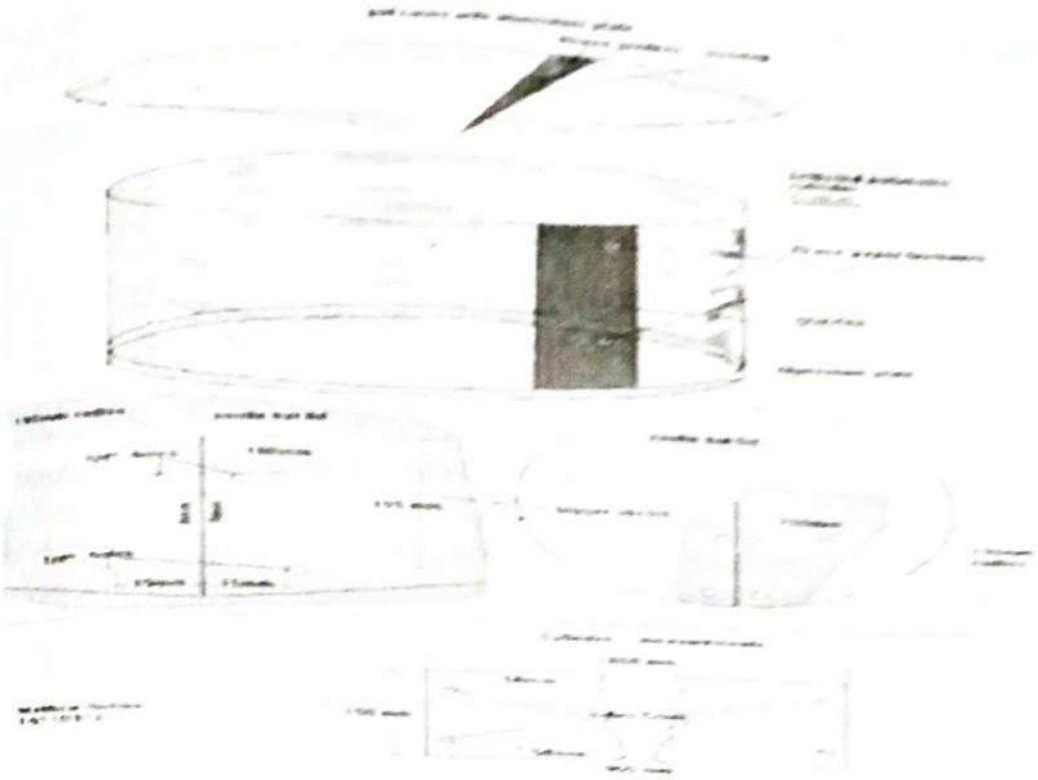
Roger Haines Tested a flexible sheet of polycarbonate wrapped in a cylinder shape for a baking enclosure. It requires a round baking pot with a substantial lip that sits at the top of the enclosure. It reports good results.

Polycarbonate cooking box for the Panel Solar Cookers .

Haines Polycarbonate Wrap with a clear Cover allows sun under the pot.



Polycarbonate Bakery Cover



Reynolds Oven Bags are available in supermarkets in developed countries. They work pretty well, but new stove designs incorporate more durable housing approaches for better efficiency and durability.

Polypropylene (PP) bags distributed with CooKits In the United States are usually reusable a few dozen times before becoming brittle. More durable alternatives have been tested over the years, including polyester sheets with ultraviolet (UV) inhibitors, formed in bags using adhesive tape.

Some solar cookers use plastic bags for wrapping pots or pans. Normally heat-resistant bags, such as baking bags, are used. These resist very well the heat of the solar cooker. If other bags of plastics are used, the bag should not touch the pot, as it could melt or weaken the bag. This would cause holes through which the heat escapes. Different cable frames have been designed for this purpose.

Polypropylene and High Density polyethylene (HDPE)

Both polypropylene and high density polyethylene (HDPE) are used in autoclaves that sterilize med instruments at much higher temperatures than solar cookers. So these plastics are usually available in most countries. HDPE is also widely used for grocery bags worldwide. They are not that superior and transparent, and are "noisy" and milky in color. These HDPE bags are generally inexpensive. If they are almost transparent, they work almost as well as oven roasting

bags which are much more expensive. The thickness of the plastic film does not significantly affect the heating of the solar cooker but can affect its life span.

Sun Scoop Lite

Transparent polypropylene food containers that are food grade # 5 recyclable can usually withstand the temperatures of a pot like any autoclave bag, and offer UV benefits. (More and more countries are prohibiting the production and use of any kind of plastic bag because they are an environmental problem. Kenya, China, France, Rwanda and Italy are some of the first countries who have banned use of plastic bags. Polypropylene containers can be round, square, rectangular, high or short, as long as they fit perfectly with the Pot. The more clarity of the container will affect the efficiency of the cooking, the clearer the better.

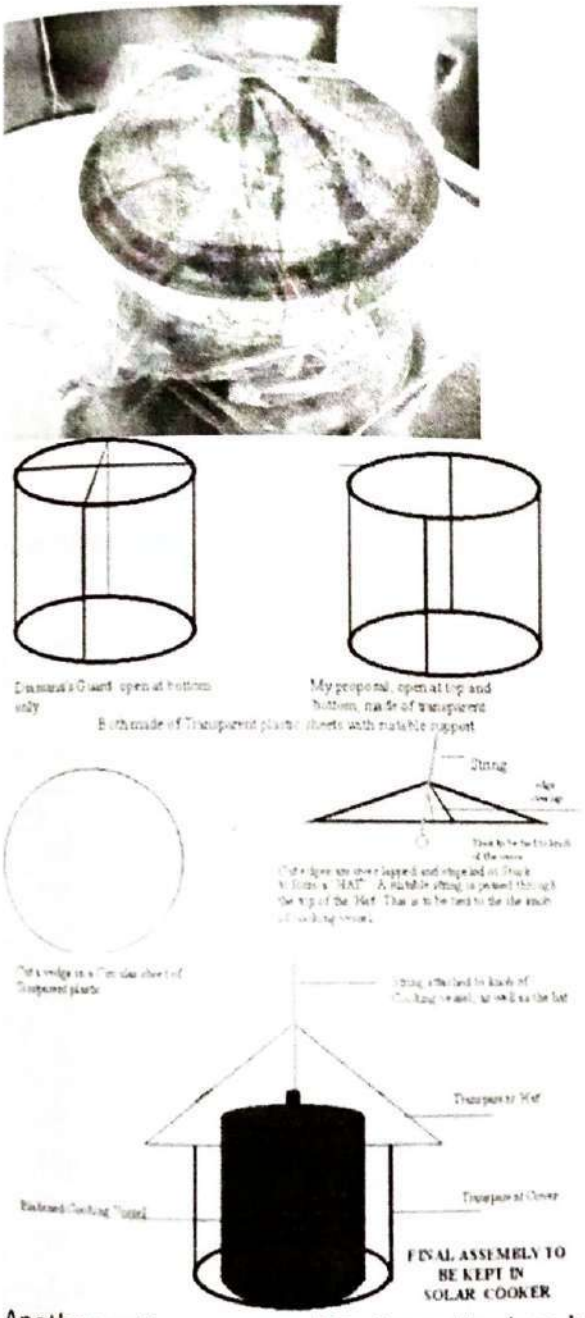
Are plastic bags dangerous For the environment?

The production of plastic bags consumes almost no energy, because the chemical changes of the oil to these plastics are minor molecular changes. The amount of fossil fuel (oil) required for producing a plastic bag is a tiny fraction of that consumed when someone prepares a meal with paraffin (kerosene). All plastics do not emit harmful fumes when heated or burned, only those that contain chlorides, fluorides or iodide-based additives, such as PVC pipes and styrenes (styrofoam) when oxygen is insufficient. Others, including all plastic bags used in solar cooking (polyethylene, Polypropylenes and Polyesters), are all simple hydrocarbons which, heated or burned, emit only minute amounts of carbon dioxide and water (vapour). Once the bags are worn, they can be safely burned, like the Paraffine or wood. They can also be reused. For example, in the context of solar cooking projects sponsored by Solar Cookers International in the refugee camps of East Africa, refugees used traditional weaving techniques to make baskets, hangers, braids, ropes and other useful objects.

Plastic Bags Accessories

Good plastic bags can be difficult to replace. Small frames can be made that hold the plastic bag around the pot/jar to insulate it, but prevent the bag from touching the hot pot, so that the bag does not heat up as much and lasts longer. A Cadre designed by M. Gnibouwa Diassana, From Mali, by twisting a rigid electrical wire, keeps the plastic bag away from the pot when baking in a solar oven CooKit .

Dr. Dale Andreatta , mechanical, and Stephen Yen, an electrical engineering student, indicate that Perfluoroalcoxy fluorocarbon (PFA) could also be a good alternative. Although expensive, PFA can withstand temperatures above 250 °c and is UV stabilized.



Another option, proposed By Steve Harrigan is to use a container made of the same polypropylene as the baking bags.

Use of a solar cooker with a "bare" pot is like using an oven with the door open. The food will warm up, but the fact that the pot is surrounded by a warm air cover is much more efficient. A saucepan can exchange heat in three ways: by radiation, by convection and by conduction. Inside a greenhouse or oven, the air helps to transfer heat into the pan. The three effects work in parallel to transfer heat into the pan. In operation without enclosure, the pan must be heated only by radiation, while convection and conduction eliminate heat.

How much does double glazing improve cooking

It depends on the transparency of the glazing and the insulation properties. In general, double glazing is better than single glazing, but it is also more complex and more expensive than single glazing. Although double glazing is better, **the real question is whether the improvement justifies additional costs and complexity.**

Inexpensive alternatives to double glazing can be:

- Use a larger reflector to increase the amount of sunlight;
- Decrease the size of the enclosure. This decreases the outer surface (which is exposed to cold air) and therefore the amount of heat loss. For example: If you replace a glass dome of 36 cm in diameter by a 30 cm, the outer surface decreases of 30%. The outer surface of a 50x50x30cm cooker decreases by almost 10% if you are 25 cm in height instead of 30.

Greenhouse effect In: Materials

Material	Thermal Conductivity W/m C
Air	0.03
Foam, Polyurethane	0.03
Fiberglass	0.04
Corkboard	0.04
Wool Felt	0.05
Cotton	0.06
Sawdust	0.06
Paper	0.18
Wood	0.1-0.2
Sand	0.3
Plaster	0.5
Glass	0.8
Dry Soil	1
concrete	1.04

Thermal inductivity of various materials

Box Solar Cookers often use insulation in their wall cavities. However, studies have shown that this insulation may not be as important as you might think, because more heat is lost through the Glazing . If the glazing is well insulated (double layer) then insulation in the walls is all the more beneficial.

Insulation in solar cookers with the construction of an inner box inside of an outer box is usually achieved by lining the walls of the boxes with aluminum foil. If you have limited quantities of aluminum foil, the priorities are as follows: 1) cover the interior space of the oven, inside walls and the inner top of the lid around the glazing and the reflector (or reflectors), 2) cover the inside of the outer box.

For additional insulation, pack with a light weight, clean, non-toxic substance. Such bulk insulation is packaged without tightening as it insulates better if it is fairly airy. Yet it is tight enough not to settle down with time, leaving an empty space at the top. Also, with loose packaging, the sides of the oven are not forced to bulge and misshape the solar cooker. A deflector between boxes foiled or not, helps to insulate, partly by preventing sedimentation and partly by blocking the convective flow of air. Sheets of cardboard or other materials used to separate the insulation space inside each wall, are set roughly in the middle of the space Coatings on both sides of the deflectors is best but not necessary. According to the work of Dr Ed Pejack, an inclined deflector adds to the structural resistance, but is not significantly better for insulation than perpendicular insulation.

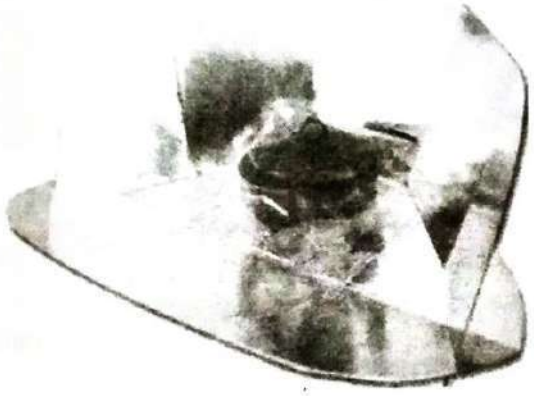
Solar Cooker Designs

Designers and Manufacturers Have adopted various approaches to create solar cookers. The most commonly used were the Box Solar Cookers And The Panel Solar Cookers . They work well for slow cooking, are generally less expensive than other styles and are fairly easy to build for most people. Variants of these designs have generally been used to introduce solar cooking in deforested developing countries since 1950. Models made of high quality are available for purchase from suppliers in many Countries

The parabolic solar cooker are also used for a long time, mainly in Europe and Asia. They bake at higher temperatures and usually require ~~a~~ more complicated manufacturing. A number of models are available from the Manufacturers . They can be used in series to create steam for Institutional kitchens feeding thousands of people a day.

Vacuum Tube Solar Cookers Are compact, cook efficiently, and cook smaller amounts of food. Several models are commercially available. Other variations of solar cookers are also included in the subcategories listed below.

Designs



The CooKit ~~is~~ - a Solar Panel Cooker - is very simple.

Benefits

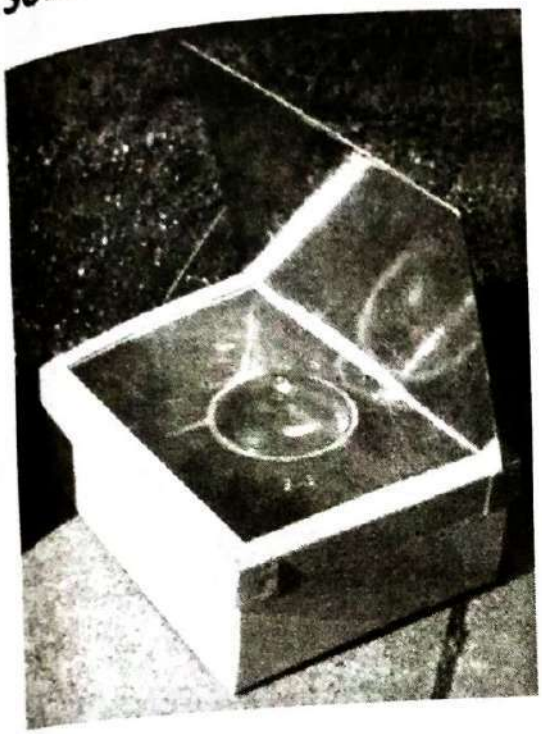
- Inexpensive to build or buy, and can generally be collapsed for storage or transportation
- Slow cooking keeps the flavors and nutrients and requires little or no reorientation to the sun

Disadvantages

- Generally reaches Temperatures ranging from 110 to 140 °c (230 to 284 °f) and cannot fry food
- Craft units are difficult to protect

Article principal: Solar Panel Cooker Designs

Solar Box Cooker



The "Minimum" Box Solar Cooker is a popular Design which can be easily built using cardboard boxes.

Benefits

- Some big enough to cook with several Pots , also perfect for cooking and slow cooking
- Can be built with simple materials
- Several high quality commercial designs also available

Disadvantages

- The front wall of the "box" casts shadow (decreases sunshine) entering the cooking chamber unless the unit is tilted
- Cannot fry food. The cooking temperature is between 135 and 200 °c (275-392 °f)

Design of Parabolic Solar Cooker

The SolSource is an effective Parabolic Solar Cooker

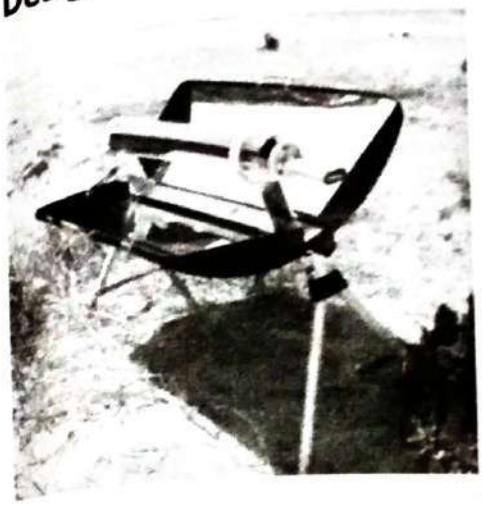
Benefits

- Cooking times are similar to those of a traditional cooker
- High temperatures allow frying and broiling food, usually between 120 and 230 °c (248 to 446 °f)

Disadvantages

- Requires periodic reorientation, often every fifteen minutes, which can be carried out with a device of mechanical Solar monitoring
- Generally more expensive than panel or box solar cookers and requires more storage space.

Design of Vacuum Tube Solar Cooker



The SLiCK SM70 is an example of a Vacuum Tube Solar Cooker.

Benefits

- Usually compact and can cook quite efficiently with relatively small reflectors
- Contemporary designs have an aesthetic appeal

Disadvantages

- The baking chamber requires careful handling to avoid thermal shocks and breakage of the glass tube
- Glass technology limits the size of the opening of the baking chamber somewhat

Benefits

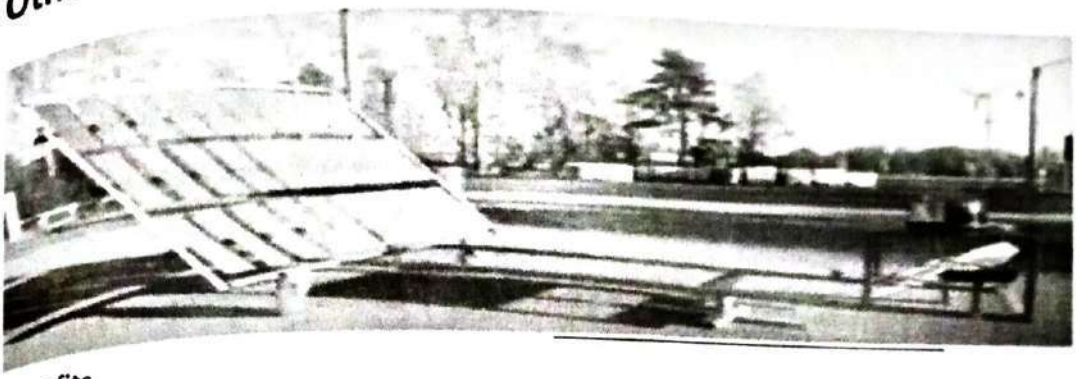
- The curved trough reflector is effective for gathering and concentrating sunlight along a straight focal line
- Works well with the baking chambers to Vacuum tubes To create a compact packaging that is easy to store

Disadvantages

- The design of the chute does not focus the sunlight on a standard pot
- Not particularly well suited for building home enthusiasts

Article principal: Solar Trough Cooker Designs

Other Solar Cooker Designs



Benefits

- Mirror reflectors are flat panels, not requiring the complex curved shape of parabolic solar cookers, they can nevertheless reach typical temperatures of parabolic solar cookers
- Metal frames to hold the mirrors can be assembled by workers with basic welding skills

Disadvantages

- Due to the relatively large size and geometry of some models, they usually need to be redirected by hand or by a mixing system and of Followed Mechanical.
- May require more floor space than other solar cookers

Fresnel Solar Cooker Design

The Solar Cooker Heliac Uses a Fresnel lens with a wide focus, ensuring efficiency and safety.

Benefits

- High temperatures can be Boiling and frying when cooking
- Easy to build on site with flat lenses, avoiding complicated convex structures
- The structures of the structures containing the lenses can be produced with resourcesS local

Disadvantages

- Highly concentrated solar radiation with a spot focus can produce burns
- They may require more storage space than other solar solar cookers

Solar Rice Cooker

There is a wide variety of models of solar cookers, many of which are very simple to build from inexpensive and easy to obtain materials. Some can be built in less than an hour for less than 5 USD. Start with choosing a type of cooker design according to your needs. The table below lists the strengths and weaknesses of the most common types and shows some popular cooks of each type. Under each table are several types of this cooker. You can also Buy a solar oven ~~to~~ from various companies.

Data collection

Data collection is an integral part of the Promotion of solar cooking . In 2017, Solar Cookers International provided the following checklist to help plan new projects.

Data collection Part I: A necessity, not an option

1. Include data sharing as part of the project partner selection process. Communicate clearly that data collection and sharing is expected, not optional.
2. Include a detailed plan for the analysis of the data. Who will collect the data? Where? When? How often?
3. Were the costs of data collection and project evaluation included in the project budget and grant applications?
4. Data quality control: Who will follow up if some of the respondents ' responses do not appear to be clear?
5. Solar Cookers International recommends using the SCI Adoption & Impact Survey Developed by the global network. It is consistent with the surveys used by homes and international organizations.
6. SCI recommends conducting the baseline survey before commencing the intervention. We recommend conducting the post-intervention survey one year after the start of solar cooking by the group.
7. Add data to There .

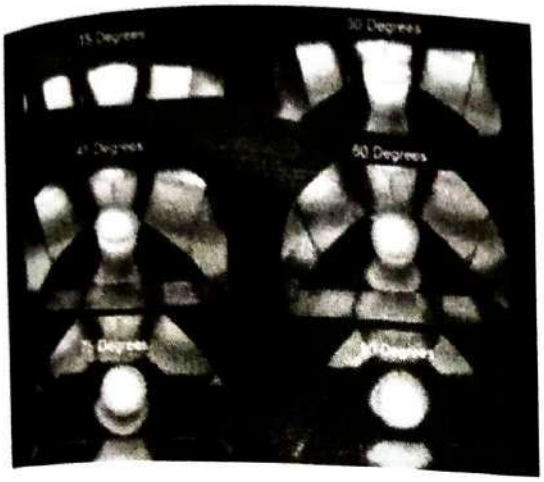
- **April 2017:** Share your best practices with info@solarcookers.org .

Data Collection Part II: Successful solar cooking projects

1. With the survey on the adoption and impact of solar cooking, we recommend conducting the basic survey (before People start cooking with solar energy) and post-distribution issues one year after the start of solar cooking.
2. Make sure that the data is added to the SCI-card of the solar cooker's distribution.
3. Include evaluation costs in the initial project budget and grant applications.
4. Include an agreement on data sharing as part of the initial selection of participation in the project. (participants must understand that this is an expectation for participation in the project)

5. Include regular meeting times in project design so that project participants solve problems, develop community and share data.
6. Make sure the surveyor understands the questions and the expected answers.
7. Gather individual success stories and facts and figures. Include requests for photographs and/or videos and/or quotes within the framework of the grant agreement (and the budget) with the organization implementation with a specific number and due date.
8. Make sure there is a data analysis plan (who does? Where? When? is included in the budget) and data quality control (a way to track whether Some responses do not appear to be clear or may have been communicated incorrectly).
9. Make sure there is a way to understand the local fuel measurement units (such as harvest waste bags) in universal terms (Like kg).
10. Consider the format in which the responses to the survey are recorded. Excel spreadsheets would be much easier for data analysis, but so far I have only been able to receive answers in Microsoft Word format. Take into account the time it takes to transfer data from Word to Excel if this is the case. If possible, use the Google Form version of the survey (but this requires an Internet connection at a given time).

Testing



Absolute Tests

- The performance of the stoves varies considerably and the performance of a specific stove is often different in the laboratory and in the field. The tests enable those responsible for the implementation to assess the performances and fuel emissions. Decisions to implement and improve the design and performance of stoves.

- **Boil water Test (WBT)**

- The SOR test Water Utilization is a laboratory test that evaluates the performance of the stove while performing a standard task (boiling and simmering) in a controlled environment to study the heat transfer and combustion efficiency of the stove. ILS are the easiest, fastest and cheapest to drive, but reveal the technical performance of a stove, not necessarily what it can achieve in real households. **Controlled Cooking Test (CCT)**

- The controlled cooking test is a field test that measures the performance of the solar cooker-compared to traditional cooking methods when a cook prepares a local meal. The CTC is designed to assess the performance of the stove in a controlled environment using local fuels, pots and practice. It reveals what is possible in households in ideal conditions, but not necessarily what is actually achieved in households during their daily use. CCT Test Protocol

Cooking Performance Test (KPT)

- The cooking performance test is a field test used to evaluate the performance of the stove under real conditions. It is designed to assess the real impacts on household fuel consumption and ease of use. LEs KPT are usually carried out as part of a real diffusion effort with real populations cooking normally, and give the best indication of the actual changes. The KPT is a reference test, with parameters that judgment must be considered as part of the process of designing the solar cooker.

Follow the Sun

It is not normally necessary to turn the Box Solar Cookers and the Panel Solar Cookers to follow the sun, unless you cook beans or a large amount of food, or if you are cooking a day when sunlight is not optimal. It may be beneficial to reorient them to the sun every three or four hours. However, the Parabolic Solar Cookers require a much more frequent reorientation with the sun, e.g. once every 15 – 20 minutes as well as stirring food frequently. If sun monitoring is necessary, some of the ideas below will be used for this purpose.

When **considering** tracking systems, it may be useful to determine the annual movement of the sun at various locations. In addition to the annual scope, this useful tool also provides real-time sun information for a specific location. Suncalc.org

The following table presents a good concept regarding sun angles and where one lives. The latitude of the following example is unknown.

Figures shown in degrees from vertical

Jan	Feb	Mar	Apr	May	Jun
26°	34°	42°	50°	58°	66°
Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
58°	50°	42°	34°	26°	18°

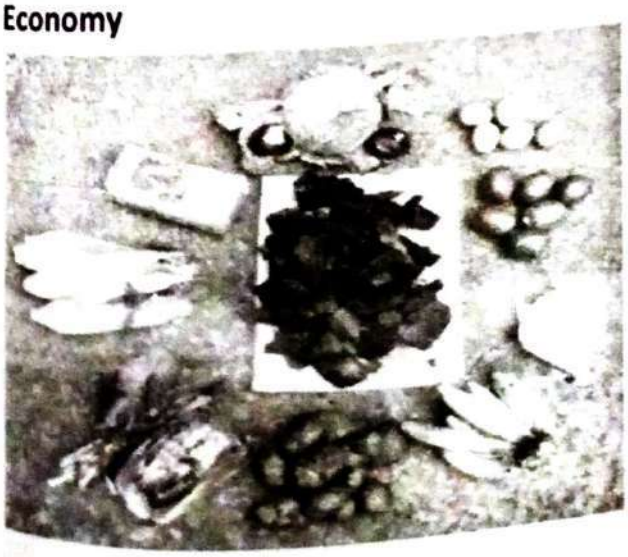
Winter	Spring/Fall	Summer
		
18° angle	42° angle	66° angle

Benefits of Solar Cooking for households

Health and nutrition

- Moderate cooking temperatures in simple solar cookers help preserve nutrients.
- Those who would otherwise do not have the means to buy fuel can cook nutritious foods, such as legumes and many whole grains, which require hours of cooking.
- Sometimes many families have to exchange rare foods for cooking fuels. Solar cooking can help them keep more food **and** improve their nutrition.
- Smoke from fires and smoldering coals irritate the lungs and eyes and can cause disease. The solar cooker is smoke-free.
- Smoke from the fires for cooking is a major cause of global warming.
- Cooking fires are dangerous, especially for children, and can easily spread if they are not contained, causing damage to buildings, gardens, etc. Solar Cookers are without fire.
- Millions of people regularly walk for miles to pick up Wood for cooking fires. Tedious fuel travel can cause injury and expose people to the dangers of animals and criminals. Solar cooking reduces these loads, risks and frees up time for other activities. In the Iridimi refugee camp in Chad The Need to leave the camp to pick up firewood was reduced by 86% thanks to the introduction of tens of thousands of solar cookers (model CooKit).
- With good sunshine, the solar cooker can be used to cook food or Pasteurizing Water In case of emergency when other fuels and energy sources are not be available.

Economy



Each group of food products costs the same price as the pile of charcoal indicated in the middle. By using a solar oven, a family can use the money saved on the fuel to buy more food

- In the world, ~~of~~ countless poverty-stricken families spend at least 25% of their income on cooking fuels. Sunlight -"fuel" for solar cookers - is free and abundant. The money saved can be used for food, education, health care, etc.
- Solar Cooker companies can provide additional income. Opportunities include manufacturing, sale and repair of solar cookers as well as solar cooker companies, such as restaurants and bakeries.
- Even residents of developed countries can save a lot of money on the costs of cooking and air conditioning. See Cost savings of solar cooking .

Convenience

- solar cooking, the food does not need to be stirred and can simply be placed in a solar oven and left to cook unattended for several hours (without burning) while other activities are being pursued. In the right circumstances, it is possible to place a brick or a soapstone in the solar cooker in the morning and go home late in the afternoon or early evening for a hot meal ready to eat. Well insulated solar cookers will keep food hot into the late afternoon and/or early evening without use of bricks or soapstone.
- The pots used for solar cooking are easy to clean.
- Time is saved - a valuable fact for persons who have to travel many kilometers to fetch firewood.
- Many solar cookers are portable, allowing solar cooking on sites or during outdoor activities such as picnics, trekking or camping.
- Solar cookers can be used to pasteurize water making it safe to drink. (included in health benefits below)

Health Benefits

- The pollution of the Air from household cooking fires often leads to respiratory diseases resulting in more than seven million deaths a year. The solar cooker is smoke-free.
- Waterborne preventable diseases account for 80% of diseases and deaths in developing countries. Solar cookers can be used at household level to Pasteurize Water and milk , making them safe to drink. Pasteurization uses about half of the fuel that would have been used for sterilization.
- Many solar cookers can be used to Disinfect Dry Medical Supplies such as medical devices, bandages and other fabric materials, as well as to heat compresses.

Environmental benefits

- Two billion people depend on wood and charcoal for cooking fuels. Solar Cooking lessens these basic needs and helps preserve the declining forests.
- Cooking fires fueled by biomass and oil pollute the air and contribute to global warming. Solar cookers are pollution-free and, when used in large numbers, can help to curb Global warming and gradation. See The overall gradation .
- The kitchens stay fresh while the solar food cooks outdoors. This reduces the load on air conditioning and refrigerators during the summer months, saving fossil fuels (and reducing public utility bills).

Business Benefits

Solar Cooker Business Opportunities

- Manufacture and sale of solar cooker
- Solar Cooker Repair
- Solar products companies such as the Restaurants, Bakeries or Catering

Other commercial uses

- Cleaning dishes and utensils
- Boil the straw Ritz for making paper
- Honey Wax Extract
- Dying fabrics
- Pasteurizing The Potting soil
- Remove the husks from the rice grain

Benefits for Governments

- Reduce imports and subsidies for biomass and fossil fuels.
- When forests disappear and many people suffer from fuel shortages, solar cookers reduce the need for firewood by 30% to 50% for families.
- Electricity companies that are struggling to meet demand in heavy usage hours due to the intensive use of stoves and air conditioners can reduce this demand by promoting the use of solar cookers.
-

Method of cooking with solar cooker

Dried and cooked cereals (barley, maize, millet, oats, quinoa, Rice , wheat) 2 hours. Start with the usual amount of water. Next time, adjust to your taste. If the conditions in your sky are less than ideal, you may have better luck if you preheat the water and grain separately, as suggested for pasta. This is especially useful if the grain is very slow to soften.

Vegetables -Do not add water. Artichokes: 2 1/2 hours; Asparagus: ½ to 1h; Other fresh green vegetables: 1-1 1/2 hour. If they are cooked for longer, they will taste good but lose their beautiful green color and can become mushy. Beans-dried: 3-5 hours. Usual amount of water may be soaked in advance; beets, carrots, potatoes and other root vegetables: 3 hours. Cabbage, Eggplant: 1 1/2 hour if cut. Eggplant becomes brownish, like an apple cut, but the flavor is good; Corn: 1 to 1 1/2 hour. Corn grains fade slightly if exposed to the sun longer. The **pot** holds the moisture and protects the grains naturally. A clean black sock can be placed on a corn cob for a faster cooking time. Squash, zucchini: 1 hour will turn into mush if it stays longer.

Martha Port's experience indicates there is enough water in all fresh (not dried) vegetables, fruits and meats for them to cook in their own natural juices. No water is necessary for them to cook. Adding water simply requires more energy to heat the water before cooking of the food can start. Adding no water is one reason solar cooking is so-o-o flavorful. Only add water to things that require rehydration (rice, pasta, grains, dried food, etc.)

Eggs - Do not add water. Two hours for hard yellows, the whites can become brownish, but the flavor is the same.

Meat - Do not add water. If they are cooked for longer, they become softer. Fish: 1-2 hours; Chicken: 2 hours cut, 3 hours whole; Beef, pork, etc.: 2 hours cut, 3 to 5 hours for large pieces; Turkey, best to cook up into quarters or smaller pieces.

Pasta -Heat the water in ~~a~~ one saucepan. Put the dry pasta with a small amount of cooking oil in another saucepan and heat both pots until the water is almost boiling. Add hot pasta to hot water, stir and cook about 10 more minutes.

Baking – Best time is in the middle of the day (9h or 10h - 14h or 15h) breads: whole loaves 3 hours; Cakes: 1 hour and a half; Cookies: 1 to 1 1/2 hour and should not be covered. The sun makes wonderful fresh garlic bread.

Sauces and gravies with flour -Heat the juice and flour separately, with or without a little oil in the flour. Then combine and Stir. It will be ready soon.

Roasting nuts -Cook uncovered. Almonds: 1 hour, peanuts: 2 hours

CARAMELIZATION of sugar -Sugar can be caramelized in a saucepan in the solar cookers. It's done at lower temperatures than on a conventional cooker. Basically, browning (in a cooker) starts at 140 °c (284 °f). Once the temperature begins to exceed 149 °c (300 °f), the sugar begins to burn

Here are some typical cooking times for 4 pounds (2 kilograms) of food on a sunny day:

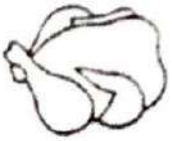
EGG

RICE

FRUIT

VEGETABLES
(above ground)

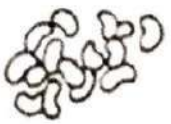
FISH



CHICKEN

POTATOES

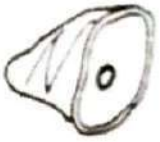
VEGETABLES
(roots)



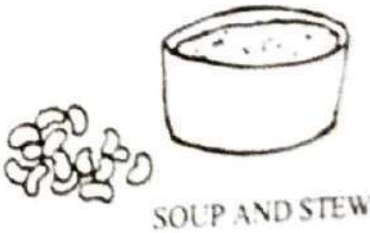
SOME BEANS,
LENTILS

MOST MEAT

BREAD



LARGE ROASTS
(all meats get more tender)



SOUP AND STEW
MOST DRIED BEANS


Solar Cooker
Demonstration


Solar Cooker
Demonstrator

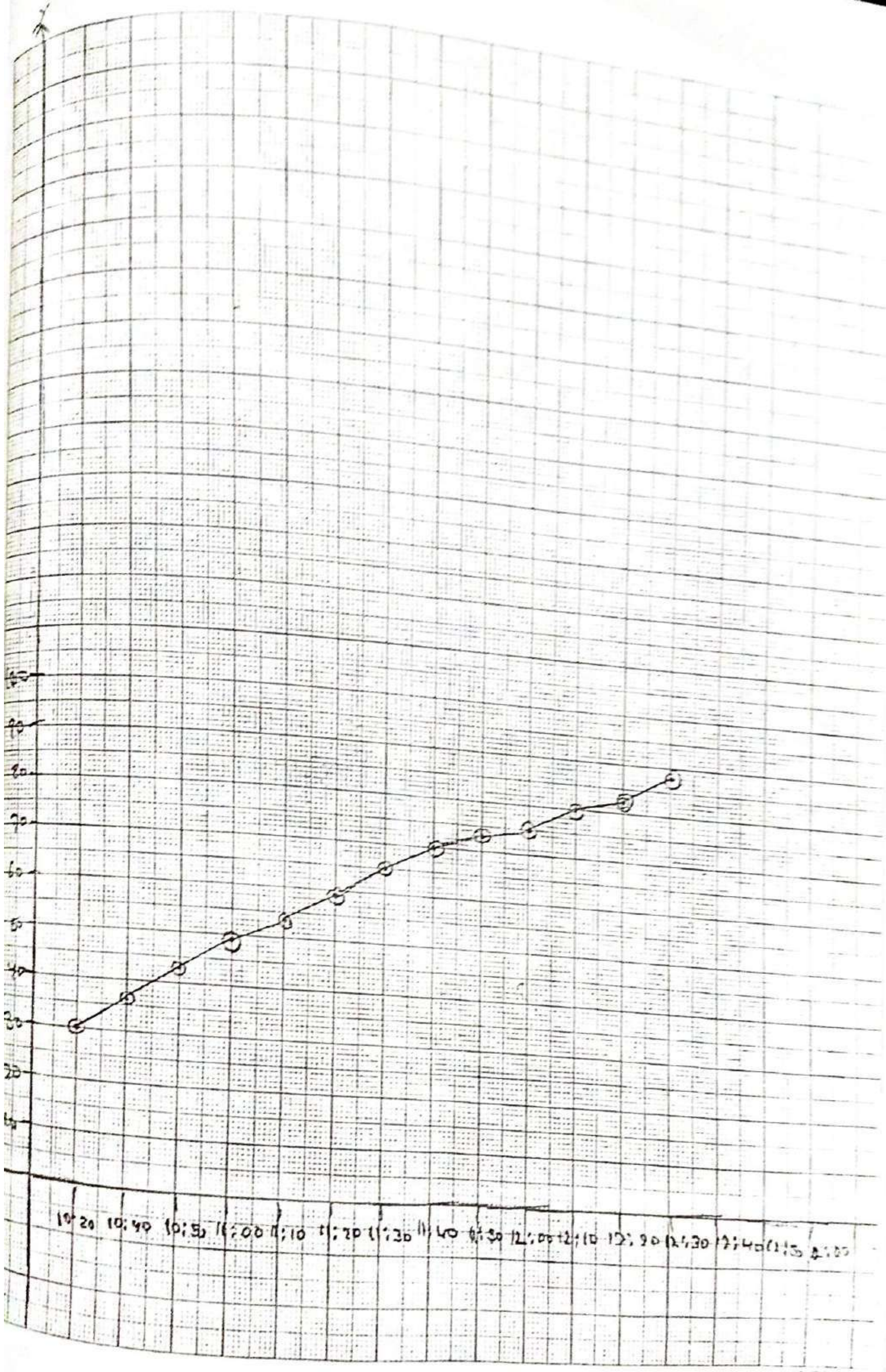
TESTING OF BOX TYPE SOLAR COOKER

Testing of Box Type Solar Cooker

Box type solar cookers are simple and suitable for limited cooking due to their relatively low heat collection capacity. For a large scale dissemination of any technology, it is essential to maintain an effective quality control on the products being offered by the industry to the end user. For this there is a need to establish test procedures and methodological for producing performance parameters, which could provide an equitable basis for comparison of performance of products.

In India, a complete test standard ISI 3429 (BIS, 2000) is available for the thermal performance evaluation and testing of box type solar cooker, which provides performance characteristics of solar cookers, more or less independent of climatic variables. There are two thermal performance parameters called figures of merit (F_1 and F_2) associated with testing of box type solar cookers as per ISI 3429: 2000.

The first figure of merit F_1 is determined from a Cremation test

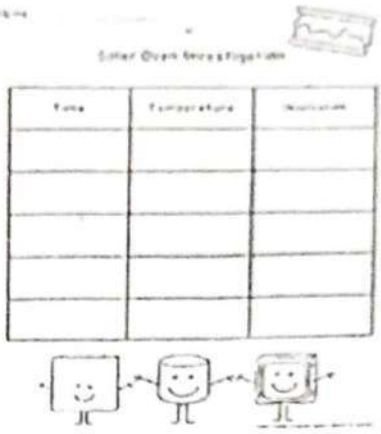

100
90
80
70
60
50
40
30
20
10
10:20
10:40
10:50
11:00
11:10
11:20
11:30
11:40
11:50
12:00
12:10
12:20
12:30
12:40
12:50
1:00

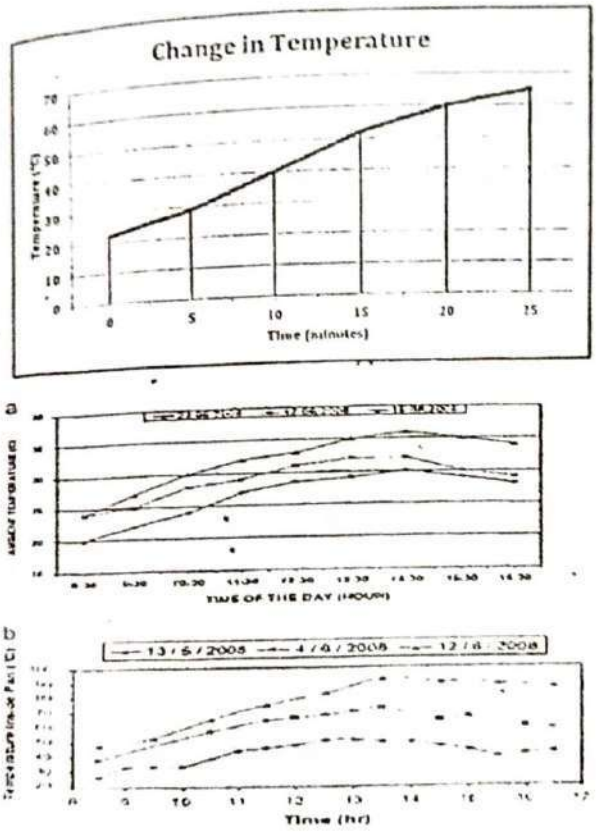
NO Load Test

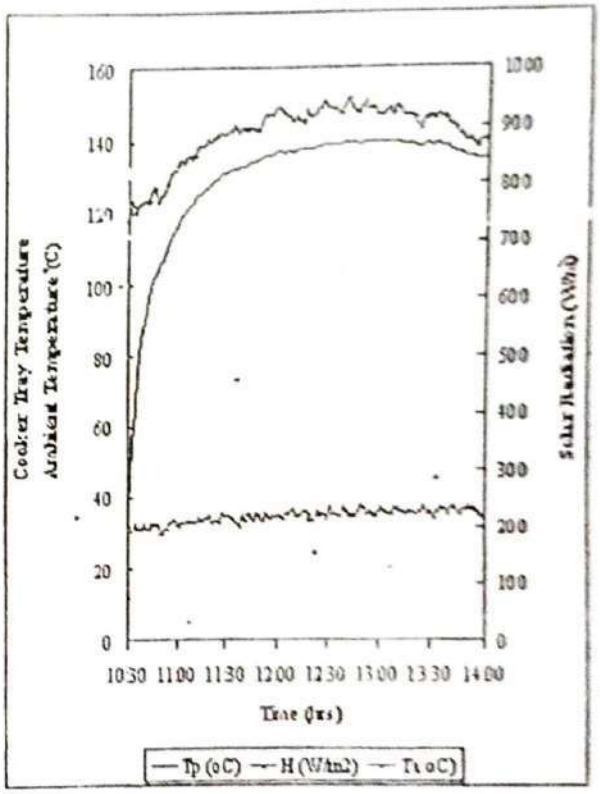
Time	Temperature	Observation
10:30	30°	14-3-2022
10:40	35°	14-3-2022
10:50	42°	14-3-2022
11:00	46°	14-3-2022
11:10	54°	14-3-2022
11:20	58°	14-3-2022
11:30	60°	14-3-2022
11:40	62°	14-3-2022
11:50	68°	14-3-2022
12:00	71°	14-3-2022
12:10	74°	14-3-2022
12:20	80°	14-3-2022
12:30	82°	14-3-2022

under no load condition while the second figure of merit, F_2 is evaluated from tests under full load conditions taking water as the load;

Stagnation (No Load) Test







It is obtained by keeping the solar cooker without pots in the sun-shine in the morning and allowing plate temperature to rise gradually. Soon after solar noon the plate temperature reaches at the quasi-steady state and the stagnation temperature has been achieved. The hot junction of the thermocouple with radiation shield should be fixed at midpoint of cooker tray

with proper thermal contact and without protruding out. The no load test should be carried out at a clear day in following steps before 10.30 hour of local solar time, so that the stagnation temperature is achieved near or just after the solar noon. A step wise methodology for stagnation test is outlined below;

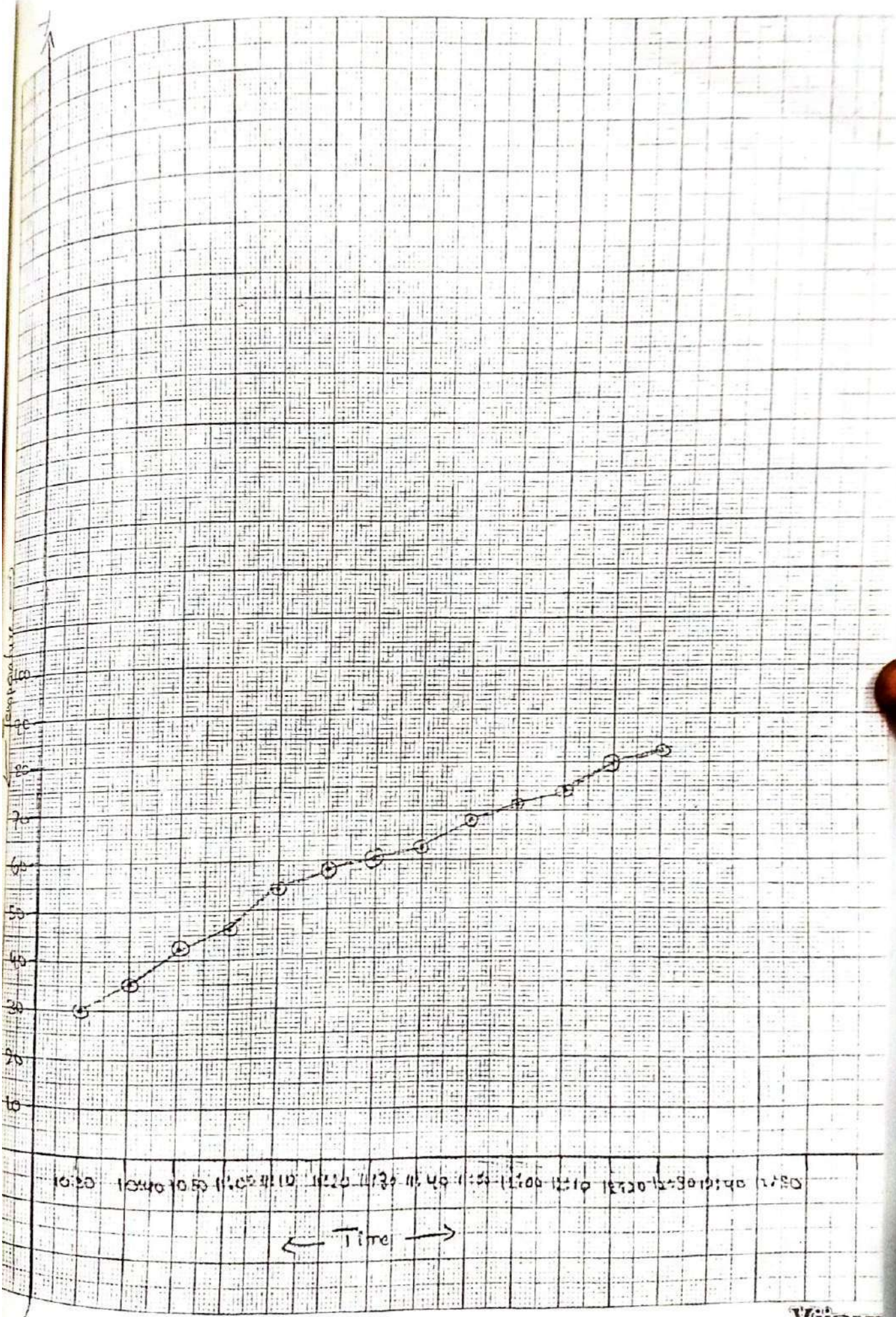
1. The box type solar cooker is placed without pots in open sun condition.
2. The reflector is covered with a black cloth.
3. Cooker tray temperature, intensity of total solar radiation, ambient temperature and wind speed at the level of aperture of box type solar cooker are monitored and measured at an interval of five minutes.
4. When the cooker tray temperature reaches quasi-steady state, the final steady cooker tray temperature, the corresponding outside temperature and intensity of total solar radiation are recorded. The steady state condition is defined as 1o minute period when:

   (i) Variation in cooker tray temperature is less then ± 1°C.

   (ii) Variation in solar radiation is ± 20 W/m^2.

   (iii) Variation in ambient temperature is ± 0.2 °C.

The permissible solar radiation condition for carrying out the tests is that it should always greater than 600 W/m^2. If the value of F_1 is greater then o.12, the cooker is marked as A - Grade and if F_1 is less than o.12 the cooker is marked as a B - Grade solar cooker.


Temperature (°C)
Time

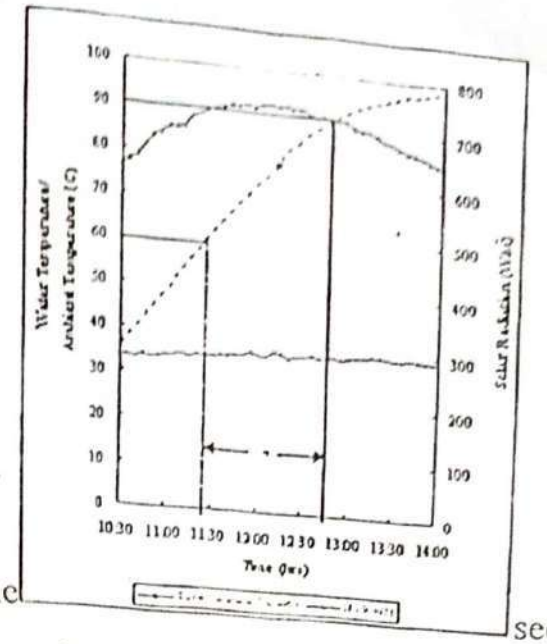
S.No	Time	Reflector temperature (T_1)	Glass temperature (T_2)	Inner glass temperature (T_3)	Surface temperature (T_4)
1	10 : 30	37°	40°	45°	50°
2	10 : 53	40°	43°	45°	50°
3	11 : 30	37°	38°	40°	42°
4	12 : 00	42°	45°	47°	52°
5	12 : 30	45°	48°	50°	55°

S.No	Time	temperature of the water
1	10 : 30	60°
2	10 : 53	65°
3	11 : 30	55°
4	12 : 00	58°
5	12 : 30	60°

Full Load Test

Time	Temperature	Observation
10:30	30°	
10:40	36°	13-3-2022
10:50	43°	13-3-2022
11:00	49°	13-3-2022
11:10	53°	13-3-2022
11:20	59°	13-3-2022
11:30	65°	13-3-2022
11:40	70°	13-3-2022
11:50	73°	13-3-2022
12:00	75°	13-3-2022
12:10	80°	13-3-2022
12:20	82°	13-3-2022
12:30	88°	13-3-2022

Full Load Test



Testing for the second figure of merit of the box type solar cooker consists of operating the solar cooker with full load test with cooking utensils, and the amount of water i.e. 8 liter/m^2 in each pot has been decided by the bottom area of the pots. The cooker is kept outside in morning (before 10.30 hours of local solar time) and the water temperature is allowed to rise gradually until it reaches up to the boiling point.

Followings instructions are associated with the full load test of box type solar cooker.

1. The empty cooking pots are weighted and then filled with water as load @ 8 litres per square meter of aperture area. Water at ambient temperature is equally distributed in all the cooking pots if they are of the same size. If sizes are different then water quantity in each cooking pot shall be in proportion of their bottom area. By reweighing the exact mass of water is calculated. The pots are placed in the cooker after removing or shading the reflector with a black cloth.

2. Temperature probe of thermocouple is placed in the largest at the cooking pots with the measuring tip submerged in the

water. The temperature lead should be sealed where it leaves the cooking pots and the cooker.

3. The ambient temperature, intensity of total solar radiation and wind speed at the level of glazing of solar cooker are measured throughout the test.

4. The test is started in the morning between 10.00 hour to 10.30 hour of local solar time. Following measurements are done;

(i) Water temperature is measured along with the exact time of the measurement.

(ii) The data recording is continued until the water temperature exceeds 95°C.

(iii) Initial and final water temperatures data pairs are located and time duration is noticed between them. Initial and final temperature is chosen 60°C and 90°C.

(iv) The average ambient temperature and average solar radiation intensity between times t_1 and t_2 are calculated.

(v) The experiment is conducted in clear weather, and it is ensured that the solar radiation during the test exceeds 600 W/m^2.

The Indian test standard has a provision of a number of qualification tests for ensuring durability of the products. These include, rain penetration test, transmittance test, mirror reflectivity test, slam test, load test for cover plate, leakage test for rubber gaskets, impact test, etc. Specifications for the different components of solar cooker are also given in the test standard.

RESULT :-

The Performance Efficiency of a Solar Cooker is Evaluated.

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

Lecturer in charge

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KAKINADA-2

29/6/2022

Head of the Department

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Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: Post Harvest Technology (Cluster VIII B 3).

Title of the Project: Shrimp Farming and Management Practices.

Lecturer in charge

Lecturer in Zoology

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Head of the Department

28/6/2022

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Regd. No. 1933006

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **L. Priyanka** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Gurajanapalli village of Karapa mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp pond and Management Practices.**

Lecturer in charge

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CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms.S.Nagasatyaof III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at bulliabbaireddy colony village of kakinadamandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:**Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp pond and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

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Certified that this is a bonafide record of Project work in Zoology, done by Ms. **CH.Manasa** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at shrimp ponds located at Addaripeta village of Thondangi Mandalam,East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp pond and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

Lecturer in charge

Head of the Department

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Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933024

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Certified that this is a bonafide record of Project work in Zoology, done by Ms. **G.Prema Jyothi** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds location at Bullabai Reddy colany Thurangi kakinada, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish pond**

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CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. **K. Rajeswari** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:**Fish Farming and Management Practices.**

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A.S. GOVT. COLLEGE FOR WOMEN
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CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. M. Akhila of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Atchuthapuratrayam village of peddapudi mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

Lecturer-in-charge

Head of the Department

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Jagannaickpur, Kakinada - 533002, East Godavari, AP.

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CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. P.bhava devi of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: Post Harvest Technology (Cluster VIII B 3).

Title of the Project:Fish Farming and Management Practices.

Lecturer in charge

Lecturer in Zoology
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8/6/2022

Head of the Department

Head of the Department
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Regd. No. 1933033

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. **P.Sravanthi** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish** Shrimp **Farming and Management Practices.**

Lecturer in charge

Lecturer in Zoology
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KAKINADA-1

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DEPARTMENT OF ZOOLOGY
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A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Hatchery Management Practices.**

Lecturer-in-charge

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Head of the Department

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CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **P Jayashila** of III B.Sc. (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Bangarammapeta village of Nakkapalli Mandal, Visakha Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:Shrimp Farming And Management Practices

Lecturer in charge

Lecturer in Zoology
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Head of the Department

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Certified that this is a bonafide record of Project work in Zoology, done by Ms. **S. Sirisha** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at BANGARAYYAPETA village of payakaraopeta mandal, Visakha Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

1. Title of the Project: **Shrimp Forming and Management Practices.**

Lecturer in charge

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Head of the Department

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp pond and Management Practices.**

S. Lalitha

Lecturer in charge

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:**Fish Farming and Management Practices.**

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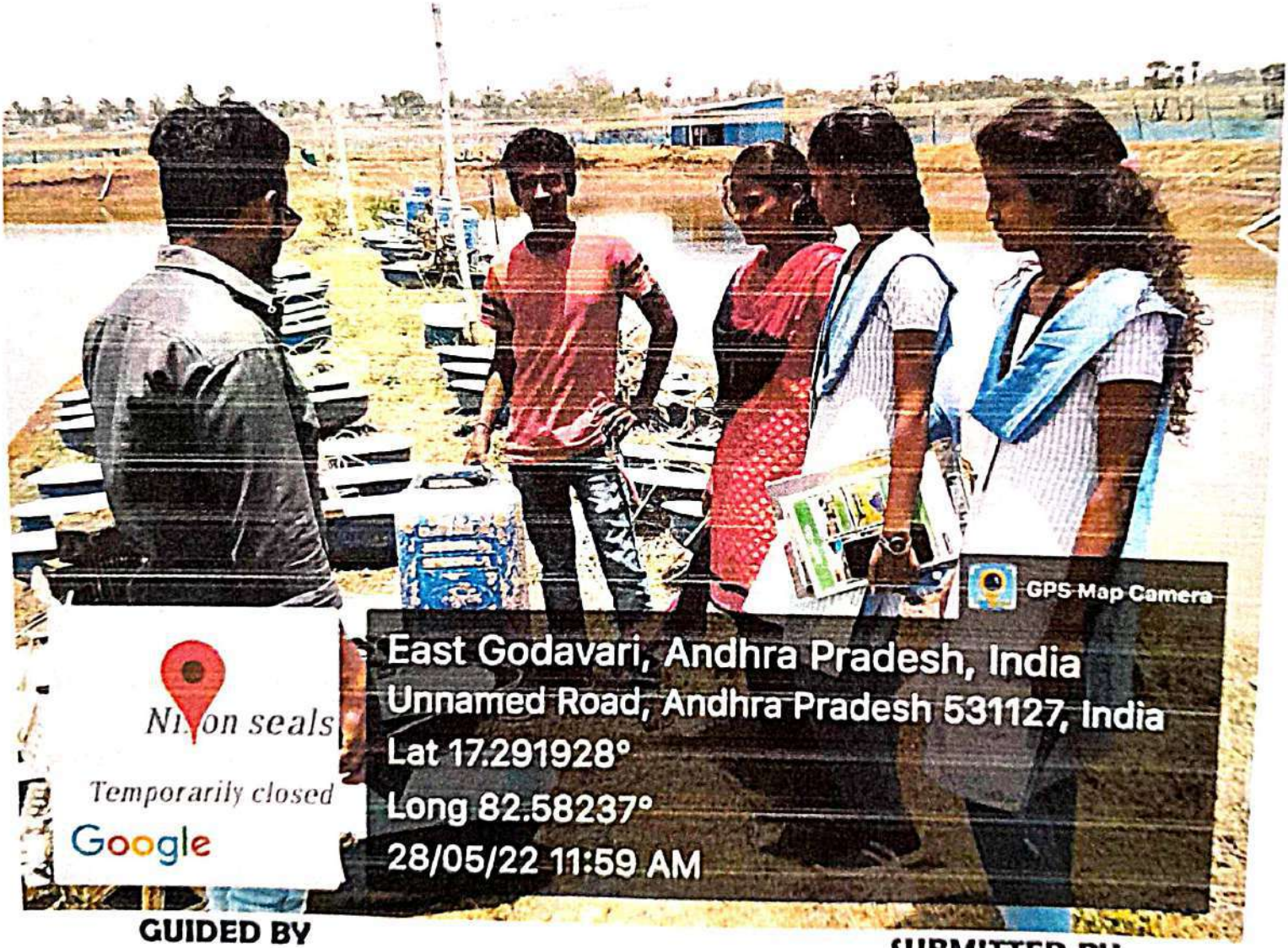
Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

D. SRAVANI

III B.Sc (CBZ).

ACKNOWLEDGMENTS

It gives me an immense pleasure to express my deep sense of reverence and gratitude for all those who have rendered their support at various stages of the project work.

I express my deepest sense of gratitude to **Smt. M.Vasantha Lakshmi, Lecturer in charge of Zoology and Smt. S. Madhavi, Lecturer in Zoology for guiding the project.**

I would like to express my sincere gratitude to **Dr. V. Anantha Lakshmi, Principal,** ASD Government Degree College, (W) (A), Kakinada, for her constant support, encouragement and valuable suggestions.

I extend my gratefulness to Sri. Prudvi Raju garu Aqua farmer of Addaripeta village of Thondangi mandal, East Godavari District, Andhra Pradesh for allowing me to carry out the project work at their fish farms and enlightening me by providing detailed information regarding the site selection, soil composition, pond preparation, liming, pond fertilization, culture species, stocking, water quality management, feed management and disease management.

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Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

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INTRODUCTION :-

The word of aquaculture through uses rather widely for the last two decades to denote all forms of Culture of aquatic animal and plants in fresh brakish and Marine Environment is still used by many in a more restrictive sence for Some it means aquatic Culture other than fish farming of fish husbandary where as other understand it as aquatic farming other than mariculture

However when it is used to be used to denote

1. the type of Culture technique & system
   Ex:- pond Culture raceway Culture Cage Culture
   pond Culture raft Culture
2. the type of aganism Cultured
Ex:- fish Culture of fish husbandary, Oysters, mussel shrimp & Seaweed Culture
3. the environment in which the Culture is done
Ex:- fresh water, brakish water, salt water & marine aquaculture
4. A specific character of the environment used for

Ex:- Cold water or warm water aquaculture upland low land inland Coastal atmosphere the use of restriction terms would properly be more appropriate

History of aquaculture :-

Large scale aquatec farm is a relatively recent development but Small scale aquatec farming existed inland area in some countries from ancient train time most being the evalution to Pastontion and Land Cultivation

Origen and growth of aquaculture :-

Most publications on aquaculture refer to long history of fresh Culture in Asia ancient Egypt and Central Europ the classic fresh Culture believed to have been written around 500 BC by Fan Lei a chinese - politician learned fresh Culturist is Considered proof that Commercial fresh Culture existed in China on this time, as he Cited fresh ponds on the Source of his wealth [Ling 1977]

Later writings of Chou mit of the Sung Dynasty Kevic Sch Chak shik in 1243 AD] and of the Hence A Complete Book of agriculture in 1639 AD] Various of this System Came to be practiced in

Indonesia for Carps and in Thailand for the Cat fish pangasious

the earliest brackish - water farming in Southeast Asia appears to have originated in Indonesia in the island of Java during the 15 Century AD

As Mentioned earlier, the history of aquaculture in Europ stars from the midde ages with the Introduction of Common Carp Culture in monastee ponds

Present status of aquaculture :-

To evolute the present status of aquaculture It is essential to asses the state of Capture of fisheries excluding the processing of animal food

for example of 94.8 million tons produced by Capture fisheries in the year 2000, only 70 million tons Can be expected to become available for Human Consumption of the Current rate of utilizing

Available fishry statics for the year 2000 seem to Justify Some of the optimistee Estimates made earlier. the Capture fisheries landing amounts to 94.84.800 tons and aquaculture harvest are estimated to be 35,58,500 tons, which together yield 130,33,3000 tons of the edible fishes

Products

Aquaculture production of fish Crustaceans and Molluscs amounts to about 35,58,5000 tons valued at US $ 50,85,900 in the year 2000. Aquatic plant production mainly in the asian region amounts to 10,130,448 tons valued of US $ 56,07,835

the Overall production of all aquatic organisms is expected to amount to 457,15,550 tons valued at US $ 56,466,782 in 2000

Aquaculture production increased from

7.4 million tons – 1980
16.8 million tons – 1990 more than
42 million tons – 1999 valued at over US $ 53 billion

Current status of the World Fisheries :-

in 2018, total global Capture fisheries production reached the highest level ever recorded at 9.4 million tons an increase of 5.4 percent from the average of the previous three years

in September 2015 the United Stations nations Launched the 2030 Agenda for Sustainable Development a beautiful blueprint for global peace and prosperity

Honored Afla 5 years of unseen progress

and with less than 10 years to go, and despite progress in many Areas. it is clear that action to meet the 17 sustainable development Goals (SDGS) is not yet advancing at the Speed at scale required

the 2020 edition of the State of world fish- eries and aquaculture Contains to demonstration the Significant and growing role of fisheries and aquaculture in providing food.

Current Current status of aquaculture in India

fisheries in india is a very important economic activity and a flourishing Sector with varied resources and potentials. Only after the indian independence, has fisheries together with agriculture been recognised as an important Sector from 0.75 million tonnes in 950-51 to 9.6 million, an comparable -led average annual growth rate over 4.5 percent over the years which has placed the Country on the forefront of global fish production. Only after China india is also an important Country that produces fish throughout aquaculture in the world in india home to more than 10 percent of the global fish diversity present the Country ranks

As the second largest country in aquaculture production the share of inland fisheries and aquaculture has gone up from 46 percent in the 1980s to over 85 percent in recent years in total fish production the freshwater prawn farming has received increased attention only in the last two decades due to its high consumer demands. indian aquaculture production basically can be classified into freshwater and brakish water fish farmers development agencies [BFDAs] for promoting freshwater and coastal aquaculture

Present status of aquaculture in AP :-

in recent, aquaculture has boomed in Andhra pradesh, the state has become one of the indias largest producer of farmed fish and Shrimp among the reasion for the boom : a major expansion of inland aquaculture farms along rivers and canals where people once raised crops.

the Operational land images (OLI) on Landsat 8 aquired this natural - Colour image of an area dense with inland aquaculture ponds along the eppuleru River on June 8, 2021

the upputere river on June 8, 2021

Aquaculture ponds appear dark green formula is generally brown. Coastal area with Mangroove forests are light green

the indian government established the first aquaculture pond in this area in the 1970s around lake Kolleru despite the Expansion india agriculture sector has faced challenges recently one recently One Study Calculated that it shrimp farming Sector may have lost as much as $1.5 billion in 2020 - 2022 due to descriuptions related to the pandamic

the state of Andhrapradesh acount for about 70 percent of indian shrimp production

Prawn Culture :-

there are two types of prawns forming freshwater Prawn forming and salt water prawn forming Commercially fresh water prawn forming Can be done in tropical and sub - tropical climatic regions having resorvious, lakes irrigation ditches seveve pond and other natural water resources

Marine shrimp Farming.

Marine shrimp is an aquaculture business for the Cultivation of marine shrimp or prawn for human Consumption the total global production

of farmed shrimp reached more than 1.6 million tons in 2003, representing a value of nearly 9 billion U.S dollars, about 75% of farmed shrimp is produced in Asia in particular in China and Thailand the other 25% is produced mainly in Latin America where Brazil, Ecuador Largest exporting nation in india

shrimp farm has changed from traditional small-scale business in southeast Asia into a global industry

Fresh Water Shrimp farming

Freshwater shrimp also called malaysian prawn are the species Macrobrachium rosenbergi originally from malaysia there are relatively Easy to aquaculture but require large ponds with excelent filteration and water Quality

Many shrimp farms have successfully employed a three-pond grow-out system. allowing for three harvest a year. the pond should maintaine a temperature of at Least 70 degrees fahrenheit and a pH between 6.5 and 9.5 purchase Juvenile Shrimp from a hatchery.

Used for prawn Culture

Currilly Macrobrachium rosenbergii is the favourite species of india prawn Culture. in india prawn breeding unit of Central Inland fisheries Research institute developed indigenous technology for prawn Culture in the year 1975. Macrobrachium rosenbergii is also known as Giant fresh water Prawn

World wide shrimp farmed production:-

the shrimp pond with at the National Fishery institutes' Global Seafood market Conference Miami, florida USA January 21-25, 2018 Estimated that the world production of farmed shrimp would reach 3.5 million metric tons in 2018.

there were some Concerns Expressed by the panelists over the Sustainability of indias production Expansion. Robin Mehtos, Senior Vice president of thai agribusiness and food processing in india Couldn't Continue forever

the panel estimated that Ecuador would Export 531,000 tons of farmed shrimp in 2018 up from 469,000 tons in 2017 Ecuador had what sandro Cogiliter, who owns Omasa a

Major shrimp farms and process called a hiccup on the hatchery side in 2017 limiting the supply of larvae

Shrimp farmed production in india :-

India as the second Largest Country on shrimp aquaculture production in the world the share of the brakish - water sector includes the culture of shrimp varieties primarily the native giant tiger prawn paneou Monodon and exotee white - leg shrimp Litopenaus Vannami, Today. L. vannami species is the most ~~extensively~~ farmed Crustacean species in the world

the selection of a suitable site always plays a major role in shrimp aquaculture farming the selection of a site for shrimp farming mainly depends on topography. ecosystem Meteorological and socioeconomic Conditions about farm design, species Compatability

the type of soil Condition is the most Critical in Site Selection since the shrimp will spend most of its time on the pond bottom during the Culture period

Present status of shaimp Culture in Andhra Pradesh :-

shaimp farming has grown a traditional small - scale business in Southest Asia, into a global industry Joseph Selwin et. al 2009. In india Extensive production systems of shaimp Culture is more profitable Leung & Engle 2006 than the other Culture systems. technological advances have led to growing shaimp at even higher densities almost all the farmed shaimp are penacid group of the family penaeu monodon and pacific white shaimp Lito pennaneu vanamei occupied more then 90% of the farmed shaimp production

Further, shrimp culture has been listed as one of the priority sector in india by the Government for increasing Exports and there by contributing to the foreign Exchange reserves the shrimp and marine Exports from Andhra pradesh has also been tremendously increased from RS. 2100 Crores to Rs. 14 200 Crores during the same period MPEDA, 2015

The farmers had first bred tiger variety peneous Monodon had first bred variety peneous Monodon and there shifted tiger variety peneous Monodon and there shifted to litopenaeus Vannamei and their Earnings are increasing

Construction of shrimp pond :-

there is no standard design for a shrimp rearing pond present days farming practices still heavily rely on the Experience of individual farmers finacial Capability and the environmental Condition prevailing at the site. A shrimp pond from the Engineering view point is Essential an in compartmented Improved in fish Culture pond

Size and Shape of Culture ponds :-

there is no standard design for a shrimp rearing pond. present days farming practices

Rectangular or square pond are appropriate for shrimp culture. the longest axis of a pond should be parallel to the prevailing wind direction

the breadth of a pond depends largely on the purpose and the operational system employed. the following are the various sizes recomended

- Nursery pond – 500 to 1,000 m^2
- Grow out pond – Intensive – 0.25 to 1.0 ha
  semi intensive – 0.5 to 2.0 ha
  Extensive – 1.0 to 10 ha

feed Management in shrimp Culture :-

To ensure optimal water quality and clean pond bottoms at shrimp farms. Choosing Consistently good Quality feed and close monitoring of food trays supported by a proven feeding guide are recommended practices to control the amount of feed applied to ponds the use of autofeeders and biofloc technology. as well as awareness of ponds Carrying Capacities can.

help shrimp farmers reduce feed costs. preserve Capital and maximize profit

Feed Quality

Not all feeds are Created equal Some feeds have better digestibility amino acid profiles and fatty acid profile and Contain sufficient immune Stimulate. selecting a Consistently good Quality feed will result in better average daily growth, survival and feed Conversion and these help a better bottom line

Water Quality

To Culture shrimp one must first Culture the water" is the adage of many shrimp farmers in Asia. As shrimp are reared in a small space with a small volume of water to maximum profit the shrimp excretion, uneaten feed and myriad opportunistic microbiotes growing in it put tremendous stress of pond ecosystem

Harvesting :-

There are several behaviour characteristics of shrimp which Can be used to advantages during harvest. they move arround the pond at night

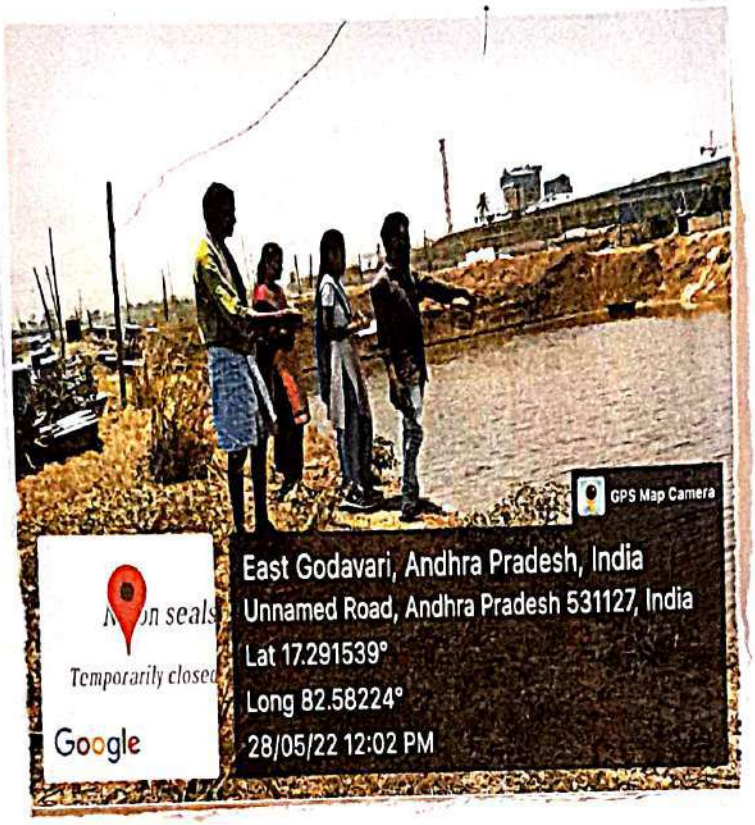
Looking for food they are attracted to light

When water is let into a pond, the shrimp become active, swimming around the pond and after gathering near the sluice gate

Partial harvesting :-

Partial harvesting is used in some types of management systems where only large shrimp are to be caught and smaller shrimp left in the pond to grow larger, and in polyculture where a farmer wants to harvest shrimp not fish

Study Area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Long 82.58224°
28/05/22 12:02 PM
Temporarily closed
Google


GPS Map Camera
East Godavari, Andhra Pradesh, India
Unnamed Road, Andhra Pradesh 531127, India
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Long 82.583006°
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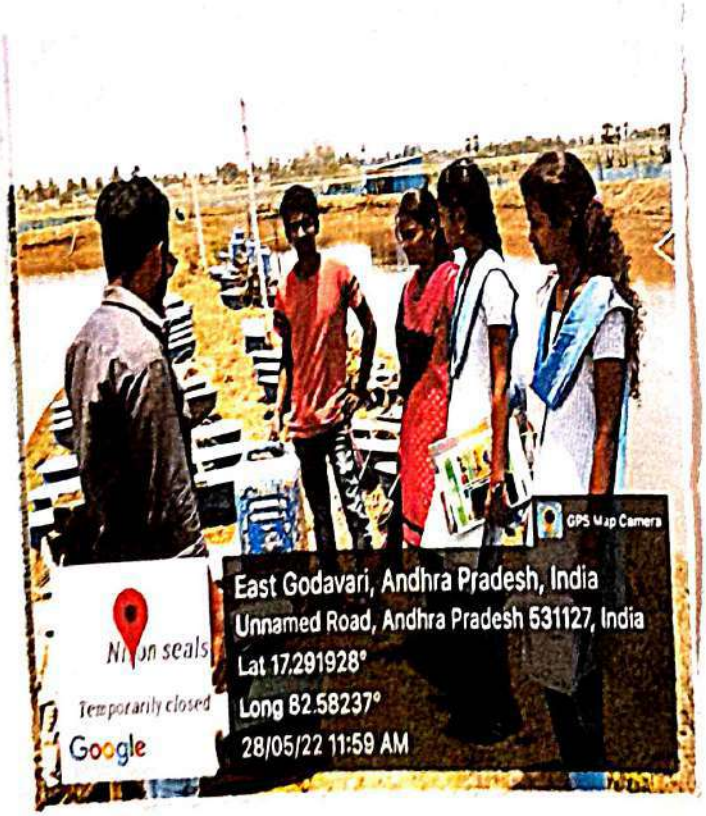
METHODS & MATERIALS REQUIRED

Methods

1. Observation
2. Questionnaire

Materials :-

1. Aerator
2. Motor pumps
3. Generator



Questionnaire :-

1. From which nursery pond you will Collect the fry for Culture?
2. How far the pond is to the nursery?
3. How many tanks of fry will bring to the Culturing pond?
4. What precautions should we take Culturing the transportation of fry?
5. How much of time it will take to make that fry adaptable to that Culture pond introduce a fry into pond?
6. What Measures should be follow to make that fry adaptable to that Culture pond?
7. Are you producing fry yourself or import from any other?
8. How many fry's reared in single pond?
9. What is the soil pH of your Culture pond?
10. Which type Chemicals do you used to increase the growth phyto and Zooplanktons?
11. What is depth and size of the pond?
12. Which type of Culture you are doing right now?
13. What species of fish you are Culturing as monoculture?
14. How many types of species rearing in the Cultured in the your area?
15. From Where you are Collecting the water for your Culture?
16. How many months it will take to Culture to Shrimp?
17. What chemicals is used for nutrients?
18. How amounts dissolved Oxygen present this pond?
19. What is the total hardness present and how much?
20. Hardness will be suitable for Culture?
21. How the tanks are prepared for fry rearing or Culture?
22. What Care should be take when a shrimp exposed to disease (or) stress?

Results and discussion :-

the present working Area is located at Addaripeta village of thondangi Mandal, East godavari District. Here the aquafarmer PRUDVI RAJU was Culture in shrimp pinceus Monodon. He was prepared the shrimp farm as per Monodon. instructions, As per my knowledge of text books. He Collected seed from Sainidhi Hatchery located At Addaripeta village. he has taken Care of Seed about feed Management. Disease Managem -ent. He changed in physical and chemical parameters of water and in physical and chemical parameters of water and soil. While he practice Culturing After three months of Culturing the harvesting is performed under Marketing in local Area

By following proper Management practices of shrimp Culture in the farmer was getting the best income and he was Continue in the shrimp Culture

He was Continue, since 10 years onwards.

CONCLUSION :-

By during this project we learn the actual practices of shrimp farming and practicle Experiences too. we need some more practical Experiences of shrimp Culture. Because at the time of our visiting the pond is de-watering and dryingand prepared for next batch of shrimp Culture

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This is to certify that **Adapa Santhi rupa** is a student of III year B.Sc CZAqT has done the project entitled **"Assessment of some Physico- Chemical Parameters of canal water at Jagannaickpur, Kakinada"** in the Dept. of Zoology and Aquaculture Technology, A.S.D. Govt. Degree College for Women (A), Kakinada during the academic year 2021-2022 under our supervision.

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ASSESSMENT OF PHYSICO-CHEMICAL PARAMETERS OF GODAVARI CANAL WATER AT KOVVURU PANCHAYATI, KAKINADA

PROJECT SUBMITTED FOR THE DEGREE OF B.Sc., CZAqT

By

G. H. V. L. PHANEENDRA
B.Sc., CZAqT
Reg. No: 1936005

ASD Govt. Degree College for Women, Kakinada

స్త్రీ విద్యా ప్రవర్ధతాం

Project Guidance by

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Project Submitted to

DEPARTMENT OF ZOOLOGY & AQUACULTURE TECHNOLOGY
A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A), KAKINADA

2021-2022

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(Smt. M. Vasantha Lakshmi)

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External examiner

DECLARATION

I **G. H. V. L. Phaneendra** III B.Sc, CZAqT to hereby declare that the project entitled **"Assessment of Physico- Chemical Parameters of Godavari canal water at Kovvuru Panchayati, Kakinada"** is an authentic record of project work done by me under the guidance of Smt. N. Veera Chanti, Lecturer in Aquaculture Technology and Smt. M. Vasantha Lakshmi, Head Dept. of zoology, A.S.D.Govt.Degree College for Women (A), Kakinada. This work has not been submitted for the award of any other degree or diploma earlier.

G. H.V.L. phaneendra

Signature

CONTENTS

ABSTRACT

In present study Physico-Chemical parameters such as, pH, Electrical conductivity, Total dissolved solid, Total hardness, Total alkalinity, dissolved oxygen, salinity, ammonia, nitrate, Calcium and Magnesium ions of Godavari canal water samples were analyzed. Samples were collected weekly from 19-03-2022 to 19-4-2022.

INTRODUCTION

Water is the most vital factor for the existence of all living organisms. Discharge of domestic waste and sewage without any treatment into the water bodies has resulted in deterioration of the quality of aquatic habitat. Indiscriminate discharge of industrial effluents is toxic to the aquatic environment, creates water pollution, making water unfit for drinking, agriculture and for aquatic life. The World Water Assessment Program indicates that, in the next 20 years the quality of water available to everyone is predicted to decrease by 30%.

Monitoring and Assessment with the help of water quality analysis techniques provide basic information on the condition of our water bodies. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know information about different Physico-Chemical Parameters before it is used for different purposes. In developing countries such as India the most of the rivers E.g., Godavari, Ganga etc., are the ends of effluents and sewage discharge from urban as well as industrial areas.

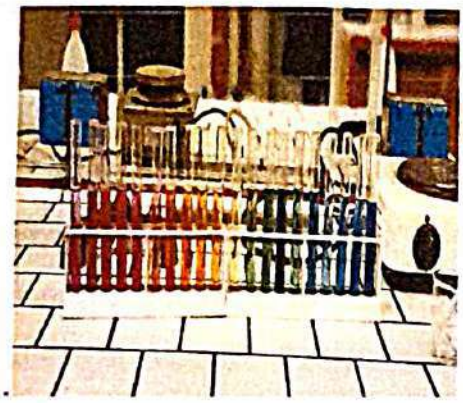
The objective of the present study has been considered, to evaluate the Physico-Chemical Parameters of Godavari canal water (upstream and downstream) at Kovvuru Panchayati, Kakinada.

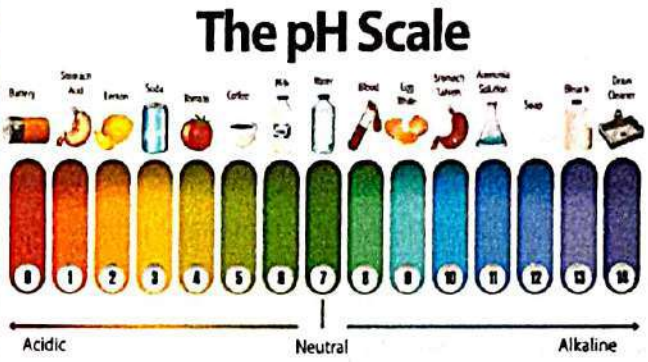
MATERIALS AND METHODS

The Godavari canal selected for the present investigation originates in Kovvuru at Kakinada in Andhra Pradesh.

pH:

The pH of the water sample is identified with the help of Digital pH meter.or by using 2 drops of universal indicator in 10 ml of sample then it generates a new color. By comparing the color with the pH scale, one can find the pH of the sample.





SALINITY:

Salinity of the sample was funded by using a Refract meter. Determination of salinity, as the total measure of inorganic dissolved matter, is by evaporation of the water and weighing of the residue. This is a difficult process because some carbon dioxide and hydrogen chloride escape during the evaporation process and corrections must be made for this. Furthermore, at sea, these methods involving weighing cannot be used. So the methods to be applied in it have to be indirect ones.

ELECTRICAL CONDUCTIVITY (EC).

EC is measured by using TDS conductivity meters. When the electrode is placed in the sample the reading can be seen in the digital meter. And note down the reading.

TOTAL DISSOLVED SOLIDS (TDS):

TDS is measured by using a TDS conductivity meter. When the electrode is placed in the sample it can be seen in the digital meter. And note down the reading.

TOTAL ALKALINITY (TA):

Procedure: Take 10ml of sample in conical flask then add 2 drops of phenolphthalein indicator. If the sample turns to pink (CO3 hardness) and then nitrate with N/50 sulphuric acids until it turns to colourless and then add 2 or 3 drops of Methyl orange indicator(sample turns to yellow) then nitrate with N/50 sulphuric acids then sample turns to light orange . Then note down the burette reading and apply it in the formula.

Alkalinity=Burette reading ×1000/volume of sample taken

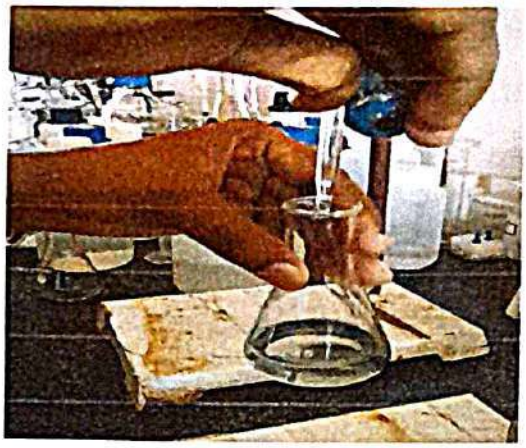
TOTAL HARDNESS (TH):

The calculation of hardness in water by EDTA titration can be found by adding a small amount of a dye such as Eriochrome Black T is added to an aqueous solution containing Ca++ and Mg++ ions at a pH of 10 ± 0.1, Ca++ and Mg++ form chelated complexes of wine red color with EBT.

But EDTA has a stronger affinity towards Ca++ and Mg++. Hence, if EDTA is added, the former complex (Ca-EBT and Mg-EBT) is broken and a new complex (Ca-EDTA and Mg-EDTA) of blue color is formed. When all the ions are complexed the solution will turn blue. This is the endpoint of the titration. The higher the pH, the sharper the endpoint.

However, above pH 10 there is a danger of precipitation of $CaCO_3$ and $Mg(OH)_2$. Hence the pH is fixed to 10 ± 0.1. The sample is diluted with distilled water to reduce the concentration of Ca^{++} and Mg^{++} ions.

. Alkalinity=Burette reading ×1000/volume of sample taken.



DISSOLVED OXYGEN (DO):

Dissolved oxygen levels can be measured by a basic chemical analysis method (titration method), an electrochemical analysis method (diaphragm electrode method), and a phytochemical analysis method (fluorescence method). The diaphragm electrode method is the most widely used method.

Titration Method

- Winkler's Method

Add a manganese peroxide solution and a sodium hydroxide solution to sample water, and a precipitate of manganese hydroxide (II) will be produced. This precipitate of manganese hydroxide (II) reacts with dissolved oxygen in the water and is oxidized according to the amount of DO, forming a brown precipitate.

If DO is not present: White precipitate
If it reacts with DO: Brown precipitate

Dissolve this brown precipitate in an acid in the presence of iodine ions (I-), and iodine (I2) will be released according to the amount of DO. Then, titrate the released iodine (I2) with sodium thiosulfate and determine the quantity.

- Modified Winkler's Method Using Sodium Azide

This method is intended to improve the accuracy of DO measurement by Winkler's method. In this method, I2 remaining after the titration of I2 with sodium thiosulfate in the final process of Winkler's method is titrated again with a starch solution.

Procedure: Collect the sample in a Stoppard D.O bottle, add 1ml of Winkler-A solution and Winkler-B solution , Restore the bottle and mix the content and add 1ml of Conc. Sulphuric acids restorer the bottle and shake the bottle (the precipitates will be dissolved), and Take 50ml of dissolved sol solution conical flask . Then nitrate with N/40 Hypo until the solution turns to Paper straw color and add 5ml of starch solution(solution turns to sample color), continue titration until the blue color disappears. Then note the burette reading and multiply by 4 to know the DO.

CALCIUM AND MAGNESIUM:

Calcium and magnesium can be determined by titration methods.

Procedure: Take 0.01M EDTA solution in burette then Take 10ml sample in conical flask and add 0.5ml NaOH solution and add a lunch of murexide indicator then solution turns link to purple. Note the burette reading. Calcium hardness=volume of EDTA consumed ×Molarity of EDTA×100×1000/ volume of sample taken.

Calcium as Ca+2= volume of EDTA consumed ×Molarity of EDTA×40×1000/ volume of sample taken.

Magnesium as Mg +2=TH-Ca Hardness ×0.243 .

AMMONIA:

Traditionally, Kjeldahl distillation methods have been used to determine ammonia levels in biological tissue, but other methods (e.g., colorimetric or ion-specific electrodes) are also available.

Procedure: Take 10ml of sample in test tube and add 0.4ml of Phenol solution, 0.4ml of Sodium nitro Prusside solution and 1ml of oxidizing solution then cover opening of test tube with Aluminium foil and keep the rest tube in dark for one hour and measure in spectrophotometer.

NITRATE:

The first analytical approach utilizes direct measurement of NO3-N by the following methods: (a) colorimetric (after a color producing reaction with NO3-N), (b) potentiometric, (c) absorption of UV radiation by NO3-N in a complex matrix, (d) trans nitration of salicylic acid, and (e) chromatographic (separation and measurement of NO3-N) methods. The second approach is based on the reduction of NO3-N to nitrite-nitrogen (NO2-N), ammonium-nitrogen (NH4-N), or nitric oxide and measurement of the reduction product. When NO3-N is reduced to NO2-N, the measurement may be achieved by (a) colorimetric, (b) fluorimetric, (c) coulometric, and (d) catalytic kinetic methods. When NO3-N is reduced to NH4-N, the measurement is done by (a) colorimetric (after a color producing reaction with NH4), (b) potentiometric, (c) steam distillation, and (d) gas diffusion conductometric methods. A chemiluminescence detection method is utilized when NO3-N is reduced to nitric oxide. The third approach determines NO3-N concentration by measuring the change in the concentration of the chemical species that react with NO3-N and form a complex.

Procedure: Take 10ml of sample and add 0.1 ml of Sulphanilamide then wait for 5 minutes and add 0.1ml of NED and wait for 10 minutes then measure in Spectrophotometer.

Principle: Nitrates react with phenoldisulphonic acid and produce a nitrate derivative, which in alkaline solution develops yellow color due to rearrangement of its structure. The color produced is directly proportional to the concentration of nitrates present in the sample.

Apparatus required: Nessler's tube, pipettes, beakers, spectrophotometer, cuvettes, measuring jar and hot water bath.

Procedure: A known volume (50ml) of the sample is pipetted into a porcelain dish and evaporated to dryness in a hot water bath. 2ml of phenol disulphonic acid is added to dissolve the residue by constant stirring with a glass rod. Concentrated solution of sodium hydroxide or conc. ammonium hydroxide and distilled water is added with stirring to make it alkaline. This is filtered into a Nessler's tube and made up to 50ml with distilled water. The absorbance is read at 410 nm using a spectrophotometer after the development of color. The standard graph is plotted by taking concentration along the X-axis and the spectrophotometric readings (absorbance) along the Y-axis. The value of nitrate is found by comparing absorbance of the sample with the standard curve and expressed in mg/L.

Calculation:

$$\text{Nitrates (As mg/L)} = \frac{\text{Absorbance of sample X Conc. of STD X 1000}}{\text{Absorbance of Std. X Sample taken}}$$

The high concentration of nitrate in water is indicative of pollution.

ELECTRICAL CONDUCTIVITY (EC)

Procedure: The electrode of the conductivity meter is dipped into the sample, and the readings are noted for stable values shown as mS/cm.

TOTAL DISSOLVED SOLIDS (TDS)

Principle: The difference in the weight of total solids and the total suspended solids expressed in the same units gives the total dissolved solids.

Apparatus: Glass-fiber filter disks, membrane filter funnel, filtration apparatus, suction flask and pump, drying oven and Grooch crucible.

Procedure: The difference in the weights of Total Solids (W1) and Total Suspended Solids (W2) expressed in the same units gives Total Dissolved Solids (TDS).

BIOLOGICAL OXYGEN DEMAND:

Principle: The method consists of filling the samples in airtight bottles of specified size and incubating them at specified temperature (20 oC) for 5 days. The difference in the dissolved oxygen measured initially and after incubation gives the BOD of the sample.

Apparatus required: BOD bottles - 300ml capacity, air incubator - to be controlled at 20 oC -\+ 1 oC, oximeter and magnetic stirrer.

Procedure: The sample having a pH of 7 is determined for the first day DO. Various dilutions (at least 3) are prepared to obtain about 50% depletion of D.O. using sample and dilution water. The samples are incubated at 20 oC for 5 days and the 5th day D.O is noted using the oximeter. A reagent blank is also prepared in a similar manner.

Calculation:

$$\text{BOD} = \frac{(D1 - D2) - (B1 - B2) \times f}{p \text{ (in mg/L)}}$$

D1 - 1st day D.O of diluted sample

D2 - 5th day D.O of diluted sample

P - Decimal volumetric fraction of sample used.

B1 - 1st day D.O of control

B2 - 5th day D.O of control

CHEMICAL OXYGEN DEMAND

Chemical oxygen demand (COD) is the measure of oxygen equivalent to the organic content of the sample that is susceptible to oxidation by a strong chemical oxidant. The intrinsic limitation of the test lies in its ability to differentiate between the biologically oxidisable and inert material. It is measured by the open reflux method.

Principle: The organic matter in the sample gets oxidized completely by strong oxidizing agents such as potassium dichromate in the presence of conc. sulphuric acid to produce carbon-di-oxide and water. The excess potassium dichromate remaining after the reaction is titrated with Ferrous Ammonium Sulphate (FAS) using ferroin indicator to determine the COD. The dichromate consumed gives the oxygen required for the oxidation of the organic matter. **Apparatus required**: Reflux apparatus, Nessler's tube, Erlenmeyer flasks, hot plate and lab glassware.

Procedure: 15ml of conc. sulphuric acid with 0.3g of mercuric sulphate and a pinch of silver sulphate along with 5ml of 0.025M potassium dichromate is taken into a Nessler's tube. 10ml of sample (thoroughly shaken) is pipetted out into this mixture and kept for about 90 minutes on the hot plate for digestion. 40ml of distilled water is added to the cooled mixture (to make up to 50ml) and titrated against 0.25M FAS using a ferroin indicator, till the colour turns from blue green to wine red indicating the end point. A reagent blank is also carried out using 10ml of distilled water.

- **Eriochrome Black**: Take 0.5 grams of Eriochrome black-T and 4.5 grams of Hydroxylamine hydrochloride and dissolved in 100ml of 70% Ethanol.

Calcium:

- **1N NaOH**: Take 4 grams of NaOH and make up to 100ml of distilled water.
- **Muroxide indicator**: Take 0.5 grams of pure murexide and mix with 100 grams of NaCl.
- **EDTA**:Take 3.723 grams of EDTA and make up to 100ml of distilled water.

Ammonia:

- **Phenolphthalein solution**: Take 10 grams of analytical Phenolphthalein and dissolve in 100ml of 95% Methyl alcohol.
- **Sodium nitroPrusside sol**: Take 0.5 grams of sodium nitroprusside and dissolved inb100ml of deionized water and preserve Amber coloured bottles. The solution can be preserved for months.
- **Alkaline Reagent**: Take 20 grams of Trial Sodium Nitrate and 1 grams of Sodium Hydroxide and dissolve in 100ml of deionized water.
- **Oxidizing sol**: Mix the alkaline Reagent and sodium Hypo chlorides in a 4:1 ratio. This sol can be preserved for 24 hours only.

Nitrate:

- **Sulphanilamide**: Take 1 grams of Sulphanilamide and add 10ml Conc. Hcl to this. Then make up to 100ml with distilled water.
- **NED (naphthyl Methyl Diamine dihydrochloride)** :. Take 0.1 grams of NED and dissolve in 100ml of distilled water and preserve in an Amber coloured bottle.

Dissolved Oxygen:

- **Winkler-A sol (manganous sulfate)**: Take 48 grams of MnSO4 4H2O or 40 grams of MnSO4 2H2O or 36.5 grams of MnSO4 H2O and dissolve in distilled water and make up to 100ml.
- **Winkler-B sol (alkaline iodide):** Take 50 grams of sodium Hydroxide and 30 grams of potassium iodide and make up to 100ml with distilled water.
- **N/40 HpO:**
    - To prepare 0.1N sodium thiosulphate 'standard sol Take 2.482 grams of sodium thiosulphate and 0.4 grams of Borax as preservation and dissolve in 70ml of distilled water and make up to 100ml.
    - To prepare N/40 (0.02N) Hypo, Take 125ml of 0.1N sodium thiosulphate and make up to 500ml with distilled water.

Starch sol (0.2%): Take 0.4 grams of starch and 6ml of 20% NaOH and dissolve in 70 ml of distilled water. Store it until clean sol is obtained. Then neutralize with 0.2 ml of HCl and acidity with 0.2 ml of glacial acetic acid. Finally dilute the sol up to 200 ml with distilled water.

Turbidity:

- **Distilled water and Stock primary Formazin suspension:**
- **Solution 1**: 1.0 g Hydrazine sulphate is dissolved in 100ml of distilled water.
- · **Solution 2:** 10.0g of Hexamethylenetetramine is dissolved in distilled water and made up to 100ml in a volumetric flask.
- **Stock Turbidity Suspension**: 5ml of solutions 1 and 2 are mixed in a volumetric flask and allowed to stand for 24 hrs at about 25o C (±3o C) and diluted to 1000ml with distilled water to give a 400 NTU suspension.
- **Standard Turbidity Suspension**: 10ml of the stock solution is diluted to 100ml with distilled water to give a standard solution of 40 NTU.

Phosphate:

- **Ammonium molybdate reagent**: 25g ammonium molybdate is dissolved in 175ml distilled water. 280ml concentrated sulphuric acid is added to 400ml distilled water and cooled. Molybdate solution is added and the mixture diluted to 1000ml.
- **Stannous chloride reagent**: 2.5g fresh stannous chloride is dissolved in 100ml glycerol, heated in a water bath and stirred with the glass rod to hasten dissolution.
- **Standard phosphate solution**: 219.5 mg of dried AR potassium hydrogen phosphate is dissolved in distilled water and made up to 1000ml, where 1ml = 50.0 mg. of phosphate. 10ml of the stock solution is made up to 1000ml to give 1ml = 0.05 mg. Standards of strength ranging from 0 (blank) to 0.05mg/L at intervals of 0.01mg are prepared by diluting the stock with distilled water.

Sulphate

- **Conditioning reagent**: 50 ml of glycerol was mixed in a solution containing 30 ml of conc. hydrochloric acid, 300ml distilled water (10% HCl), 100 ml of 95% ethyl alcohol or isopropyl alcohol and 75g NaCl.
- **·Barium Chloride**
- **Standard sulphate solution**: 147.9mg of AR grade sodium sulphate was dissolved in distilled water and made up to 1000ml, to give 1ml = 100mg sulphate.

Chlorides

- **Potassium chromate indicator solution**: 50g of potassium chromate is dissolved in a minimum amount of distilled water and silver nitrate is added dropwise till a red precipitate is formed. The mixture is allowed to stand for about 12 hours and diluted to 1000ml with distilled water.

- ·**Silver nitrate solution (0.014N):** 2.395g of silver nitrate is dissolved in distilled water and made up to 1000ml.

BOD:

- **Preparation of dilution water**: To 1000ml of water, 1ml each of phosphate buffer, magnesium sulphate and calcium chloride and ferric chloride solution is added, before bringing it to 20 °C and aerating it thoroughly.

COD

- **Standard potassium dichromate solution (0.250M):** 12.25g of potassium dichromate dried at 103 °C for about 2 hours is dissolved in distilled water and made up to 1000ml.
- **Standard ferrous ammonium sulphate (FAS) 0.25N:** 98g of FAS is dissolved in minimum distilled water to which 20ml of conc. sulphuric acid is added and made up to 1000ml using distilled water to give 0.25N of ferrous ammonium sulphate.
- ·**Ferroin indicator**: 1.485g of 1, 10-Phenanthroline monohydrate and 695 mg of ferrous sulphate is dissolved in 100ml of distilled water.
- ·**Conc. sulphuric acid**
- ·**Silver sulphate crystals**
- ·**Mercuric sulphate crystals**

STUDY AREA

Kovvuru canal water, kakinada 2.6km from the origin of Godavari Rivers which is situated in Kovvuru at Kakinada in Andhra Pradesh, India. Kovvuru falls within latitudes 16°92'46.35"N and longitudes 82°22'25.74"E. This Godavari canal water is used in agricultural fields and ponds.

PHYSICO-CHEMICAL ANALYSIS OF WATER

Physical parameters:

Color, Temperature, Transparency, Turbidity and Odor.

Chemical Parameters:

pH, Electrical Conductivity (E.C), Total Solids (TS), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Total Hardness, Calcium Hardness, Magnesium Hardness, Nitrates, Phosphates, Sulphates, Chlorides, Dissolved Oxygen (D.O), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD).

RESULTS AND DISCUSSION

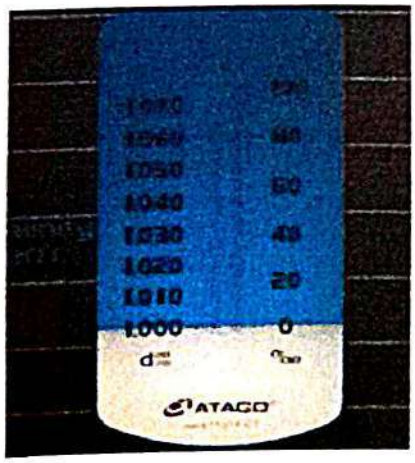
The results of the weekly variation in Physico- Chemical Parameters of Godavari canal water samples is presented in the table.

pH:.

pH is most important in determining the corrosive nature of water. Lower the pH value higher is the corrosive nature of water. The changes in pH of water is due to season, photosynthesis and respiration of aquatic plants, acid rains, increased Conc. of CO2 , and dumping industrial range would be acceptable. In natural waters pH is governed by the equilibrium between carbon dioxide/bicarbonate/carbonate ions and ranges between 4.5 and 8.5 although mostly basic. It tends to increase during the day largely due to the photosynthetic activity (consumption of carbon-di-oxide) and decreases during night due to respiratory activity. Wastewater and polluted natural waters have pH values lower or higher than 7 based on the nature of the pollutant. In the present study pH varied between 7.34-7.87. The variation of pH in surface water samples shows that samples are alkaline in nature.

Salinity:

Freshwater from rivers has Salinity value of 0.5ppt or less. It is best to maintain Salinity of 1.026 for freshwater fishes. The marine water Salinity is about 35ppt. Evaporation of ocean water and formation of season ice both increase the Salinity of the ocean.



Electrical conductivity (EC):

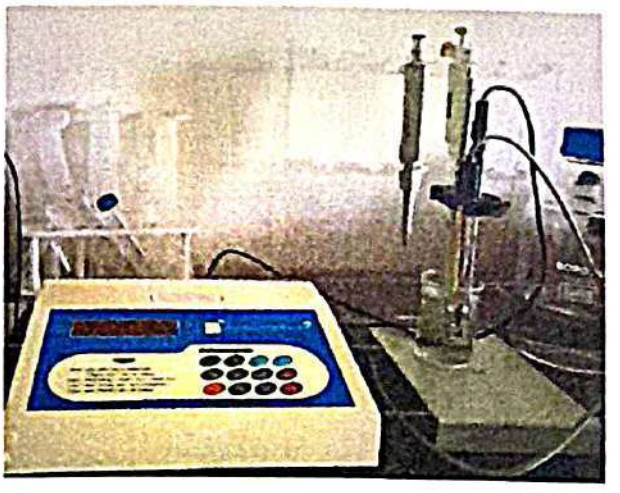
Electrical Conductance of water is a measure of its ability to carry Electric current as a Results of dissolved salts in water. The conductivity measurements provide an indication of ionic concentrations. The electrical conductivity values ranged from 874.6µS/ppm - 986.7µS/ppm. By introducing salts, chlorides, sulfides, carbonates, and other ions, the conductivity of water will increase as the concentrations of ions increase. Fresh water is usually between 0and 1,500µS/cm and typically season water has a conductivity value of about 5000µS/cm.

Total Dissolved Solids (TDS):

TDS values are also considered as important parameters in determining the usage of water. TDS is composed mainly of carbonates, bicarbonates, chlorides, phosphates and nitrates, calcium, magnesium, sodium, potassium, manganese, organic matter salts and other particles. High TDS values are not suitable for irrigation and drinking water is 600ms/ppm. The TDS value in present study ranged between 269.5 - 466.7mS/ppm.

Water can be classified by the level of total dissolved solids (TDS) in the water:
Fresh water: TDS is less than 1,000 ppm
Brackish water: TDS = 1,000 to 10,000 ppm
Saline water: TDS = 10,000 to 35,000 ppm
Hypersaline: TDS greater than 35,000 ppm

Drinking water generally has a TDS below 500 ppm. Higher TDS Fresh Water is drinkable but taste may be objectionable.



Total Alkalinity (TA):

Alkalinity is a measure of ability to neutralize acids. The value of total Alkalinity in water provides an idea of natural salts present in water. Total alkalinity (TA) is the measure of water's ability to neutralize acids. Alkaline compounds that are present in water, like hydroxides and carbonates, eliminate H+ ions from the water, which lowers the acidity of the water and results in a higher pH. Excess alkalinity gives a bitter taste to water and reacts with cations farming precipitates, which can damage the pipes, values etc., A total Alkalinity of at least 20 mg/ L is necessary for good pond productivity. For drinking water the alkalinity should be 20-200 mg/L. The variations of alkalinity in sample water varied between 90-260 mg/ L.

Total Hardness (TH):

Water hardness is a measure of the capacity of water to react with soap. Total Hardness of water is characterized by the content of calcium and magnesium salts. The carbonate hardness of pond or Take should ideally fall between 50 to 200ppm. The variation of hardness in sample water varied between 130-280 mg/L.

Dissolved Oxygen (DO):

Healthy water should generally have dissolved oxygen concentrations above 6.5-8 mg/L and between about 80-120 %. DO present in drinking water adds waste and it is a highly fluctuating factor in water. The variation of dissolved oxygen in sample water is 3.6 to 17.6mg/L.

Ammonia and Nitrate:

Nitrates are essential plant nutrients but in excess amounts they can cause significant water quality problems. Together with phosphorus, nitrates in excess amounts can accelerate eutrophication, causing the types of plants and animals that live in the stream. The safe level for nitrate in drinking water is <10ppm and Ammonia is 0.25 to 32.5mg/L. The NIOSH Recommended Exposure Limit (REL) for

ammonia is 25 ppm averaged over an eight-hour work day. NIOSH also says that there should be a Short Term Exposure Limit (STEL) of 35 ppm during any 15 minute period in the day. No worker should be exposed to more than that amount over any 15 minute period.

Calcium and magnesium:

The presence of calcium (fifth most abundant) in water results from passage through or over deposits of limestone, dolomite, gypsum and such other calcium bearing rocks. Calcium contributes to the total hardness of water and is an important micro-nutrient in aquatic environments and is especially needed in large quantities by molluscs and vertebrates. It is measured by the EDTA titrimetric method. Small concentration of calcium carbonate prevents corrosion of metal pipes by laying down a protective coating. But increased amounts of calcium precipitate on heating to form harmful scales in boilers, pipes and utensils.

Magnesium is a relatively abundant element in the earth's crust, ranking eighth in abundance among the elements. It is found in all natural waters and its source lies in rocks, generally present in lower concentration than calcium. It is also an important element contributing to hardness and a necessary constituent of chlorophyll. Its concentration greater than 125 mg/L can influence cathartic and diuretic actions.

Total Dissolved Solids (TDS)

Electrical, or specific, conductivity of water is directly related to the concentration of dissolved ionized solids in the water. Ions from the dissolved solids in water create the ability for that water to conduct an electric current, which can be measured using a conventional conductivity meter or TDS meter. When correlated with laboratory TDS measurements, conductivity provides an approximate value for the TDS concentration, usually within ten-percent accuracy.

Electrical conductivity (EC)

Electrical conductivity is the measure of the amount of electrical current a material can carry or its ability to carry a current. Electrical conductivity is also known as specific conductance. Conductivity is an intrinsic property of a material.

Water Type	Conductivity (µS/cm)
totally pure water	0.055
typical deionized water	0.1
distilled water	0.5-3.0
reverse osmosis water	50-100
domestic "tap" water	500-800
potable water	1,055 max
sea water	56,000
brackish water	100,000

Biological oxygen Demand (BOD):

Biochemical oxygen demand, or BOD, measures the amount of oxygen consumed by microorganisms in decomposing organic matter in stream water. BOD also measures the chemical oxidation of inorganic matter (i.e., the extraction of oxygen from water via chemical reaction). A test is used to measure the amount of oxygen consumed by these organisms during a specified period of time (usually 5 days at 20 C). The rate of oxygen consumption in a stream is affected by a number of variables: temperature, pH, the presence of certain kinds of microorganisms, and the type of organic and inorganic material in the water.

BOD directly affects the amount of dissolved oxygen in rivers and streams. The greater the BOD, the more rapidly oxygen is depleted in the stream. This means less oxygen is available to higher forms of aquatic life. The consequences of high BOD are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die.

Sources of BOD include leaves and woody debris; dead plants and animals; animal manure; effluents from pulp and paper mills, wastewater treatment plants, feedlots, and food-processing plants; failing septic systems; and urban stormwater runoff.

Chemical Oxygen Demand (COD):

Chemical Oxygen Demand (COD) is a test that measures the amount of oxygen required to chemically oxidize the organic material and inorganic nutrients, such as Ammonia or Nitrate, present in water. The earliest methods for quantification of COD were developed ~150 years ago and involved recording color changes of a permanganate solution mixed with water samples. There was, however, significant variability between samples using this compound. The use of the dichromate procedure was pioneered and perfected for wastewater in 1949. COD is measured via a laboratory assay in which a sample is incubated with a strong chemical oxidant for a specified time interval and at constant temperature (usually 2 h at 150°C).

The most commonly used oxidant is potassium dichromate, which is used in combination with boiling sulphuric acid. It is important to note that the chemical oxidant is not specific to organic or inorganic compounds, hence both these sources of oxygen demand are measured in a COD assay. Furthermore, it does not measure the oxygen-consuming potential associated with certain dissolved organic compounds such as acetate. Thus, measurements are not directly comparable to Biochemical Oxygen Demand (BOD) but can be used to complement (though it is sometimes used as a surrogate measure).

RESULTS

Table: 1 Variations in the pH of Sample Water

Dates	pH	
	upstream	downstream
19-03-2022	7.93	7.49
21-03-2022	7.49	7.93
22-03-2022	7.63	7.4
23-03-2022	7.87	7.34
24-03-2022	7.87	7.31
25-03-2022	7.87	7.39
26-03-2022	7.87	7.58
29-03-2022	7.87	7.25
31-03-2022	7.87	7.49
01-04-2022	7.87	7.37
04-04-2022	7.87	7.48
05-04-2022	7.87	7.36
06-04-2022	7.87	7.44
07-04-2022	7.36	7.49
08-04-2022	7.36	7.49
11-04-2022	7.63	7.39
12-04-2022	7.43	7.39
13-04-2022	7.36	7.39
18-04-2022	7.53	7.39
19-04-2022	7.09	7.59
Maximum value		7.93
Minimum value		7.09

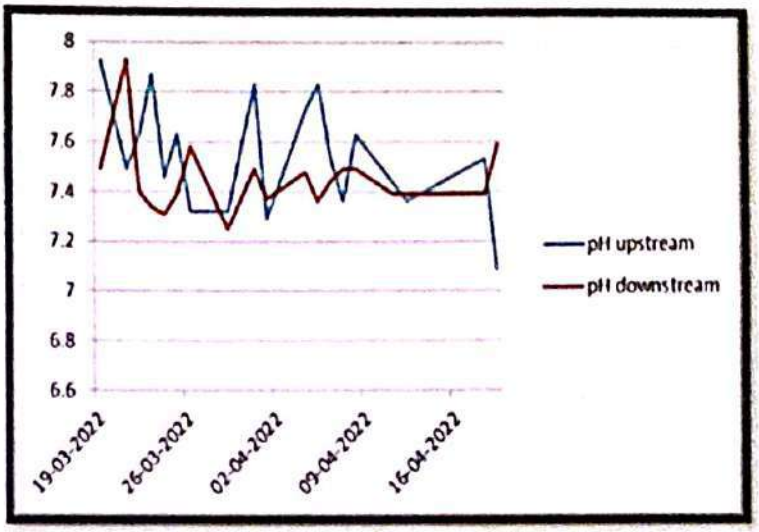


Table: 2 Variations in the Salinity of Sample Water

Dates	salinity	
	upstream	downstream
19-03-2022	0	0
21-03-2022	0	0
22-03-2022	0	0
23-03-2022	0	0
24-03-2022	0	0
25-03-2022	0	0
26-03-2022	0	0
29-03-2022	0	0
31-03-2022	0	0
01-04-2022	0	0
04-04-2022	0	0
05-04-2022	0	0
06-04-2022	0	0
07-04-2022	0	0
08-04-2022	0	0
11-04-2022	0	0
12-04-2022	0	0
13-04-2022	0	0
18-04-2022	0	0
19-04-2022	0	0

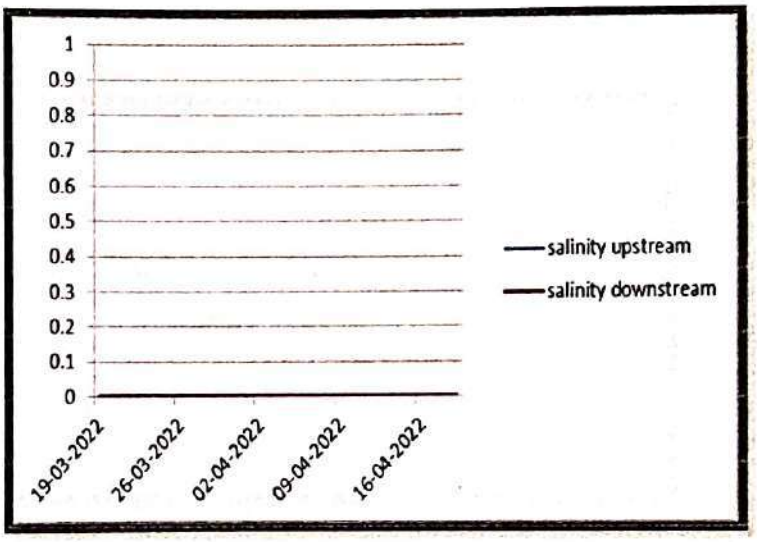


Table: 3 Variations in the Alkalinity of Sample Water

Dates	Alkalinity	
	upstrea m	downstream
19-03-2022	230	260
21-03-2022	160	160
22-03-2022	150	180
23-03-2022	160	150
24-03-2022	160	160
25-03-2022	100	190
26-03-2022	90	140
29-03-2022	100	100
31-03-2022	150	90
01-04-2022	220	150
04-04-2022	120	220
05-04-2022	219	120
06-04-2022	103	150
07-04-2022	291	160
08-04-2022	106	180
11-04-2022	155	160
12-04-2022	155	160
13-04-2022	105	140
18-04-2022	140	150
19-04-2022	106	120
Maximum value		291
Minimum value		90

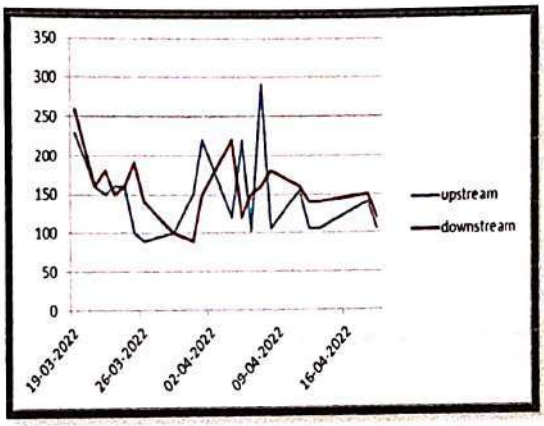


Table: 4 Variations in the Hardness of Sample Water

Dates	Hardness	
	upstream	downstream
19-03-2022	220	260
21-03-2022	260	160
22-03-2022	350	180
23-03-2022	230	150
24-03-2022	250	160
25-03-2022	230	190
26-03-2022	240	140
29-03-2022	130	100
31-03-2022	140	90
01-04-2022	220	150
04-04-2022	120	220
05-04-2022	219	120
06-04-2022	103	150
07-04-2022	291	160
08-04-2022	106	180
11-04-2022	155	160
12-04-2022	105	140
13-04-2022	105	140
18-04-2022	140	150
19-04-2022	106	120
Maximum value		350
Minimum value		90

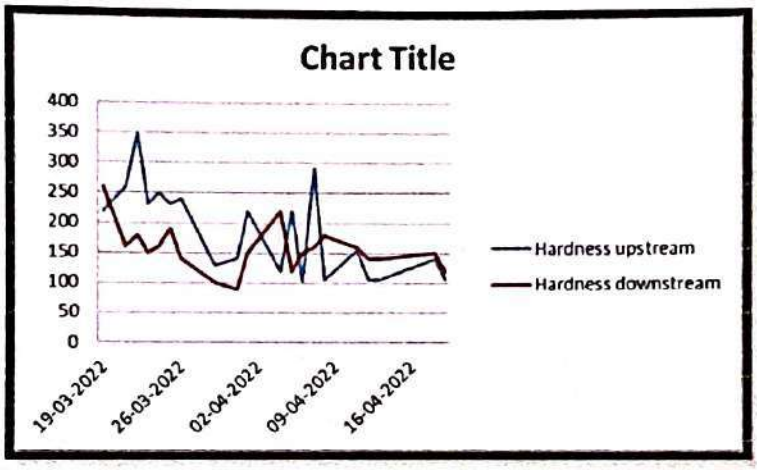


Table: 5 Variations in the Ammonia of Sample Water

Dates	Ammonia	
	upstream	downstream
19-03-2022	nill	nill
21-03-2022	nill	nill
22-03-2022	nill	nill
23-03-2022	0.5	nill
24-03-2022	0.02	0.5
25-03-2022	nill	0.05
26-03-2022	nill	nill
29-03-2022	nill	nill
31-03-2022	0.25	0.1
01-04-2022	0.02	0.01
04-04-2022	0.01	nill
05-04-2022	nill	nill
06-04-2022	nill	nill
07-04-2022	nill	nill
08-04-2022	nill	nill
11-04-2022	0.01	0.1
12-04-2022	0.25	0.1
13-04-2022	0.02	0.1
18-04-2022	0.5	0.05
19-04-2022	nill	nill
Maximum value		0.5
Minimum value		0.05

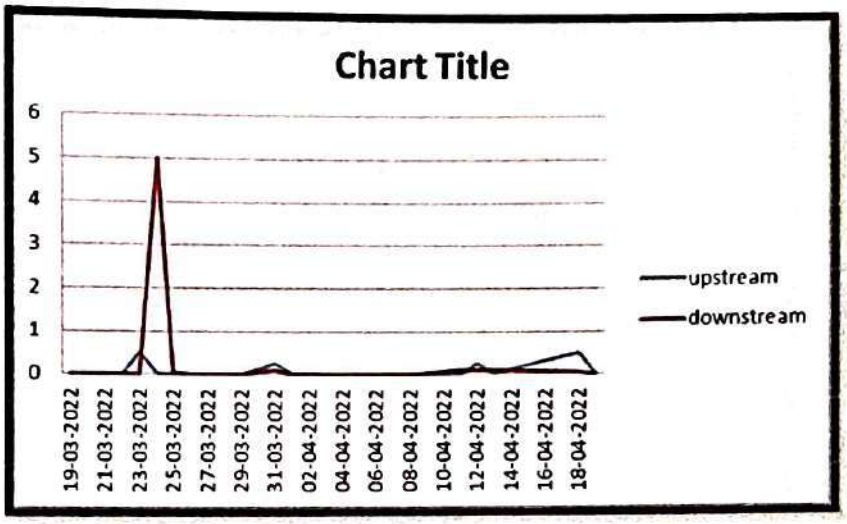


Table: 6 Variations in the Alkalinity of Sample Water

Dates	Nitrate	
	upstream	downstream
19-03-2022	nill	nill
21-03-2022	nill	nill
22-03-2022	nill	nill
23-03-2022	nill	nill
24-03-2022	0.05	nill
25-03-2022	0.28	0.38
26-03-2022	0.05	nill
29-03-2022	nill	nill
31-03-2022	nill	nill
01-04-2022	nill	nill
04-04-2022	nill	nill
05-04-2022	nill	nill
06-04-2022	0.05	nill
07-04-2022	0.38	0.05
08-04-2022	nill	nill
11-04-2022	nill	nill
12-04-2022	nill	nill
13-04-2022	0.05	nill
18-04-2022	0.28	0.38
19-04-2022	nill	nill
Maximum value		0.38
Minimum value		Nill

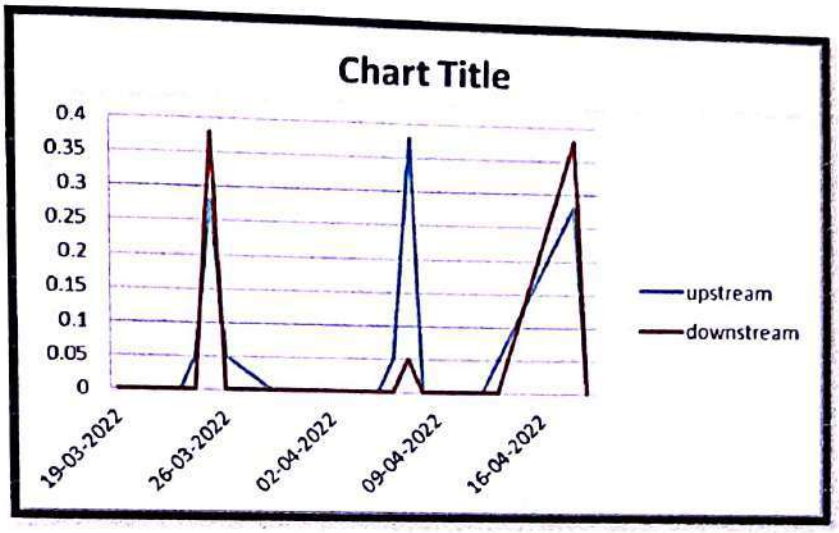


Table: 7 Variations in the Calcium of Sample Water

Dates	Calcium	
	upstream	downstream
19-03-2022	38	36
21-03-2022	32	36
22-03-2022	40	80
23-03-2022	56	56
24-03-2022	28	24
25-03-2022	20	32
26-03-2022	32	40
29-03-2022	53	27
31-03-2022	49	32
01-04-2022	47	27
04-04-2022	43	53
05-04-2022	49	28
06-04-2022	39	43
07-04-2022	38	25
08-04-2022	21	38
11-04-2022	37	28
12-04-2022	28	33
13-04-2022	37	29
18-04-2022	38	53
19-04-2022	35	43
Maximum value		80
Minimum value		24

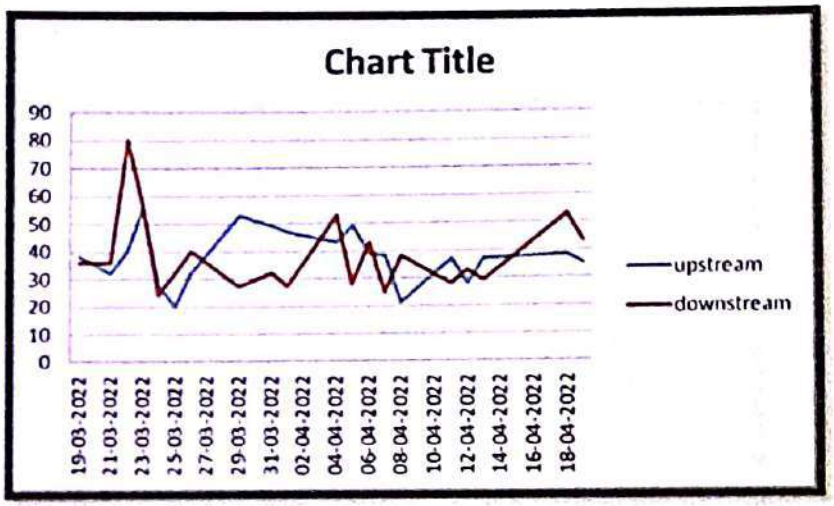


Table: 8 Variations in the Alkalinity of Sample Water

Dates	Magnesium	
	upstream	downstream
19-03-2022	27	31.2
21-03-2022	32	36
22-03-2022	36	40
23-03-2022	80	56
24-03-2022	56	28
25-03-2022	24	20
26-03-2022	20	32
29-03-2022	32	40
31-03-2022	36	29
01-04-2022	27	20
04-04-2022	27	37
05-04-2022	25	42
06-04-2022	32	42
07-04-2022	28	31
08-04-2022	27	36
11-04-2022	32	36
12-04-2022	24	42
13-04-2022	32	48
18-04-2022	29	42
19-04-2022	34	40
Maximum value		80
Minimum value		20

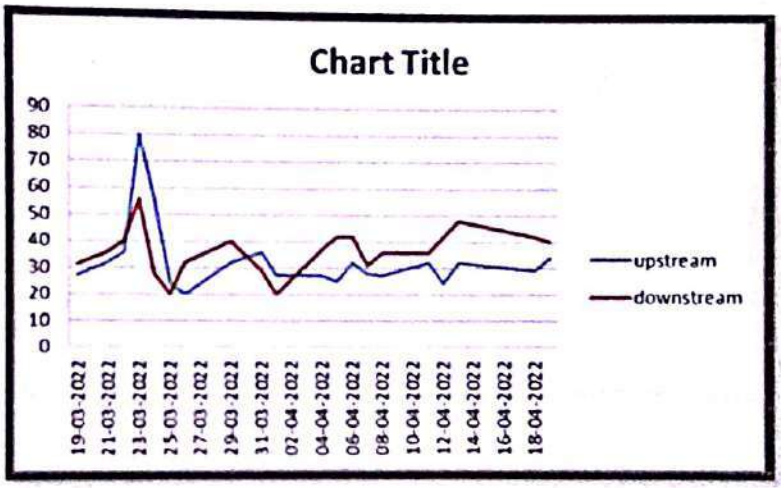


Table: 9 Variations in the DO of Sample Water

Dates	DO	
	upstream	downstream
19-03-2022	2	1
21-03-2022	6	3
22-03-2022	8	5
23-03-2022	3	3
24-03-2022	7	2
25-03-2022	2	2
26-03-2022	6	3
29-03-2022	3	3
31-03-2022	6	2
01-04-2022	6	4
04-04-2022	4	8
05-04-2022	3	8
06-04-2022	3.6	6
07-04-2022	8	4
08-04-2022	5	3
11-04-2022	9	3
12-04-2022	4	3
13-04-2022	4	2
18-04-2022	4	8
19-04-2022	2	3
Maximum value		8
Minimum value		1

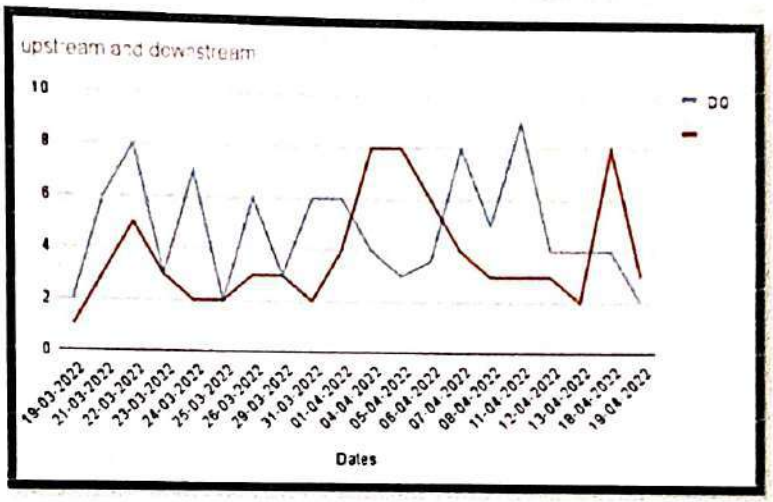


Table: 10 Variations in the Alkalinity of Sample Water

Dates	TDS	
	upstream	downstream
19-03-2022	296	295
21-03-2022	332	392
22-03-2022	334	335
23-03-2022	422	489
24-03-2022	466	382
25-03-2022	423	492
26-03-2022	376	204
29-03-2022	392	402
31-03-2022	284	339
01-04-2022	392	209
04-04-2022	402	209
05-04-2022	389	329
06-04-2022	382	303
07-04-2022	285	403
08-04-2022	246	309
11-04-2022	346	543
12-04-2022	346	305
13-04-2022	574	357
18-04-2022	356	497
19-04-2022	353	402
Maximum value		574
Minimum value		295

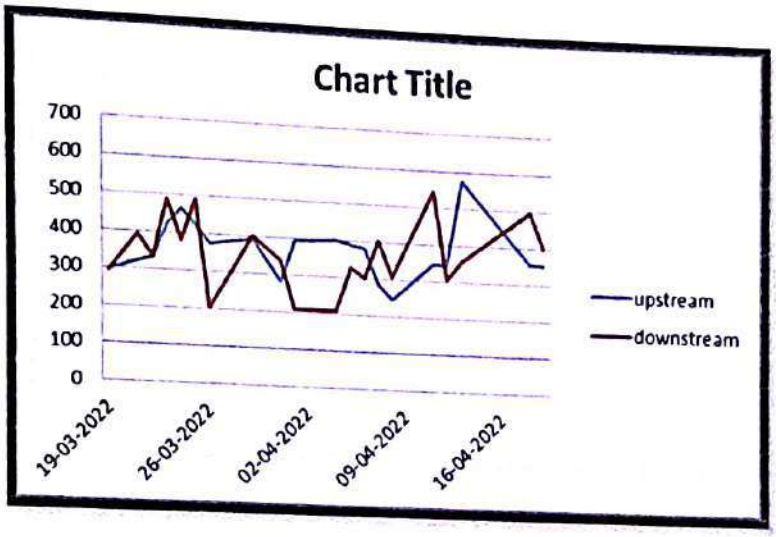


Table: 11 Variations in the Alkalinity of Sample Water

Dates	EC	
	upstream	downstream
19-03-2022	934	734
21-03-2022	620	835
22-03-2022	733	836
23-03-2022	726	698
24-03-2022	648	754
25-03-2022	489	865
26-03-2022	876	997
29-03-2022	945	678
31-03-2022	575	943
01-04-2022	554	864
04-04-2022	456	367
05-04-2022	755	457
06-04-2022	555	447
07-04-2022	484	478
08-04-2022	633	344
11-04-2022	944	667
12-04-2022	854	645
13-04-2022	588	767
18-04-2022	976	876
19-04-2022	785	765
Maximum value		934
Minimum value		367

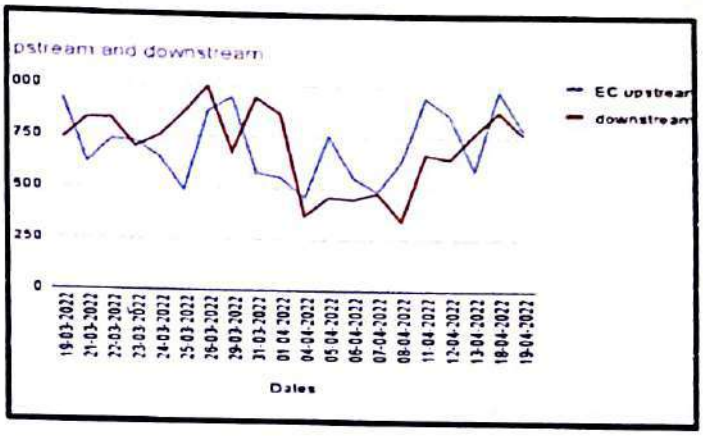


Table: 12 Variations in the BOD of Sample Water

Dates	BOD	
	upstream	downstream
19-03-2022	3.4	4.6
21-03-2022	2.7	3.5
22-03-2022	3.2	3.5
23-03-2022	3.6	3.4
24-03-2022	2.8	3.4
25-03-2022	3.7	2.9
26-03-2022	3.7	3.5
29-03-2022	3.7	3.6
31-03-2022	3.8	2.5
01-04-2022	2.4	2.4
04-04-2022	2.56	2.7
05-04-2022	1.8	1.62
06-04-2022	1.78	1.4
07-04-2022	2.4	2.4
08-04-2022	2.56	2.7
11-04-2022	1.8	1.62
12-04-2022	1.78	1.4
13-04-2022	2.4	2.4
18-04-2022	1.8	1.48
19-04-2022	1	1
Maximum value		4.6
Minimum value		1

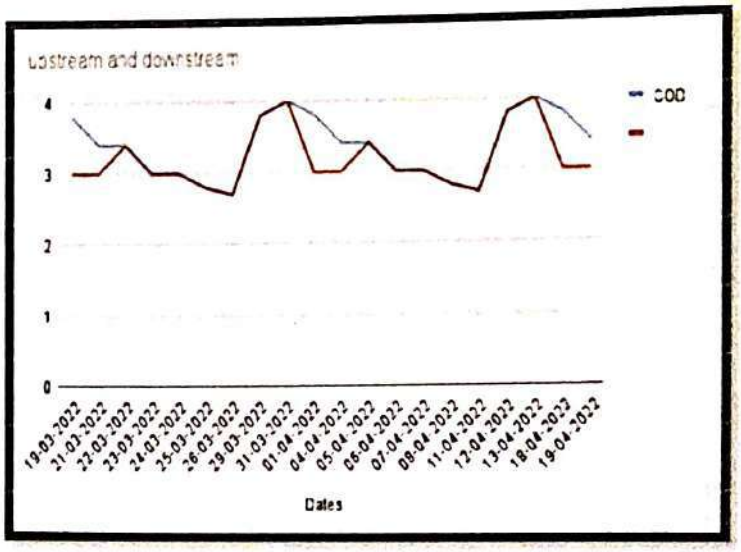
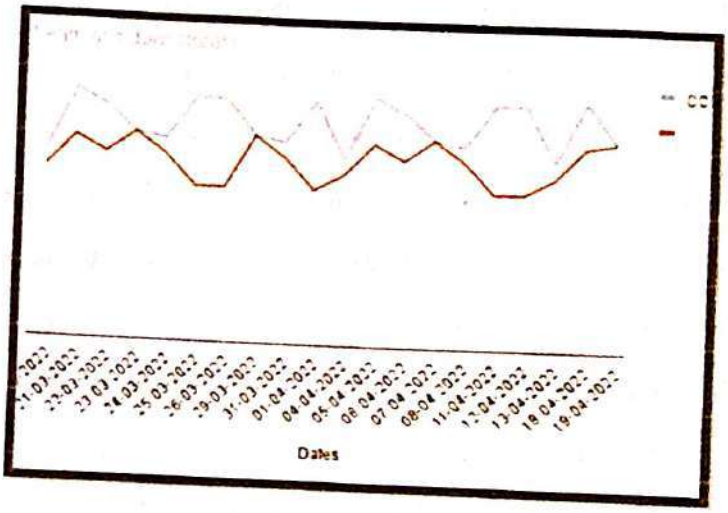


Table: 13 Variations in the Alkalinity of Sample Water

Dates	COD	
	upstream	downstream
19-03-2022	36	33
21-03-2022	48	39
22-03-2022	45	36
23-03-2022	40	40
24-03-2022	39	36
25-03-2022	47	30
26-03-2022	47	30
29-03-2022	40	40
31-03-2022	39	36
01-04-2022	47	30
04-04-2022	36	33
05-04-2022	48	39
06-04-2022	45	36
07-04-2022	40	40
08-04-2022	39	36
11-04-2022	47	30
12-04-2022	47	30
13-04-2022	36	33
18-04-2022	48	39
19-04-2022	40	40
Maximum value		48
Minimum value		33



CONCLUSION

The Physico-chemical parameters showed significant weekly variations. In this Godavari water the pH is neutralized and varies between 7.3 to 7.9 due to it being a pure water. The Salinity is 0 due to the freshwater. The Alkalinity of Godavari water is about 100 to 200 due to Soil or bedrock around water sources including carbonate, bicarbonate, or hydroxide compounds; those materials get dissolved and travel with the water. These mineral deposits also increase the alkalinity of the water. The hardness of water is due to the dissolved minerals like calcium and magnesium in water which varies between 180 to 260. The ammonia and nitrate is almost nil due to there is no contamination of water or any industrial effluents are not released into the canal. The TDS and EC value is high due to leaching of salts from soil and also domestic sewage may percolate into the groundwater, which may lead to an increase in TDS values. BOD and COD values are variable due to phytoplanktons. This canal water is suitable for fish production and for agriculture. Since the water quality parameters are determined generally within the desirable limit.

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WOMEN FREEDOM FIGHTERS IN NORTH ANDHRA

Project report submitted to

DEPARTMENT OF HISTORY

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Jagannaickpur, KAKINADA – 533 002

In partial fulfilment of the requirements for the award of the Degree of Bachelor of Arts

2019-2022

UNDER CBCS CLUSTER SYSTEM

Submitted by

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&

UNDRAJAVARAPU SANTHI

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CERTIFICATE

This is to certify that the content of this project entitled "WOMEN FREEDOM FIGHTERS IN NORTH ANDHRA" by PULAPAKURA SARASWATHI DEVI & UNDRAJAVARAPU SANTHI are the Bonafide work of their submitted to Ms. Y. SITA MAHA LAKSHMI, M. A, NET, Lecturer in charge, Ms. L. BHANU TEJA Lecturer in Department of History & Tourism for partial fulfilment of the Requirement of A.S.D. Govt. Degree College for Women, (Autonomous), Jagannaickpur, KAKINADA for the award of the Degree of BACHELOR OF ARTS.

V. Sita Maha Lakshmi
Signature of the Principal

Signature of the
Lecturer in charge,
Department of History

L. Bhanuteja
Signature of the
Project Supervisor

FOLK ART IN TELUGU LAND AN ANALYSIS

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This is to certify that the content of this project entitled "**FOLK ART IN TELUGU LAND ANALYSIS**" by **SANGANI TRILOCHANA** is the Bonafide work of her submitted to **Ms. Y. SITA MAHA LAKSHMI, M. A, NET**, Lecturer in charge, **Ms. L. BHANU TEJA** Lecturer in Department of History & Tourism for partial fulfilment of the Requirement of A.S.D. Govt. Degree College for Women, (Autonomous), Jagannaickpur, KAKINADA for the award of the Degree of **BACHELOR OF ARTS.**

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L. Bhanu Teja
Signature of the
Project Supervisor

Signature of the
Lecturer in charge,
Department of History

FOLK ART IN TELUGU LAND AN ANALYSIS

* Acknowledgement *

ఈ ప్రాజెక్ట్ అంశం ప్రతిపాదనకు వచ్చినప్పుడు "Folk art in telugu land on analysis" పై అధ్యాయనం చేయమని సలహాను ఇచ్చి ప్రాజెక్టు మొత్తం పూర్తి అయ్యేంత వరకు తమ అమూల్యమైన సమయాన్ని మరియు సలహాలను ఇచ్చిన చరిత్ర కాళా అధ్యాపకులు మరియు ప్రాజెక్టు పర్యవేక్షకులు అయిన "Y. సీతామహాలక్ష్మి" గారికి నా హృదయ పూర్వక ధన్యవాదములు.

ఈ ప్రాజెక్టు సక్రమంగా పూర్తి చేయడానికి తమ అమూల్యమైన సమయాన్ని వెచ్చించిన "అన్నవరం సత్యవతి దేవి ప్రభుత్వ మహిళా డిగ్రీ కళాశాల" ప్రిన్సిపల్ "Dr. V. అనంతలక్ష్మి" గారికి నా హృదయపూర్వక ధన్యవాదములు. అవసరమైనప్పుడు ఆర్థిక సహాయం అందించిన మా తల్లిదండ్రులకి, మా బంధువులకి ధన్యవాదములు.

Your's faithfully
Sangani. Tulochana

19/10/12.

OBJECTIVES

* జానపద కళల యొక్క విశిష్ట లక్షణాలను విశ్లేషించడానికి...?
* జానపద కళాకారుల యొక్క జీవన విధానమును పరిశీలించడానికి...?
* ప్రస్తుత కాలంలో ఈ కళలు ఆదరణ తగ్గడానికి గల కారణాలను అధ్యయనం చేయడానికి...?
* తోలుబొమ్మలాట పుట్టుక, అభివృద్ధి, ప్రస్తుత, వివిధ పాత్రలను గురించి తెలుసుకోవడానికి...?
* బుర్రకథలు, హరికథలు ప్రజల్లో సమాజంపై వాటి ప్రభావాలను విశ్లేషించడానికి...?
* తప్పెట గుళ్ళు, కోలాటం, గరగ నృత్యాలు వంటి గ్రామీణ కళలను గురించి చర్చించడానికి...?
* తెలంగాణ ప్రాంతంలో ప్రజల ఉత్సవాలకి ఇచ్చే ప్రాధాన్యతను అధ్యయనం చేయడానికి...?
* వివిధ జానపదకళలో ఉపయోగించే వివిధ వాయిద్యాలు, ఇతర సామాగ్రి గురించి పరిశీలించడానికి..?
* ఈ కళలు ప్రోత్సహించడానికి, అంతరించకుండా కాపాడటానికి ప్రభుత్వం తీసుకోవల్సిన చర్యల గురించి అవగాహన చేసుకోవడానికి..?

తూర్పుగోదావరి జిల్లా

తూర్పుగోదావరి జిల్లాలో రాజమహేంద్రవరం మరియు కాకినాడ అనే రెండు పెద్దనగరాలు కలవు. తూర్పుగోదావరి జిల్లాలో చాలా ముఖ్యమైన పెద్ద ప్రదేశాలు ఉన్నాయి.

తూర్పుగోదావరి 13,807 చదరపు కిలోమీటర్ల విస్తీర్ణాన్ని కలిగి ఉంది. 2011 జనాభా లెక్కల ప్రకారం తూర్పుగోదావరి జిల్లా జనసాంద్రత 5,154,296 ఉంది. ఇది భారతదేశంలోనే 19వ స్థానంలో ఉంది మరియు రాష్ట్రంలో 1 వ స్థానంలో ఉంది.

ఈ జిల్లాలో 7 రెవెన్యూ విభాగాలు ఉన్నాయి. అవి అమలాపురం, ఎటపాక, కాకినాడ, పెద్దాపురం, రాజమండ్రి, రామచంద్రపురం మరియు రంపచోడవరం. వ్యవసాయం మీరియు దాని అనుబంధ కార్యకలాపాలకు తూర్పుగోదావరి జిల్లా అధిక వ్యవస్థీకృత వెన్నెముక్క.

జూనపదీ కళ - ప్రాచుర్యం

తెలుగువారికి అపూర్వమైన జూనపదీకళా వారసత్వము ఉన్నది. జూనపదీ కళా సాహిత్యము ద్వారా జాతి సంస్కృతి తెలుస్తుంది. ఒక జాతి నిర్మాణానికి అవసరమైన ఉకారాలు జూనపదీ కళలు అందిస్తాయి అనడంలో అతిశయోక్తి లేదు. ఇలాంటి సంస్కృతి వారసత్వాన్ని కాపాడుకోవటం మన బాధ్యత. జూనపదీ ప్రదర్శన కళలకు తెలుగు భూమి పండిన పంట పాలం వంటిది. ఎన్నో రీకాల జూనపదీ కళలు తెలుగు నేలను సుసంపన్నం చేసాయి. నేటాధ్యాలుగా

ప్రజలకు వినోదాన్ని విజ్ఞానాన్ని అందించిన జానపద ప్రదర్శన కళ. ఆంధ్రప్రదేశ్‌లో ఈ నాటికి ఎన్నో జానపద కళలు సజీవంగా ప్రదర్శిస్తూ ఉన్నాయి. జానపద కళలు ఎప్పుడు ప్రారంభం అయ్యాయి అని ఆధారాలు లేవు.

జానపద కళల్లో ముఖ్యంగా చెప్పుకోదగినవి.

* తోలు బొమ్మలాట

* బుర్రకథ

* హరికథ

* తప్పెట గుళ్ళు

* కోలాటం

* ప్రాచీన సంస్కృతి

* హరిదాసు

* నెమలి నృత్యం

* పులి వేషం

* థింసా నృత్యం.

తెలుగు వారి

జానపద కళారూపాలు

కళా ప్రపూర్ణ

డా. మిక్కిలినేని రాధాకృష్ణ మూర్తి

పొట్టి శ్రీరాములు తెలుగు విశ్వవిద్యాలయం

హైదరాబాద్

* తోలు బొమ్మలాట *

తోలుబొమ్మలాట ఒక జానపద కళారూపం. పురాణాల్లో వర్ణింపబడిన పాత్రల ఆహార్య విశేషాలను స్థూలంగా సృష్టించుకున్నారు. తన భాషతో ఆ మూగచిత్రాలకు ప్రాణం పోసారు. లేకర్ కాల విన్యాసాలను వాటి చేత చేయించారు. జానపదుడు తానే స్వయంగా తెర వెనుక నుండి ఈ పాత్రలను కదిలించాడు. కదిలిస్తున్న ఆ జీవం లేని బొమ్మలతో జీవవిభిన్నమైన ఒక దృశ్యాన్ని ప్రదర్శించడంలోనే జానపదుడి కళాత్మకత దాగి ఉంది. ఒక సామూహిక సంగీత, నాట్యప్రదర్శనే కళారూపమైన తోలుబొమ్మలాట చారిత్రక పరిణామాలు గమనిస్తే ఒకప్పుడు విలక్షణమైన ఉన్నతిని అనుభవించిన ఈ కళ మొత్తం భారతీయ జానపద కళారూపాల్లోనే విశిష్ట స్థానాన్ని పొంది ఉంటుందని చెప్పవచ్చు. స్పష్టంగా చెప్పాలంటే నుండి మానవుడు నాటకదశలో ఎదిగే పరిణామంలో తోలుబొమ్మలాట ప్రముఖ పాత్ర వహించింది. జానపదుని మొదటి రంగస్థల ప్రదర్శన కళగా ఈ కళారూపాన్ని భావించవచ్చు.

తోలుబొమ్మలాట ఆవిర్భావం

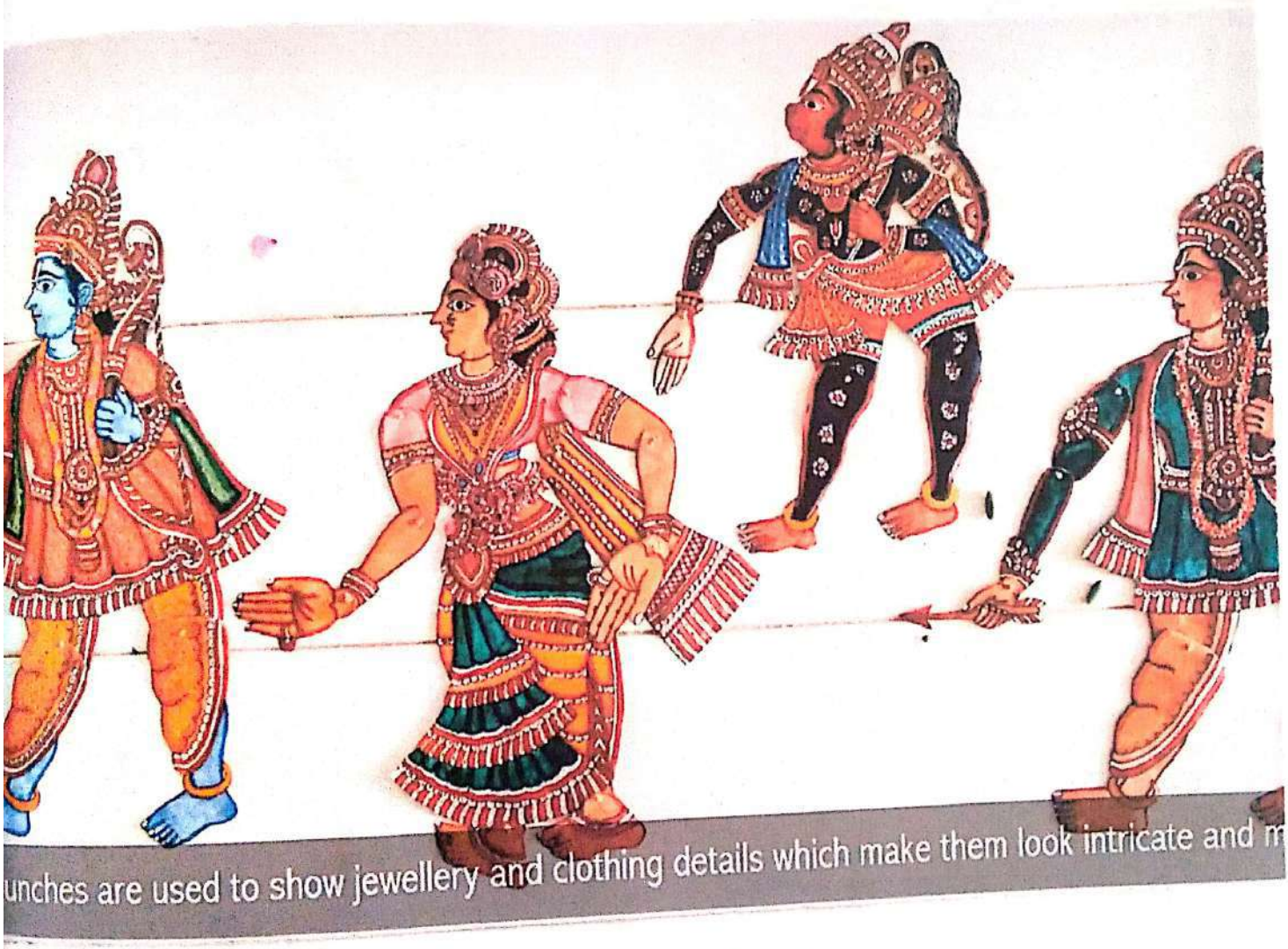
తోలుబొమ్మలాట పుట్టుక గురించి అనే ప్రశ్నలో ఉంది. పూర్వం రాజస్థానాలలోని పండితులు తమ ప్రభువులను సంతోషం పెట్టడానికి బొమ్మలను తయారు చేసి మానవులుగా నటింపచేస్తే సృజనాత్మకంగా ఉంటుందని భావించి తోలుబొమ్మలను తయారుచేసి, తెల్లటి పంచెను తెరగా అమర్చి, దాని వైన కాంతి దీపం పెట్టి, ఆ కాంతిలో బొమ్మల నీడలను పడేలా చేస్తారు. ఈ విధంగా తోలుబొమ్మలాట పుట్టిందని

ఈ ఆట పండితుల చేత మెరుగులు దిద్దుకుందని చెప్పడానికి అమరకోశంలోని శ్లోకాలు నిదర్శనంగా చెప్పవచ్చు.

ఈ తోలుబొమ్మలు ఆంధ్ర రాష్ట్రంలో ప్రాచీన పీఠస్థలైన కళింగపట్నం, భీముని పట్నం, కోరంగి, మచిలీపట్నం, కొత్తపట్నాల నుండి విదేశాలకు భారతీయులతో పాటు వెళ్ళాయి. పాశ్చాత్య దేశాలలో జరిగే ఉత్సవాలలో తోలుబొమ్మలను ప్రదర్శించడాన్ని బట్టి చూస్తే ఈ కళకు ఇతర దేశాలలో కూడా ఆదరణ లభించిందని తెలుస్తున్నది. పర్షియా, టర్కీల మీదుగా "గ్రీసు" దేశంలో ప్రవేశించిన తోలుబొమ్మలు గ్రీసులో నూతన రూపం సంతరించుకొని ఉత్తరాఫ్రికాలోని ముస్లిం దేశాలకు 17 వ శతాబ్దంలో ఇటలీకి అక్కడ నుండి ఫ్రాన్సులోని వర్సయిల్స్, పారిస్ "పెతెరాయల్" నగరాలకు వ్యాపించాయి. తోలుబొమ్మలు కాలానుగుణంగా ఆయా దేశాలల్లో భిన్న రూపాలు ధరించినప్పటికి, భారతదేశం వీటికి మాతృక అని చెప్పవచ్చు.

రామాయణంలోని ద్విపదలను పాడుతుంటారు. బొమ్మలను సూత్రములతో నడిపించువారగుట చేత అట్టి ప్రదర్శకుని "సూత్రధారుడు" అని అందురు. సంస్కృత నాటకములో నాటకాన్ని ప్రారంభించినప్పుడు "సూత్రధారుడు" ప్రవేశించి ప్రదర్శింపనున్న నాటకమును గురించి కొన్ని మాటలు చెప్పిపోవును. కాని తోలుబొమ్మలాటలో ఆది నుండి తుది వరకు సూత్రధారుడు తెరది తోలుబొమ్మలాటయందు ఉండును.

తోలుబొమ్మలపై "వాలి సుగ్రీవుడు", రావణుడు, సీతారామలక్ష్మణులు, రాజులు, భటులు, మహాభారత వీరులు మున్నగు విశేషాలన్నియు వివిధ రంగులతో తీర్చుదురు. ప్రేక్షకులు బొమ్మలను చూడగానే ఈ వ్యక్తిని గుర్తించు



unches are used to show jewellery and clothing details which make them look intricate and m

Tholu Bhommalata

* బుర్ర కథ *

పల్లె పదాలు, వంత హాస్యాలు, బరువైన కథనాలు, పద్యాలు, పాటలు అన్నింటినీ కలుపుకుంటూ సరదాసరదాగా సాగిపోయే ఒక జానపద కళారూపం. సమయోచితమైన ఉపోద్ఘాతంతో, ఆడుతూ పాడుతూ, హాస్యోక్తులు పలుకుతూ జన సామాన్యానికి చేరువగా వెళ్లే కళారూపాల్లో హరికథ ముందుంటుంది అయితే బుర్రకథ రెండవది. హరికథలో కొంత సాంప్రదాయమూ ఉంది. అయితే బుర్రకథలో పూర్తిగా జానపదకళారూపం కనిపిస్తుంది.

ఒక కళారూపం

తెలుగునాట జానపద వినోదగాన ప్రక్రియలో ప్రజాదరణకి ప్రచారానికి సాధనంగా ఈ నాటికీ విస్తృతంగా ఉపయోగపడే కళారూపం బుర్రకథ. కథకుని చేతి ప్రక్రియ ఇది. ప్రదర్శన సౌలభ్యాన్ని బట్టి వీర గాథలు, త్యాగమూర్తుల కథలు బుర్రకథ ఇతివృత్తంగా వెలిశాయి. ఈ ప్రక్రియ ప్రచార సాధనంగా ఎంతగానో ఉపకరిస్తుంది. కుటుంబ నియంత్రణ, రాజకీయ ప్రచారం, ప్రజలను విజ్ఞానవంతులను చేయటము వంటి కార్యక్రమాలలో ఇది బాగా వాడబడింది. జంగం కథ, పంబల కథ, జముకుల కథ, పిచ్చుకుంట్ల కథ తరువాత వచ్చింది. డోలు, కత్తితో పాటే ప్రధాన కథకుడికి పిచ్చుగుంట్ల కథలో ఇద్దరు వంతలున్నట్లే బుర్రకథలో కూడా ఉంటారు. దీనికి మంచి ఖ్యాతి కల్పించి పద్మశ్రీ బిరుదును సంపాదించుకొన్నవారు షేక్ నాజర్. పేరును బట్టి వీరు ముస్లిం మతానికి చెందిన వారైనా చెప్పిన కథలలో ఎక్కువ భాగం హిందూ దేవీదేవతలకు చెందినవే. ప్రకాశం

బుర్రకథ

* వీరికథ *

వీరికథ అన్నది తెలుగువారి సంప్రదాయ కళారూపం. యిందూ మతపరమైన భక్తి కథలు, ప్రధానంగా వీరలీలలను సంగీత, సాహిత్యాల సంగమంగా చెప్పడాన్ని వీరకథ అంటారు. దీనిలో "సాహిత్యాల సంగమంగా చెప్పడం దీనికి తెలుగు సాహిత్యంలో చాలా ప్రాముఖ్యత ఉంది. "నారదుడు" మొదటి "వీరుడు" అంటారు. దానిని ఒక విశిష్ట కళారూపంగా తీర్చి దిద్దిన వ్యక్తి అదిభట్ల నారాయణదాసు. అప్పుడే అదిభట్ల నారాయణదాసు ప్రముఖ వీరకథ విద్వాంసులు మరియు అభిమానులుండేవారు. ఇది సంగీత, సాహిత్యాల మేళవింపుకలయిక. ఈ కథ చెప్పేవారికి భాగవతులు (లేదా) భాగవతార్ అని అంటారు. అదిభట్ల నారాయణదాసు, పరిమి సుబ్బరామశాస్త్రి భాగవతార్ మొదలగువారు ఈ ప్రక్రియలో ఉద్దండులు. వీరకథా కళారూపంలో ఒకే ఒక పాత్రధారి మూడు గంటల కాలం కథానాయకుడు కనిపిస్తాడు. ఒకే వ్యక్తి అన్ని పాత్రల్లోనూ జీవించి, రసవత్తరంగా నటిస్తాడు. నోటితో వాచకం చెబుతూ, మృదుమధురమైన గానం పాడుతూ, మధ్యలో సాత్వికమూ, కాలితో నృత్యమూ చేతులతో అంగికమూ సుస్పష్టం చేస్తూ ఆకర్షణీయమైన ఉపోద్ఘాతంతో ఏకకాలంలో అభినయిస్తాడు. వీరకథలో వున్న ప్రత్యేకత ఇదే. మూడు గంటల కాలం కూర్చున్నా ప్రేక్షకులకు విసుగు పుట్టించకుండా మిట్ట కథలతో, మళ్ళీ మళ్ళీ హాస్యరసాన్ని పోషిస్తూ సమాజంలో వున్న కుళ్ళును ఎత్తి చూపిస్తూ, వేదాంతి జోడి చేస్తూ ఆసక్తిరంజకంగా వీరకథను గానం చేస్తాడు. వీరకథకు చాలా విలువ ఉంటుంది.

వీరకథకుని వేషధారణ:

కథకుడు కేవలం అతని ప్రతిభే వల్లనే ప్రేక్షకులను వీరకథతో రంజింపచేయగలడు. వీరకథకుని వేషధారణ కూడా [illegible] చేతితో చురకత్తులు, కాలికి గజ్జెలు, పట్టు ధోవతి

పంచెకట్టు, పట్టు కండువా నడుముకి కట్టి, మెడలో ఒక పూల హారం ధరించి చక్కగా తిలకం దిద్దుతాడు.

స్వీకరించే కథలు

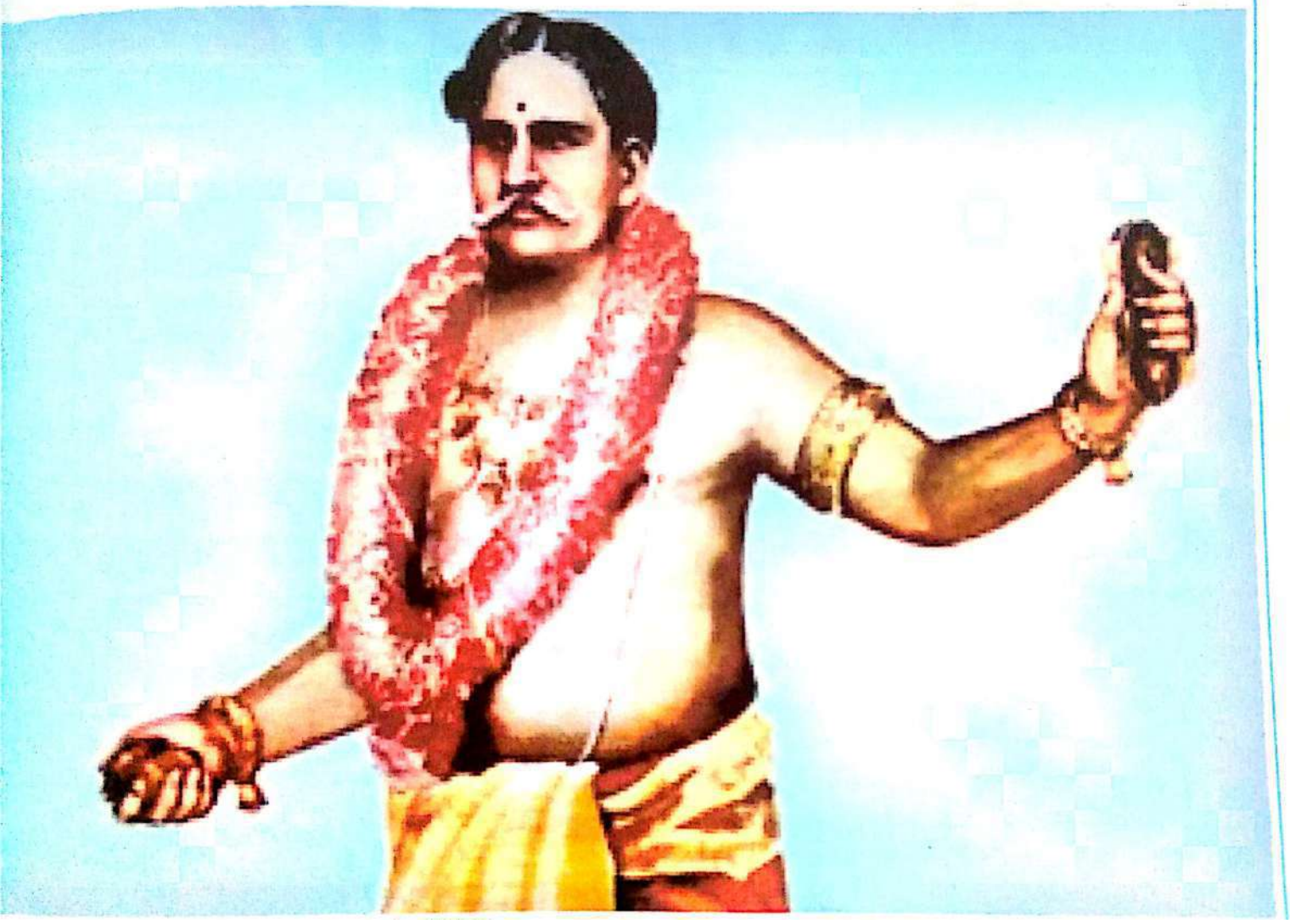
హరికథకులు రామాయణం, భారతం, భాగవతం మొదలైన ఆధ్యాత్మిక సంబంధమైన కథలను విరివిగా చెప్తూ వుంటారు. సంపూర్ణ రామాయణం, సంపూర్ణ భారతం, భాగవతం మొదలైన కథలు పదిహేను రోజులు, నెల రోజుల వరకు కూడా సాగుతాయి. పట్టణాలలోనూ, గ్రామాల్లోనూ పనుల తీరికం అయిపోయిన తరువాత, పర్వదినాలలోనూ ఆంధ్రదేశపు హరిదాసులు ఈ కథ చెప్తుంటారు.

వివిధ భాషలలో హరికథ

హరికథ ప్రక్రియ ఇతర భారతీయ భాషలలోను ఉంది. తమిళుల కథాకాలక్షేపము సంగీత ప్రధానమైనది. కన్నడ హరికథ ప్రవచనా భరితమైనది. మరాఠి కీర్తనలు, భక్తి ప్రధానమైనది. కాని తెలుగు హరికథ భక్తి, సంగీత, సాహిత్య అభినయాల మేలు కలయిక అని తూమాటి దోణప్ప వివరించారు. 5 వేల పైగా హరికథలు, హరికథపై 200 మందికి పైగా రచయితలు వ్రాసిన దాదాపు వెయ్యి పుస్తకాల వాఙ్మయము కలిగిన ఏకైక భాష తెలుగు.

హరికథ పుట్టుక

హరికథ పుట్టుక గురించి భిన్నాభిప్రాయాలు ఉన్నాయి. హరికథ వేదాలు నుండి పుట్టిందని కొందరు భావిస్తారు. జమ్ములమడక మాధవరాయ శర్మ కథాగానము యొక్క మూలము సామగానమేనని అభిప్రాయం వెలిబుచ్చారు. మరికొందరు లవకుశుల రామాయణ పారాయణము నుండే హరికథ ఉద్భవించిందని భావిస్తున్నారు. మరికొందరు నారద భక్తి సూత్రము హరికథ యొక్క మూలమని భావించారు. ఇంకొందరు యక్షగానమే హరికథగా రూపాంతరం చెందిందని భావిస్తున్నారు. హరికథ మూలము వేదైనా



కోటిళ్ల సత్యనారాయణ, ఎరుకయ్య మొదలైన మహామహులెందరో ఆంధ్రదేశంలో హరికథా గానాన్ని ప్రచారం చేశారు. వీరు ఆదిభట్ల నారాయణ దాసు గారి శిష్యులు అని చెప్పవచ్చు.

ప్రముఖ హరి కథకులు

* హరికథలో మొదటిది ఆదిభట్ల నారాయణ ప్రాచీన మోక్షగుండం రామయ్య

* హరికథకు అంతటి ప్రాముఖ్యాన్ని కథకులకు మార్గదర్శకాన్ని చేసిన హరికథ పితామహులు ఆదిభట్ల నారాయణదాసు.
* నారాయణదాసు సమకాలికులుగా చిలకపల్లి సూర్యనారాయణ, బాలాజీదాసు, చేరాల ఎరుకయ్యదాసు, పెద్దింటి సీతారామ భాగవతార్ సుప్రసిద్ధులు. దాసు శిష్యుల్లో ములుమూరి సత్యనారాయణ, పంతుల సుబ్రహ్మణ్యశాస్త్రి, ములుగుట్ల పున్నయ్య, అద్దేపల్లి లక్ష్మీదాసు వంటి వారెందరో ఉన్నారు.

ప్రసిద్ధ హరిదాసులు :

* సామవేదం కోటేశ్వరరావు
* వల్లమూరి నరసింహదాసు
* బాల బ్రహ్మానంద దాసు
* ఉమాకాంత్ దాసు
* బెల్లనాటి లింగమూర్తి
* చిట్టిమళ్ల రంగయ్యదాసు
* శలాకవరపు లింగమూర్తి శర్మ
* పంతుల మధుసూదన రావు
* దొంతుర్తి ఉమ (కాకినాడ)
* ఘట్టి శైలజ (రేలంకి)
* చదలవాడ వెంకటేశ్వరుడు (భీమవరం)
* వీర్ల రామచంద్రయ్య (తణుకు)

* తప్పెట గుళ్ళు *

ఉత్తరాంధ్ర కళారూపం. ఈ నాటికి పల్లె గ్రామాలలో నాగరికతకు దూరంగా ఉన్న గొల్ల కులస్థులు ప్రదర్శించే తప్పెట గుళ్ళు, కొన్ని వందల సంవత్సరాలుగా చెక్కు చెదరకుండా ఈ కళారూపాన్ని కాపాడుకొస్తున్నారు. కోనాలు, యాదవులు, గొల్లలుగా పిలవబడే ఈ కులస్థులు గ్రామీణ ప్రాంతాలలో ఎక్కువగా ఈ నాటికీ మేకలు, గొర్రెలు మందలపై ఆధారపడి జీవనం సాగిస్తున్నారు. ఊళ్ళకు దూరంగా పొద్దంతా గొర్రెలను కాపలా కాస్తుంటారు. వీరు ఒంటరితనాన్ని మర్చిపోవటానికి వీరి నోట నుండి అనేక రకాలైన పాటలు వస్తుంటాయి. కుటుంబాలకు దూరంగా, రాత్రి పూట మందకాపలా సమయంలో వీరు ఈ తప్పెటగుళ్ళు పాట, గొల్ల చరిత్ర తెలిపిన పాటలు, కాటమరాజు కథలు పాడుతుంటారు.

ఉత్తరాంధ్రాలో

ఆంధ్రప్రదేశ్‌లో ముఖ్యంగా విశాఖపట్టణం, విజయనగరం, శ్రీకాకుళం జిల్లాలలో తప్పెట గుళ్ళు కళారూపం ప్రాచుర్యంలో ఉంది. ఇది సంప్రదాయ నృత్యం. గొల్ల కులానికి చెందిన వారు ఎక్కువగా చేస్తూ ఉంటారు. వారికి పశువులు, గొర్రెలు, మేకలు మందలు ఎక్కువ. వర్షాలు పడక పశుగ్రాసానికి కూడా కష్టమైనప్పుడు భగవంతుని కటాక్షం కోసం చేసే దేవతారాధనలో ఈ తప్పెట గుళ్ళు ప్రస్థానం ఉంటుంది. ముఖ్యంగా యాదవులే జరిపే గంగ జాతర సందర్భాలు ముఖ్యమైనది. కాటమరాజు భార్య గంగమ్మ, పార్వతిదేవి శివుని ఆజ్ఞ మేరకు కాటమరాజు భార్యగా జన్మించిందని, ఆ గంగమ్మ యాదవ కులానికి ఆరాధ్య దేవత అని, యాదవుల నమ్మకం. శివుణ్ని దర్శించిన భక్తులందరికీ అన్ని వాయిద్యాలను ఇచ్చి వేయగా మిగిలిపోయిన తప్పెట గుళ్ళను మాత్రం మిగిలిన యాదవులకు ఇచ్చారని వారి కథనం. తప్పెట గుళ్ళు

తూర్పుగోదావరి జిల్లావరకు విస్తరించింది. గొల్లలు ఎక్కువగా ఉండే ప్రతి గ్రామంలో తప్పెటగుళ్ళ బృందం ఒకటి ఉంటుంది. ఇప్పటికీ ఈ నాలుగు జిల్లాల్లో చిన్న పెద్ద బృందాలు ఇవి ఎన్ని ఉంటాయో చెప్పలేము. అయితే ఇది ఏ జిల్లాలో పుట్టినా గొల్లవారి నోటిలో గొల్లవారి మధ్యలో పుట్టిందనేది నిజం. దీనికి 400 సంవత్సరాల చరిత్ర ఉంది.

ప్రదర్శనా విధానం

తప్పెటగుళ్ళను ప్రదర్శించేటప్పుడు వీరు రంగురంగుల బనీను బనియన్లను ధరిస్తారు. కాళ్ళకు గజ్జెలు కట్టుకొని ఒకే విధమైన రంగురంగుల నిక్కర్లు తొడిగి, లంగోటి లాంటి గోచీలను ధరించి, రేకులతో గుండ్రంగా తయారుచేసిన తప్పెటగుండెను గుండెకు కట్టుకొని రెండు చేతులతో వివిధ గతులలో ఉధృతంగా వాయిస్తారు. కేకలతో, అరుపులతో కొంతెలు కొడుతూ, ఆనందంగా గుండ్రంగా తిరుగుతూ శాస్త్రీయమైన అడుగులతో అందరూ గంతులేస్తూ, గంతుతూ సుదీర్ఘరాగాలతో ఆలాపన చేస్తూ తప్పెటలను కొడుతూ పాటలు పాడుతారు. బృందంలో సుమారు 20 వరకు ఉంటారు. తాళం లయ తప్పకుండా క్రమం తప్పకుండా వలయాకారంలో తిరుగుతూ వీరు నృత్యం చేస్తారు.

జట్టు నాయకుడే గురువు

తప్పెట గుళ్ళ బృందానికి ఒక నాయకుడు వుంటాడు. అతనే ఆ బృందానికి గురువు. నాయకుని చెప్పుచేతల్లో ప్రదర్శన సాగుతుంది. తప్పెటగుళ్ళతో నృత్యం చేయటమే మాత్రమే కాక నాయకుడు రామాయణం, భారతం, బొబ్బిలియుద్ధం మొదలైన కథలను చెబుతూ మధ్య మధ్య రంధి రంధిగా మా స్వామి జన్యాయ్యా వంటి కొన్ని కీర్తనలు పాడుతూ ప్రేక్షకులను

* "కోలాటం" *

ఆంధ్ర ప్రజాజీవితంలో అన్ని జానపద నృత్య కళారూపాలతో పాటు ఈ కోలాట నృత్యం కూడా తెలుగు జానపదుల జీవితాలతో పెన వేసుకుపోయింది. పెద్దల్ని, పిల్లల్ని, అందర్ని అలరించిన కళారూపం కోలాటం. కోలాట నృత్యాలు ప్రతి పల్లెలోనూ విరామ సమయాల్లో రాత్రిపూట పొద్దుపోయే వరకు చేస్తూ వుంటారు. భక్తి భావంతో దేవుని స్తంభాన్ని పెట్టుకుని ఇంటింటికి తిరిగి ప్రతి ఇంటి ముందు కోలాటాన్ని ప్రదర్శిస్తారు. ఈ కోలాట నృత్యాలను పెద్ద పెద్ద తిరునాళ్ళలోనూ బహిరంగ వీధులలోనూ ప్రదర్శిస్తారు. కోలాటం ఒకమైన సాంస్కృతిక సామూహిక ఆట. కోల మరియు ఆట అనే రెండు పదాల వల్ల కోలాటం ఏర్పడింది. కోల అంటే కర్రపుల్ల అని అర్థమని, ఆట అంటే క్రీడ, నాట్యం అనే అర్థాలుండటంతో కోలాటం అంటే కర్రతో ఆట తోడ ఆడే ఆట అనే అర్థంగా భావించవచ్చు. రెండు చేతులతోను కర్రలను పట్టుకొని పదం పాడుతూ గుండ్రంగా తిరుగుతూ లయానుగుణంగా అడుగులు వేస్తూ ఒకరి చేతికర్ర ముక్కలను వేరొకరి చేతికర్ర ముక్కలకు తగిలిస్తూ ఆడతారు. సాధారణంగా వీటిని తిరునాళ్ళలో స్త్రీలు మరియు పురుషులు ఎక్కువగా ప్రదర్శిస్తారు. విజయనగర సామ్రాజ్యంలో ఈ ప్రదర్శనలు ప్రసిద్ధంగా జరిగినట్లు అబ్దుల్‌రజాక్ అనే చరిత్రకారుడు వర్ణించాడు. విజయనగర శిథిలాలపై కోలాటం ఆడుతున్న నర్తకీమణులు శిల్పాలను నేటికి మనం చూడవచ్చు. గ్రామ దేవతలైన ఊరడమ్మ, గండిమైసమ్మ, గంగాదేవి, కట్టమైసమ్మ, పోతలింగమ్మ, పోలేరమ్మ, దుర్గకొండ గంగమ్మ, మొదలగు గ్రామ దేవతల జాతర సందర్భంగా కోలాటం ఆడతారు.

* ప్రభల సంస్కృతి *

ప్రభల సంస్కృతి గుంటూరు జిల్లా పల్నాడు ప్రాంతంలో కనిపించే ఒక గొప్ప సంస్కృతి. రాష్ట్రంలో ఎక్కడాలేని విధంగా మహాశివరాత్రి నాడు గుంటూరు జిల్లా కోటప్ప కొండ, క్షీరారామలింగేశ్వర స్వామి, పుత్తేశుల ప్రాంతంలో ప్రభల సంస్కృతి కనిపిస్తుంది.

కోటప్పకొండ

కోటప్పకొండ గుంటూరుజిల్లా, నర్సారావుపేటకి 10 కి.మీ దూరం ఉంది. ఇది ప్రముఖ శైవ క్షేత్రం కొండపై త్రికూటుడై కోటపై ఉన్నాడు. ప్రతీ ఏడాది మహాశివరాత్రి పర్వదినాన రాష్ట్ర నలుమూలలా నుంచి భక్తులు కొండకు తరలివస్తారు. శివరాత్రి నాడు కోటప్పకొండకు 30 కీ.మీ. దూరంలో ఉన్న అన్ని గ్రామాల వారు ప్రభలు పట్టుకొని వెళ్తారు.

ఆంధ్రాలో ప్రభల ఉత్సవం

అంబాజీపేట మండలం, జగన్నాథపురం కాశీక నది తీరాన జరిగే మహోన్నత ఉత్సవం ప్రభల ఉత్సవం. ఇది ఎక్కువగా సంక్రాంతిలో కనుమ రోజున ఈ ప్రభల తీర్థం అంగరంగ వైభవంగా జరిగింది. ఇచ్చట 11 రథాలతో కూడిన ప్రభలను ఏర్పాటు చేశారు. మన ఆంధ్రాలో ఆంధ్రాలో చూస్తే ఎక్కువగా ప్రభల తీర్థం కోనసీమ ప్రాంతంలో జరుగుతాయి.

అలాగే ఈ సంస్కృతి అనేది గుంటూరు జిల్లా మిక్కిలిగా పల్నాడు ప్రాంతంలో కనిపించే గొప్ప సంస్కృతిగా చెప్పవచ్చు. ఇక్కడ ఈ ప్రభల తీర్థం మహాశివరాత్రి నాడు జరుగుతుంది.

BRIEF HISTORY OF A.S.P ARCHAEOLOGICAL MUSEUM KAKINADA

A Study Related to KAKINADA

Study Project Report submitted to

DEPARTMENT OF HISTORY

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In partial fulfilment of the requirements for the award of the Degree of Bachelor of Arts

2019-2022

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Submitted by

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CERTIFICATE

This is to certify that the content of this project entitled "A.S.P ARCHAEOLOGICAL MUSEUM, KAKINADA" by ANGADI MALLISWARI & PALLAPROLU SYAMALA are the Bonafide work of their submitted to Ms. Y. SITA MAHA LAKSHMI, M. A, NET, Lecturer in charge, Ms. L. BHANU TEJA Lecturer in Department of History & Tourism for partial fulfilment of the Requirement of A.S.D. Govt. Degree College for Women, (Autonomous), Jagannaickpur, KAKINADA for the award of the Degree of **BACHELOR OF ARTS.**

V. Ananta Lakshmi
Signature of the Principal

L. Bhanu Teja
Signature of the
Project Supervisor

Signature of the
Lecturer in charge,
Department of History


ఆంధ్ర
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ప్రభుత్వప్రదర్శనశాల
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కృతజ్ఞత సమర్పణ.

ఈ పరిశోధక నివేదికను తయారు చేసి పూర్తి చెయడంలో సహకరించిన అందరికి కృతజ్ఞతలు తెలియజేయడం నా అత్యున్నత విధి.

ఈ పరిశోధక నివేదికను పూర్తి చెయడంలో నాకు పూర్తి సహకారాలు అందించిన మా గురువులు Ms. Y. Sitha Mahalakshmi Madam గారికి సర్వదా కృతజ్ఞతలు.

ఈ పరిశోధక నివేదికలో భాగంగా నాకు సహకరించిన ఆంధ్ర సాహిత్య పరిషత్తులోని గల అందరికి నా కృతజ్ఞతలు.

నా చదువు అంతటిలో నన్ను ముందుండి నడిపించిన నా తల్లి, తండ్రులకు మరియు అందరికి నా కృతజ్ఞత అభినందనలు.

నా ఈ చదువు (కమంలో మరియు నా వ్యక్తిత్వ వికాసంలో సహకరించిన మా కళాశాల అధ్యాపక బృందానికి వారి (పేమాభిమానాలకు ఆజన్మాంతము ఋణపడి ఉంటాము.

ఇట్లు :-

A. Mallisubari.

P. Shyamala.

INDEX

OBJECTIVES

1). ఆంధ్ర సాహిత్య కళా పరిషత్ గురించి స్పష్టంగా తెలుసుకోవడం.

2). మ్యూజియం ఆవిర్భావం, ఆవశ్యకతను తెలపడం ఎలాగో తెలుసుకోవచ్చును.

3). పురావస్తు త్రవ్వకాలను, అపురూప శిల్పాలను గురించి తెలుసుకోవడం.

4). ఆంధ్ర సాహిత్య పరిషత్ పూర్వ చరిత్ర తెలుసుకోవడం.

5). ఈ మ్యూజియం స్థాపనకు అనేక మంది కవులు, పండితులు చేసిన కృషి.

6). ఈ మ్యూజియం ద్వారా అనేక మంది విద్యార్థులు, పరిశోధకులకు అవగాహన కల్పించడం.

7). మొదటి ప్రపంచ యుద్ధంలో వాడిన ఆయుధాలు ఇక్కడ ఉండడం.

పరిచయం

ఆంధ్ర సాహిత్య పరిషత్తు మన దేశానికి స్వాతంత్ర్యం రాక పూర్వము దక్షిణ భారతదేశ మందలి చెన్నపట్టణము నందు స్థాపించబడినది. శ్రీ జయంతి రామయ్య పంతులు గారు 1911 వ సం॥రం ప్రారంభమున ఉద్యోగ నిమిత్తమై చెన్నపట్ట-ణము చేరినారు. ఈ సందర్భములోనే వారికి ఆంధ్ర భాషా వాఙ్మయాభివృద్ధికై ఒక మహా సంఘమును ఏర్పాటు చేయవలెనని తలంపుతో "ఆంధ్ర భాషా మహా సంఘము" అను శీర్షికను ఆంధ్ర పత్రికను విరోధికృతు సంవత్సర ఉగాది సంచికలో ప్రచురించినారు. ఈ సమయమునకే పిఠాపురసంస్థానాధిపతులైన శ్రీ మహారాజారావు వెంకట కుమార మహీపతి సూర్యారావు గారు మరియు వారి దివాను మొక్కపాటి సుబ్బారాయులతో సంప్రదించినారు. వారు ఇరువురు కలిసియుండగా "వెస్లీ కాలేజి" 1911 మార్చి 25 వ తేదీన ఒక సభను నిర్వహించినారు. ఈ సభకు అనేక మంది గొప్ప వారు హాజరు కావడం జరిగింది. వారిలో కొందరిని క్రింది విధంగా చూడవచ్చు.

ఈ సభకు

1). రావుబహద్దూరు, కందుకూరి వీరేశలింగం పంతులు గారు.
2). వేదము వెంకటరాయ శాస్త్రులు గారు.
3). మొక్కపాటి సుబ్బారాయుడు గారు.
4). చెన్నాప్రగడ భానుమూర్తిగారు
5). గోటేటి కనకరాజుగారు
6). వావిలకొలను సుబ్బారావు గారు
7). దినవహి హనుమంతరావు గారు
8). కొమర్రాజు వెంకట లక్ష్మణ రావు గారు.

వీళ్ళంతా ఈ సభలో ఆంధ్రభాష, వాఙ్మయము-నకు సంబంధించి అభివృద్ధి కార్యక్రమాలను చేపట్టవలెనని ఏకగ్రీవ తీర్మానము చేయడం జరిగింది. అంతేగాకుండా సమగ్ర నిఘంటు నిర్మాణము ముఖ్యమని వీరేశలింగము పంతులు గారు ప్రతిపాదించగా అందరు అంగీకారమును తెలిపినారు. దీనికి కావలసిన ధనమును వెచ్చించెదనని పిఠాపురం మహారాజావారు అక్కడే ప్రకటించినారు.

తెలుగు భాషా వాఙ్మయ పరిరక్షణకై మహా సంఘము స్థాపించవలెనన్న సంకల్పంతో 1911 మే 12 వ తేది నాడు "తిరువల్లిక్కేణి" ఉన్నత పాఠశాల భవనంలో ఒక సభను నిర్వహించినారు. ఆనాటి సభకు శ్రీ పిఠాపురము మహారాజావారు అగ్రాసనాధిపతిగా ఉండి సభను

నిర్వహించినారు. ఈ సభకు ఆహ్వానించబడిన వారిలో వెంకటగిరి పురపరాధిష్ఠాయలు, బొబ్బిలి పురాపరాధిష్ఠాయలు, హైకోర్టు వకీలు మొ॥ ప్రముఖుల ఆహ్వానంగా వారందరు ఈ సభకు హాజరై మద్దతు తెలికినారు. పరిషత్తుకు సంబంధించి నియమ నిబంధనలు ఏర్పాటు చేసి ఆమోదించినారు.

ఫై నిబంధనలను అనుసరించి ప్రథమముగా పిఠాపురం మహారాజా వారు మరియు వెంకటగిరి మహారాజావారు ఒక్కొక్కరు వంద వేల రుపాయల చొప్పున ఇచ్చి దానికి ప్రతిష్టాపకులైనారు. చందా లేకుండా కూడా కాందరిని గౌరవ సభ్యులుగా స్వీకరించి, వారి సేవలను కూడా పరిషత్తుకు వినియోగించుకున్నారు. ఈ యొక్క సాహిత్య పరిషత్తును 1913 Apl - 8 వ తేదిన కంపెనీ యాక్టు ప్రకారం రిజిస్టరు గావించినారు.

ఆంధ్ర సాహిత్య పరిషత్ 12 మే 1911 మద్రాసులో ఏర్పడింది. 8-4 1913 చొప్పున్ కంపెనీ Act ప్రకారము రిజిస్ట్రేషన్ జరిగింది. సంస్థ ఏర్పాటుకు ప్రధాన కారణం తెలుగు సాహిత్య పుస్తక ప్రచురణ, వ్యాప్తి ప్రోత్సహం కల్పించడం. దాని వెనుక ప్రముఖ కవి మరియు గాయన పరిశోధకులు కాయంతి రామయ్య పంతులు ముఖ్యులు. ఈయన గాయన పరిశోధకులు. తొలినాళ్ళలో

వ్యవహారిక భాషోద్యమం జరిగినప్పుడు ఆయన గ్రాంథిక-వాదులకు నాయకత్వం వహించి పోరాడారు. పిఠాపురం మహారాజా వారి ఆర్థిక సహాయంతో "సూర్యరాయాంధ్ర నిఘంటువును 1936 లో రచించారు.

ఆంధ్ర సాహిత్య పరిషత్ వార్షిక సభ 1912 వ సం॥రము ఏప్రియల్ మాసములో 6,7 తేదీలలో పచ్చ-యప్ప కళాశాల యందు జరుపబడినది. ఆ సభకు పిఠాపురం మహారాజా వారు అగ్రసనాధిపతిగా ఉండి సభను జయ ప్రదముగా గావించినారు.

ఆంధ్ర సాహిత్య పరిషత్ వారు ప్రప్రథమముగా 1913 - మే 15,16 తేదీలలో పచ్చయప్ప కళాశాలలో నిర్వహించిన పండిత గోష్ఠిలో ప్రముఖులెందరో పాల్గొని వివిధ అంశాలను పత్రికలలో ప్రచురించాలన్న దానిపై చర్చించినా-రు. నాటి సభలో గిడుగు అప్పారావు కూడా ప్రసంగించినారు.

ఆ నాటి నుండి ఆంధ్ర సాహిత్య పరిషత్ తెలుగు భాషా వాఙ్మయ అభివృద్ధికి, పరిరక్షణకు పలుమార్లు చర్చ, భాషా పండితులెందరో సమావేశాలు జరిపి, సమగ్రంగా చర్చించి ఏ విధంగా రచనలు గావించాలి ఏ విధంగా తెలుగు పాఠాలు విద్యార్థులకు బోధించాలి ఏ విధంగా భాషను తెలుగు ప్రజలకు పత్రికల ద్వారా అందించాలన్న తపన, వాదనలు వాడి వేడిగా సాగి ఎన్నో

ఆంగ్లనాలు ద్వారా మన ఆంధ్రుల తెలుగు భాషా ఔన్నత్యానికి ఎనలేని ఎంతటో కృషి సలిపే తెలుగు ఔన్నత్యాన్ని, సంస్కృతిని జీవింప చేసేటందుకు పునాదులు వేసినారు.

ఈ పత్రికను ప్రారంభించిన నాటి నుండి పత్రికపై "ఆంధ్ర సాహిత్య పరిషత్ పత్రిక" అని రెండు వరుసలలో, సరస్వతి దేవి చిత్రములో క్రింది భాగములో ముద్రించబడే-ది. ఈ సరస్వతి దేవి చిత్రములో శ్రీ కృష్ణ దేవరాయలు చెప్పిన "దేశ భాషలందు తెలుగు లెస్స" అనే వాక్యమును ఉంచి ముద్రించబడినది. తరువాత 1927 లో ఆంధ్ర సాహిత్య పరిషత్ పత్రిక అనే అక్షరాలను కొద్దిగా లావు పాటిగా ముద్రించినారు. తరువాత 1928 నుండి ఆంధ్ర సాహిత్య పరిషత్ పత్రికకు ముందు శ్రీ అక్షరమును చేర్చబడినది. ఈ శ్రీ అక్షరములో మూడు వరుసలలో పత్రిక పై ముద్రించబడుటయే కాకుండా సరస్వతి దేవి చిత్రమును క్రింది భాగమునకు తీసుకొని రావటము జరిగినది.

1936 నుండి శ్రీ అక్షరాన్ని పై భాగమున ఉంచి ఆంధ్ర సాహిత్య పరిషత్ పత్రిక అని ఒకే వరుసలో తీసుకొని ముద్రించబడుటయే కాకుండా పుస్తకము సైజును కూడా తగ్గించటం జరిగినది. అట్లు తరువాత కాలంలో సరస్వతి దేవి చిత్రములో పాటు ఉన్నటువంటి శ్రీ కృష్ణదేవరా-యలు వాక్యమును కూడా కాలము పై భాగమునకు

తీసుకొని తరువాత క్రింది భాగమునకు కూడా తీసుకుని వచ్చి ప్రచురించుట జరిగినది.

కాకినాడకు తరలింపు :-

సాహిత్య పరిషత్ 1912 మొదలుకొని 1918 వరకు అనేక రచయితల పుస్తకాలను ప్రచురించి ప్రాచుర్యం కల్పించినది. 1919-20 మధ్య కొన్ని కారణాల వలన పిఠాపురం రాజావారి ఆస్థానంలోను జయంతి రామయ్య పంతులు గారి ఆధ్వర్యంలో దానిని కాకినాడకు తరలించారు. తరువాత 1946 వరకు ఇది ప్రైవేట్ పరంగా పుస్తక ప్రచురణ, ప్రసారాల కృషి చేసింది. 1947 లో జయంతి రామయ్య పంతులు గారి నాడు శ్రీమతి సుబ్బమ్మల భర్త అయిన ప్రభల సుందర రామయ్య గారి దాతృత్వం వలన సంస్థకు చక్కని భవనం సమకూరింది. అప్పటి నుండి ఆంధ్ర సాహిత్య పరిషత్తు ప్రచురణల ఉత్తరోత్తర ప్రవర్ధమానం పొందిన గ్రంథాలయ సంపుటములను 1946 లో ప్రచురించింది. దానిని 7 సంపుటాలుగా వర్గీకరించి సరికొత్త ప్రచురణ కావించింది.

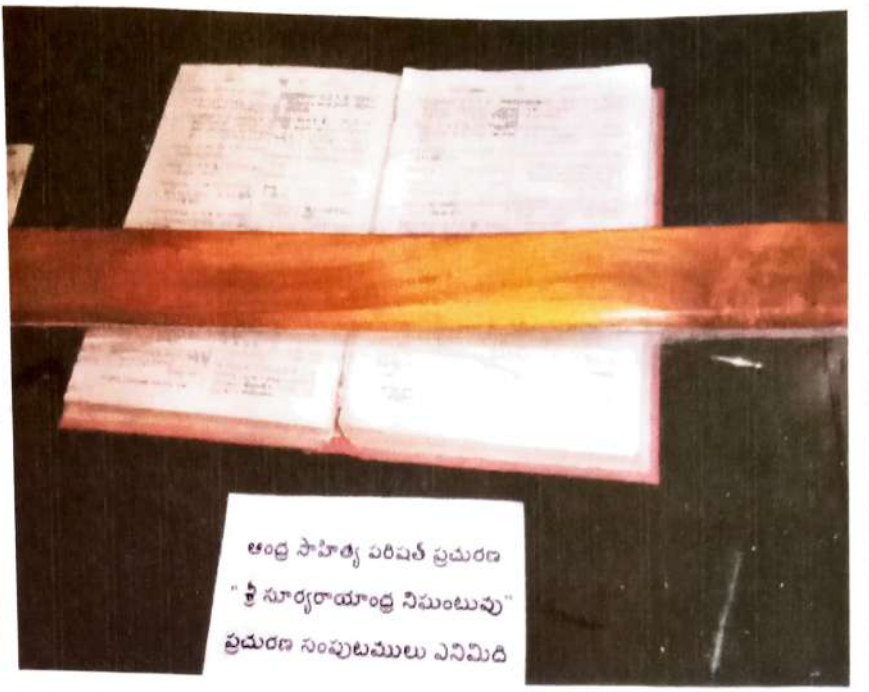
ఆంధ్ర సాహిత్య పరిషత్తు 1919 వ సం॥ రములో చెన్నై పట్టణము నుండి కాకినాడకు తరలించి కొన్ని ప్రైవేటు భవనములలో దీనిని నడిపించడమైనది. 1946 వ సం॥ములో సొంతమైన భవనాన్ని ప్రభల సుందర రామయ్య మరియు వారి సతీమణి వెంకట సుబ్బమ్మ దానమూలగుంం జరిగింది.

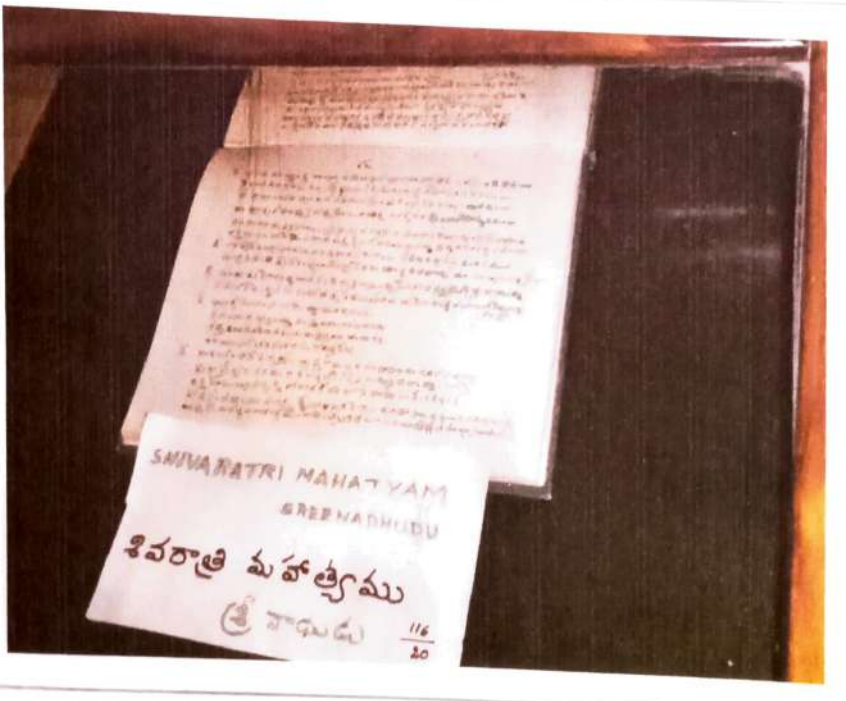
ఆంధ్ర సాహిత్య పరిషత్ పత్రికను 1946-47 వరకు
58 సంపుటాలను ప్రచురించడమైనది. ప్రతి రెండు ప్రతి
మాసాలకొక్క పత్రికను ప్రచురించియు తెలుగు భాష,
సంస్కృతి, భాషా వ్యుత్పత్తి, కవుల చరిత్ర వారు గావించిన
పద్య, వచన, కావ్యాలు, నాటకాలు మరియు అంశాలు
వ్యాసములు కాకుండా ఆంధ్ర తామ్ర శాసనములు మరియు
శిలా శాసనములను కూడా పరిశోధించి చరిత్ర అంశాలను
తెలియజేయుటలో పరిషత్ పత్రిక ఎంతగానో ప్రజలకు
జ్ఞానాన్ని ప్రసాదించిందని చెప్పుటలో అతిశయోక్తి లేదు.

అంతేకాకుండా సూర్యరాయాంధ్ర నిఘంటువును
7 సంపుటములుగా తయారు చేసి ఆంధ్ర ప్రజలకు
అందించుటలో పిఠాపురం రాజావారు చేసిన కృషి
సాయంలో మరియు వారి కృషికి ఆంధ్రులు ఎంతగానో
ఋణపడి ఉంటారని భావిస్తున్నాను.

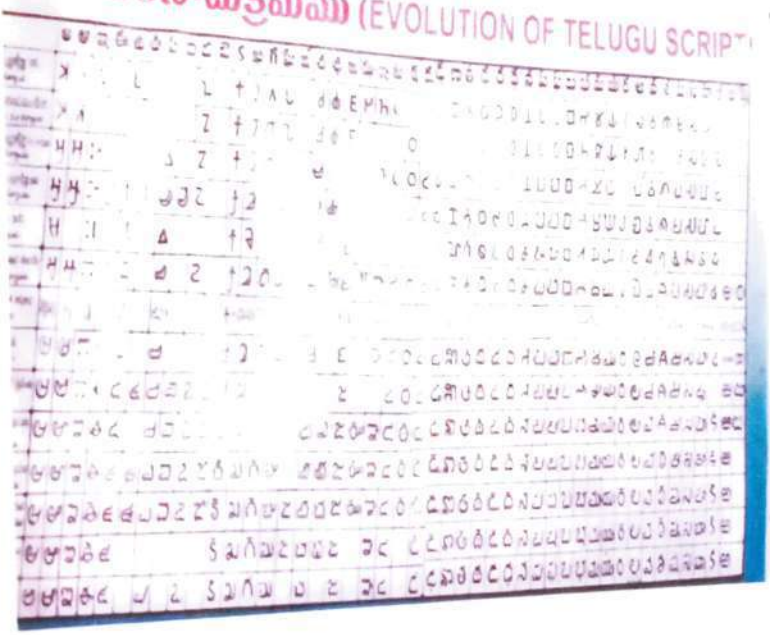
ఆంధ్ర దేశంలో స్వాతంత్ర్యానికి ముందు వెలసిన
పత్రికలు ఈ "కళ్య" ఈ కార్యాలయ గ్రంథాలయములో
భద్ర పరచటం జరిగింది. అంతే కాకుండా ఈ కార్యాలయ
గ్రంథాలయంలో వివిధ అంశాలకు సంబంధించినవి
వంద పది వేలకు పైగా పుస్తకములను సేకరించి
భద్రపరచటం జరిగింది. ముఖ్యంగా ఆంధ్రుల
భాష, సంస్కృతి కి సంబంధించిన వివిధ రకాల
ఆయుధాలను సేకరించి భద్రపరచడం జరిగింది.


ఆంధ్ర
పరిషత్
A.S.P
KAKINADA


ఆంధ్ర సాహిత్య పరిషత్ ప్రచురణ
"శ్రీ సూర్యరాయాంధ్ర నిఘంటువు"
ప్రచురణ సంపుటములు ఎనిమిది


SHIVARATRI MAHATYAM
GREENADHUDU
శివరాత్రి మహాత్మ్యము
(శ్రీ వాధుడు)
116
20

లిపి పరిణామక్రమము (EVOLUTION OF TELUGU SCRIPT)



సంగ్రహించిన అంశాలు

⇒ ఆంధ్ర సాహిత్య కళా పరిషత్ పూర్వం మద్రాసులో ఉండేది కాని ఇప్పుడు ఆంధ్ర (ప్రాంతంలో) (తూర్పు) గోదావరి జిల్లాలోని కాకినాడలో ఉండి పూర్వ కళా అనేక వస్తువులతో దీనిని చాలా సుందరంగా అభివృద్ధి పరచడం జరిగింది.

⇒ ఆంధ్ర ప్రదేశ్‌లో కెల్లా పురావస్తు శాలలో పెద్దదిగా మరియు మొట్టమొదటిగా కూడా పేరు గాంచడం జరిగింది.

⇒ దీనిని సందర్శించుటకు గాను అనేక మంది పర్యాటకులు రావడం దీనికి ప్రత్యేకం. అలాగా అనేక ప్రాంతాలు మరియు కళాశాలల నుండి విద్యార్థులు రావడం అనేక విషయాలు తెలుసుకోవడం జరుగుతుంది.

⇒ ఆంధ్ర సాహిత్య కళా పరిషత్ స్థాపనకు అనేక మంది కృషి చేయడం జరిగింది అలాగే పిఠాపురం మహా రాజావారు దీనికి ఎక్కువగా కృషి చేయడం జరిగింది.

⇒ ఈ మ్యూజియంలో మనం ఎన్నడు చూడని వింత వింత కళాకృతులను, ఆకృతులను, ఎన్నో చిత్రాలను, మరియు ఎన్నో చరిత్రలు ఉన్నటువంటి నాణేలు మరియు సామానులు మనం చూడటం ఇది ఆశ్చర్యంగా కలగడం కూడా జరుగును.

⇒ అలాగే ఈ ఆంధ్ర సాహిత్య పరిషత్‌లో ప్రత్యేక ఆకర్షణగా 1914-18 మధ్య ప్రపంచ యుద్ధంలో

వాడేవారు మరియు యుద్ధ కళలు నేర్చారు.

అలాగే ఈ మ్యూజియంలో మొదలగు ఎన్నో విషయాలకు సంబంధించిన చరిత్ర తవ్వకాలను ఇక్కడ చూడవచ్చు.

Conclustion.

ఆంధ్ర సాహిత్య పరిషత్ 12 మే 1911 మద్రాసులో ఏర్పడింది. 8-4-1913 (సొసైటీ కంపెనీ Act ప్రకారం రిజిస్ట్రేషన్ జరిగింది. సంస్థ ఏర్పాటుకు ప్రధాన కారణం తెలుగు సాహిత్య ప్రచారం విస్తృత ప్రాచుర్యం కల్పించడం జరిగింది.

అలాగే ఆంధ్ర సాహిత్య పరిషత్ ఎంతో సుందరంగా ఉన్నప్పటికి దీనిని ఇంకా బాగా పర్యాటకులను ఆకర్షించే విధంగా చర్యలు ప్రభుత్వం తీసుకుంటే విద్యార్థులకు, మరియు పర్యాటకులకు మరింత విజ్ఞాన అవగాహన కల్పించవచ్చును. దీనిలో భాగంగా ప్రసిద్ధి చెందిన, తవ్వకాలలో లభించిన రకరకాల అవశేషాలను సంగ్రహం ఉపయోగకరంగా భావించవచ్చు.

సంప్రదించిన గ్రంథాలు.

* అంతర్జాలము (Net సమాచారం).
* వార్తా పత్రికలు
* డిగ్రీ మహిళా కళాశాల గ్రంథాలయం.
* డిగ్రీ మహిళా కళాశాల (కాకినాడ) ఉపాధ్యాయుల -రాలు రాసిన పుస్తకం నుండి (కొమ్మల వడక (తోపాటు) కొంత సమాచారం సేకరించడం.
* మ్యూజియంలో ఉన్న కొన్ని పుస్తకాల నుండి సమాచారాన్ని గ్రహించడం.
* సంబంధిత బుక్ షాపుల్లో దొరికిన కొంత సమాచారం.
* జిల్లా గ్రంథాలయం కాకినాడ
* శ్రీ మండ రెడ్డి సుబ్బారావు గ్రంథాలయం
* విశాలాంధ్ర బుక్ ప్రదర్శన శాల.