Manoharbhai Shikshan Prasarak Mandal Armori's

MAHATMA GANDHI ARTS, SCIENCE &

LATE NASARUDDINBHAI PANJWANI COMMERCE

COLLEGE, ARMORI

Dist. Gadchiroli (Maharashtra) 441 208

Affiliated to Gondwana University, Gadchiroli.

Re-accredited by NAAC 'A' with 3.02 CGPA

ANNUAL QUALITY ASSURANCE REPORT

AQAR : 2020-2021

CRITERION – I

CURRICULAR ASPECTS

METRIC NO: ~ 1.3.2.

METRIC NAME: ~Number of courses that include experiential learning through project work/ field work/ internship during the year.

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PROJECT WORK/ FIELD VISIT REPORTS OF BACHELOR OF SCIENCE (B.Sc.)

CONTENT

B.Sc.
Chemistry
Project Work
Group - I

महात्मा गांधी कला विज्ञान व स्व. नसरूद्दीनभाई पंजवानी वाणिज्य महाविद्यालय आरमोरी

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PROJECT REPORT

SESSION 2020-2021

DEPARTMENT OF CHEMISTRY

SKILL ENHANCEMENT COURSE

B.Sc. (chemistry) SEM. VI

Pesticide chemistry

"Survey on different types of insecticides in agriculture used by farmer in Gadchiroli district"

Guided By:

Mr. S.M. Sontakke **Dr. N.D. Bansod** **Dr. S.S. Kola**

HoD Chemistry

CERTIFICATE

This is certified that "Group- I" of Chemistry department under Skill Enhancement Course (SEC) satisfactorily completed the project work on the topic " survey on different types of insecticides in agriculture used by farmer" as a fulfillment for the degree of Bachelor of Science (B.Sc.) Sem. VI during the academic session 2020-2021.

Head of Department

Chemistry

Head
Dept. of Chemistry
M.G Art & Science & Late N. P. Commerce
College, Armori, Dist. Gadchiroli

Prof. S.M. Sontakke

Project Head

Dr. Satish Kola

Dr. Naresh Bansod

Date: 9: 08: 2021

Place: Armori

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Mahatma Gandhi Arts,
Science & Late
N. P. Commerce College,
Armori, Dist - Gadchiroli

M.G. Art's, Science & late N.P. Commerce College ★Armori★

DECLARATION

I hereby declare that the matter embedded in this project entitled "survey on different types of insecticide in agriculture used by farmer, their composition and comparative study" is genuine work carried out with my group members under the guidance of Prof. S.M. Sontakke, department of Chemistry, M.G. College, Armori. The work presented in this thesis is original and has not been submitted for any other degree.

Sr. No.	Student Name	Signature
1	Ku. Vaishnavi Ravindra Tichkule (Group Leader)	
2	Ku. Avanti Ishwar Shende	
3	Ku. Priyanka Shamrao Thakre	
4	Ku. Sapna Gajanan Talmale	
5	Ku. Puja Vishwanath Sorte	
6	Ku. Abhilasha Nitin Soyam	
7	Ku. Chetana Ramesh Shelote	
8	Ku. Diksha Shishupal Shende	D. S. Shende
9	Ku. Payal Dilip Sorte	
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Head
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M.G. Arts, Science & late N.P. Commerce College Armori

Visit Report

Skill Enhancement Group-I Of B.Sc. 3rd Year 6th Semester Visited To The Following Krushi kendras Located In Armori Town In Gadchiroli District.

- Wanmali krishi Kendra and cement agency, Armori
- Star krushi Kendra, Opposite Hitkarini Highshcool, Armori Bardi
- Advik Krushi Kendra, Old Bus Stop, Armori
- Baliraja Krushi Kendra, Fule Square, Armori

We Gathered Information From Krushi Kendras From Armori Town Regarding Farmers Using Various Insecticides, Pesticides And Herbicides.

The Purpose Of Visit Was To Know More About Insecticides , Their Effects Usage Guidelines, Etc.

In This Way We Have Visited Krushi Kendras to know chemical composition of the Insecticides. Krushi Kendra Shopkeeper Told Us A Lot About Insecticides and their use, side effects, compositions and various brands they have. In this way we have completed our skill enhancement project successfully.

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ACKNOWLEDGMENT

I take this opportunity to express my profound gratitude and deep regards to my guide Prof. S.M. Sontakke (H.O.D) Chemistry, M.G. College, Armori for this exemplary guidance, monitoring and constant encoragment throughout the course of this project. The blessings, help and guidance given by him time to time shall carry to me in the journey of our life on which I am about to embark.

I am extremely thankfull to Dr. S.S. Kola and Dr. N.D. Bansod (assistant professor, chemistry) of the college, for their timely help.

I also express a deep sense of gratitude to the Dr. L.H. Khalsa sir (principal) of M.G.College ,Armori for giving me this opportunity and for providing me all the required facilities in chemistry department.

Lastly, I thank Almighty, my parents and friends for their constant encouragement without which is project would not be possible.

Ku.Vaishnavi R. Tichkule

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▪ Introduction

Substance which are used to kill insects are called insecticides. Insecticides have a wide application in the field of medicine, agriculture, and industry. They have the potential to alter ecosystem components majorly and are toxic to animals as well as humans. Some insecticides become concentrated as they spread in the food chain.

▪ Classification of Insecticide

Based on chemical composition, it is classified as organic and inorganic.

Based on the mode of entry in the insects, it is classified as contact poisons, fumigants poisons, stomach poisons, and systemic poisons.

- Based on the mode of action , it is classified as physical poisons, nerve poisons, respiratory poisons, protoplasmic poisons, general poisons, and chitin inhibitors.
- Based on toxicity, it is classified into four types:
- 1 Extremely toxic - Colour:red, symbol: skull and poison, oral LD50: 1-50
- 2 Moderately toxic - Colour:blue, symbol: danger, oral LD50:501-5000

- 3 Highly toxic - Colour:yellow, symbol: poison, oral LD50: 51-500
- 4 Less toxic - colour:green, symbol: caution, oral LD50: >5000
- Based on the stage of specificity, it is classified as ovicides, pupicides,larvicides,andadulticides.

▪ Types of insecticides

There are three types of insecticides. They are-

- **1 Systemic** - This type of insecticide is introduced into the soil for it to get absorbed by the plants roots. Once the insecticide enters the roots, it moves to external areas such as leaves, fruits, twigs, and branches. It forms a layer on the plant surface area and acts as a poison to any insect that comes to chew the plant.
- **2 Ingested** - Some examples of ingested pesticides are rat and roach.
- **3 Contact** - These type of insecticides act like bullets that aim only at a particular target to kill insects by its

Conclusion

The purpose of this research was to identify effective and famous brands of insecticides use by farmers in Gadchiroli district. Based on the results , it was concluded that organophosphates containing insecticides are commonly used insecticides in area for several crop disease by land owners and farmers.

In our recent survey on various types of insecticides use by the farmers in gadchiroli district, we observe that there are various brands of insecticides like yavalkar, ferterra, danitol ,nagarjuna insecticides are famous in market. People are using organic insecticide brands like bavistin in addition to regular chemical brands.

B.Sc.
Chemistry
Project Work
Group - II

महात्मा गांधी कला विज्ञान
व
वरिष्ठ महाविद्यालय
* आरमोरी *

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PROJECT REPORT

SESSION 2020- 2021

DEPARTMENT OF CHEMISTRY
SKILL ENHANCEMENT COURCE
B.sc. (CHEMISTRY) SEM. VI

Topic : survey on different types of pesticides in agriculture used by farmer in Armori tahasil

In partial fulfillment of three years full-time graduation degree program

UNDER THE GUIDENCE OF

Dr. S.S. KOLA	PROF. S. M. SONTAKKE	Dr. N.D. BANSOD
(ASSISTANT PROFESSOR)	(H.O.D. OF CHEMISTRY DEPARTMENT)	(ASSISTANT PROFESSOR)

SUBMITED BY

Group – II

KU. PRACHI VENUNATH KALBADHE
(GROUP LEADER)

late N.P. Arts, Science & Commerce College * Armori *

SKILL ENHANCEMENT COURCE

CERTIFICATE

This is certified that **"GROUP-II"** of chemistry department satisfactorily completed the project work on the topic "survey on different types of pesticides in agriculture used by farmer in Armori tahasil". As fulfillment for the degree of bachelor of science (B.Sc.) sem. VI during the academic session 2020-2021.

Head of Department (chemistry)

Prof. S. M. Sontakke

Project head

1) Dr. Satish Kola

2) Dr. Naresh Bansod

DATE : 05/08/2021

PLACE : Armori

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GROUP – II

DECLARATION

I hereby declare that the matter embedded in this project entitied "survey on different types of pesticides in agriculture used by farmer in Armori tahasil" is genulne work carried out with my group members under the guidance of PROF. S. M. SONTAKKE, Department of Chemistry, M. G. College, Armori. The work presented in this is thesis is original and has not been submitted for any other degree or diploma.

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3	Chandani Ghanshyam Jumnake	
4	Sonam Damodhar Kunghadkar	
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6	Heena Ramesh Undirwade	
7	Prajakta Ashok Lade	
8	Poonam Lomesh Lonare	
9	Akshay Waman Madavi	
10	Subhash Goverdhan Kule	

Head
Department of Chemistry
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Principal
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VISIT TO THE KRUSHI KENDRA

We are the students from B.Sc. 3rd year. We are visit to the Krushi Kendra of Armori for gathering some information about the different types of pesticides under the guidance of Prof. S. M. Sontakke sir.

The purpose of the visit that we wanted to know about different types of pesticides, herbicide, rodenticide, bactericides, insecticide, larvicide, fungicide we visited among 2-3 krushi kendra.

In it they told us a lot about this different types of pesticides their uses, side effects and gave us brief information about it.

Survey pictures are given below :

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Introduction

Pesticides are chemicals designed to kill or control insects, weeds, fungi, rodents and microbes. Many pesticides have been found to be harmful to human and animal health or to the environment. pesticide is any substance used to kill, repel, or control certain forms of plant or animal life that are considered to be pests. Pesticides include herbicides for destroying weeds and other unwanted vegetation, insecticides for controlling a wide variety of insects, fungicides used to prevent the growth of molds and mildew, disinfectants for preventing the spread of bacteria, and compounds used to control mice and rats. Because of the widespread use of agricultural chemicals in food production, people are exposed to low levels of pesticide residues through their diets. Scientists do not yet have a clear understanding of the health effects of these pesticide residues. Results from the Agricultural Health Study, an ongoing study of pesticide exposures in farm families, show that farmers who used agricultural insecticides experienced an increase in headaches, fatigue, insomnia, dizziness, hand tremors, and other neurological symptoms. Evidence suggests that children are particularly susceptible to adverse effects from exposure to pesticides, including neurodevelopmental effects.

Any substance or mixture of substances intended for preventing, destroying, or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit. Also used as substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.

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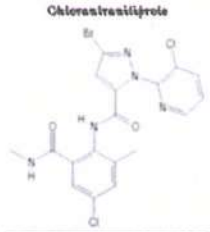
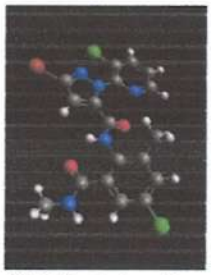
(1) CORAGEN

Chlorantraniliprole 18.5% Sc

Chlorantraniliprole is active on chewing pest insects primarily by ingestion and secondarily by contact. ... Chlorantraniliprole 18.5% SC having the trade name Coragen.

Chlorantraniliprole (Rynaxypyr) is an insecticide of the ryanoid class.[1] Chlorantraniliprole is being developed world-wide by DuPont belonging to a new class of selective insecticides featuring a novelmode of action to control a range of pests belonging to the order Lepidoptera and some other Coleoptera, Diptera and Isoptera species.





Discription ON OF CHEMICAL

Chemical Name: 3-Bromo-N-[4-chloro-2-methyl-6-(methylcarbamoyl)phenyl]-1-(3-chloro-2-pyridine-2-yl)-1H-pyrazole-5-carboxamide

Chemical formula:	C18H14BrCl2N5O2
Empirical Formula:-.	C18H14N5O2BrCl2
Common Name:	Chlorantraniliprole
Experimental Name:	DPX-E2Y45

Properties

Molar mass :-	483.15 g·mol−1
Melting point :-	209 °C
EPA PC Code:	090100
Class:	Anthranilic diamide insecticide
Mode of Action:	Interruption of normal muscle contraction

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USE PATTERNS AND FORMULATIONS

Pests/Application Sites: - beetles, caterpillars, etc.
Application Rates:-. Seasonal Maximum:
Food Crops- 0.2 lb a.i./acre (rice- 0.13 a.i./acre/year)
Ornamentals - highly variable, range between 0.33 to 0.5 lb a.i./acre

Types of Formulations/ Product Names:-
Technical: - DuPont Rynaxypyr Technical (95.3% a.i.) End Use (Agricultural Uses):

Used for

CORAGEN Broad Spectrum Insecticide is used to control pesticides like caterpillar, American boll worm, fruit borer, shoot borer, leaf folder, heliothis in different crops like rice, cabbage, cotton sugarcane, tomato, chilli, soyabean, Brinjal pigeon pea (red g), Bengal g, black g, bitter guard, and okra can be used to ...

Side effects

toxicity Coragen has low acute toxicity by the oral, dermal and inhalation routes in the rat. It was non- irritating to the skin or to the eyes of the rabbits. Results of skin sensitization testing were negative in the local lymph node assay (LLNA) in the mouse.

Dupont FMC Brand product overviw

Coragen® insecticide insect control powered by Rynaxypyr® active is a break through Group 28 mode of action insecticide that delivers excellent protection from target pests. This break through technology controls all economically important Lepidoptera & select others pecies. This unique formulation provides ease for application along with rapid activity, high insecticidal potency, long duration control and an excellent safety to crops & non-target organisms. Working primarily through ingestion, Coragen® insecticide manages insects at all stages from immature to adult stage thereby, providing excellent and long-lasting crop protection. Exposed insects stop feeding within minutes and extended residual activity protects crops longer than competitive options. Among the solutions available to the growers it boasts of having one of the widest label claims on various crops and has been the best choice among growers to manage leps in the target crops.

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Precautions

• KEEP OUT OF REACH OF CHILDREN.
• Wear long sleeves, long pants and chemical resistant gloves while mixing /loading,

and during clean up and repair.
• Follow manufacturer's instructions for cleaning/maintaining personal protective equipment (PPE). If no such instructions for washables are available, use detergent and hot water. Keep and wash PPE separately from other laundry.
• Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
• For agricultural uses, do not enter or allow worker entry into treated areas during the restricted entry interval of 12 hours.

storage and handling

- **Store** product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed. To prevent contamination, store this product away from food or feed.
- Do not store or cosume food drink or tobacco in area where they become contaminated with this material.
- the insecticide in original container only, tighy closed in well built, cool dry place, well it and ventilated and3 should be sufficient dimensions to avoid contamination with vapour.

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(6) Larviside

A larvicide is a type of insecticide used to control mosquitoes indoors and outdoors around your home. They work by killing mosquito larvae before they can grow into adults. ... When used according to product label instructions, larvicides do not harm people, pets, or the environment.

Larvicide its usd and side effect

(1)Outdoors

100% organic larvicide 125 ml dosage 4-5ml per liter of water and spray give 7-10 days for each speray. Control root borer, shoot borer, fluid borer, stem borer, and many more pests .it also has micro nutrients growth promoter which help the plant to flowers and grow.

Side effect:-

Apiaceae,Biosafety, gambasia affinis, heracleum, sprengelium, mosquito non target effect.

(2)Indoor

When usd as bit is not toxic to people it has not been shown to make people sick bit will not norm people pets and other animals aquiatic life or other insect.

Side effect

A deadly chemicals that target baby mosquito is much more effective. When attacking zika virus than traditional insecticides. When the first case of locally transmitted zika virus reported in south Florida

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Use of personal protective equipment (PPE)

Personal protective equipment (PPE) is the least effective risk control measure providing a barrier between the worker and the hazard. personal protective equipment for the work with PPPs includes:

1. Head protection.
2. face protection.
3. Respiratory protection.
3. Protective gloves.
4. Protective clothes.
5. footwear.

The main requirements for the use of PPE are following:

1. Protective equipment should be in a good condition and fit well.
2. Filter or cartridge of respiratory equipment should be changed at the specified time.
3. Gloves must be protective, fit the hands comfortably and be flexible enough to grip PPP containers firmly.
4. Gloves and boots should be washed before removal in order to avoid self-contamination.
5. The clothes should be resistant against the PPPs used and washable.
6. Garments should be washed separately from other clothes.
7. Protective clothing should be stored in a clean, dry and well-ventilated room separated from other clothing or living accommodation.
8. Contamination of work clothes through/by protective equipment should be avoided.
9. Personal protective equipment should be used even on a hot and humid day.
10. Generally, the Safety Data Sheet of a PPP may be helpful in selecting the proper PPE.

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Conclusions

We inquired about Pesticides in the nearest Krushi Kendra and got some suggestions from the shoper. Pesticides are a wide range of substances that are used to gain an advantage over species that cause diseases or are pests in agriculture, forestry, or horticulture. However, the use of many pesticides carries risks of causing damage to human health or the environment. Pesticides have become an integrated component of most of the intensive systems by which foods and other crops are grown, and there are not yet good replacements for all of their uses. For this reason, the use of pesticides will continue into the foreseeable future. Use fo pesticide is nmcreasing day by day but now a day scenario is chaanging towards organic farming variety of pesticide are using by farmer by Brand name Ekka, Benomyl 500wp, Dupont FMC, Cannon.

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B.Sc.
Chemistry
Project Work
Group - III

महात्मा गांधी कला विज्ञान
व
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★ आरमोरी ★

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GONDWANA UNIVERSITY , GADCHIROLI
PROJECT REPORT
SESSION 2020-2021

DEPARTMENT OF CHEMISTRY
SKILL ENHANCEMENT COURCE
B.Sc.(CHEMISTRY)SEM.VI

Topic: Types of herbicides in agriculture used by farmer in Armori Tehsil.

In partial fulfillment of three years full-time graduation degree program

UNDER THE GUIDENCE OF

Dr. S.S.KOLA	**PROF. S.M. SONTAKKE**	**Dr.N.D.BANSOD**
(ASSISTANT PROFESSOR)	(H.O.D. OF CHEMISTRY DEPARTMENT)	(ASSISTANT PROFESSOR)

SUBMITED BY

Group-III

KU. SONALI MANOHAR SHAHARE
(GROUP LEADER)

M.G. Art's, Science & late N.P. Commerce College ★Armori★

SKILL ENHANCEMENT COURCE

CERTIFICATE

This is certified that " GROUP-III" of chemistry department satisfactorily completed the project work on the topic "survey of various herbicides their composition and comparative study within Armori Town". As fulfillment for the degree of bachelor of science (B.Sc.) sem.VI during the academic session 2020-2021.

Head of Department(chemistry)

Prof.S.M.Sontakke

Head
Department of Chemistry
M.G. Art & Science & Late N. P. Commerce
College, Armori. Dist Gadchiroli

Project head

1)Dr.Satish Kola

2)Dr.Naresh Bansod

DATE: 5/8/2021

PLACE: Armori

Principal
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Armori, Dist - Gadchiroli

M.G. Art's, Science & late N.P. Commerce College Armori

DECLARATION

I hereby declare that the matter embedded in this project entitled *"Types of herbicides in agriculture used by farmers in Armori Tehsil."* Is genuine work carried out with my group members under the guidance of PROF.S.M.SONTAKKE ,Department of Chemistry , M.G. College ,Armori. The work presented in this is thesis is original and has not been submitted for any other degree or diploma.

SR. NO.	STUDENTS NAME	SIGNATURE
1	KU. SONALI MANOHAR SHAHARE (GROUP LEADER)	
2	KU. PRIYANKA ARUN JUARE	
3	KU. RESHAMA RAJEEV VAKKAYIL	
4	KU. SEEMA SHRIDHAR SHIWANKAR	
5	KU. SHRADHA MAHADEV WADHAI	
6	KU. PAYAL RAJESHWAR MANE	
7	KU. PRANJALI RAJKUMAR YENUGWAR	

DATE: **PLACE: Armori**

Arts, Science & late N.P. Commerce College * M.G. * Armori

ACKNOWLEDGEMENT

I take this opportunity to express my profound gratitude and deep regards to my guide Prof. S.M. SONTAKKE(H.O.D.) of chemistry, M.G. College, Armori for his exemplary guidance, monitoring and constant encouragement throughout the cource of this project. The blessings, help and guidance given by him time to time shall carry To me in the journey of our life on which I am about to embark.

I am extremely thankfull to Dr.S.S.KOLA and Dr.N.D.BANSOD (assistant professor)of chemistry department of the college,for their timely help.

I also express a deep sence of gratitude to the Dr. L.H.KHALSA Principal of M.G.College,Armori for giving me this opportunity and for providing me all the required facilities in chemistry department.

Lastly, I thank Almighty, my parents and friends for their constant encouragement without which is project would not be possible.

Sonali M. Shahare

Principal
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INTRODUCTION

HERBICIDE also commonly known as weedkillers, are substances used to control unwanted plants.[1] Selective herbicides control specific weed species, while leaving the desired crop relatively unharmed, while non-selective herbicides (sometimes called total weedkillers in commercial products) can be used to clear waste ground, industrial and construction sites, railways and railway embankments as they kill all plant material with which they come into contact. Apart from selective/non-selective, other important distinctions include persistence (also known as residual action: how long the product stays in place and remains active), means of uptake (whether it is absorbed by above-ground foliage only, through the roots, or by other means), and mechanism of action (how it works). Historically, products such as common salt and other metal salts were used as herbicides, however these have gradually fallen out of favor and in some countries a number of these are banned due to their persistence in soil, and toxicity and groundwater contamination concerns. Herbicides have also been used in warfare and conflict.

Modern herbicides are often synthetic mimics of natural plant hormones which interfere with growth of the target plants. The term organic herbicide has come to mean herbicides intended for organic farming. Some plants also produce their own natural herbicides, such as the genus Juglans (walnuts), or the tree of heaven; such action of natural herbicides, and other related chemical interactions, is called allelopathy. Due to herbicide resistance – a major concern in agriculture – a number of products combine herbicides with different means of action. Integrated pest management may use herbicides alongside other pest control methods.

In the United States in 2012, about 91% of all herbicide usage, determined by weight applied, was in agriculture.[2]:12 In 2012, world pesticide expenditures totaled nearly $24.7 billion; herbicides were about 44% of those sales and constituted the biggest portion, followed by insecticides, fungicides, and fumigants.[2]:5 Herbicide is also used in forestry,[3] where certain formulations have been found to suppress hardwood varieties in favor of conifers after clearcutting,[4] as well as pasture systems, and management of areas set aside as wildlife habitat.

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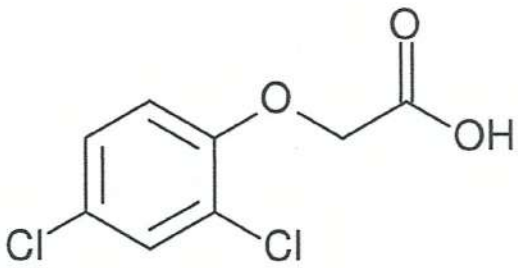
History

Prior to the widespread use of herbicides, cultural controls, such as altering soil pH, salinity, or fertility levels, were used to control weeds.[5] Mechanical control (including tillage) was also (and still is) used to control weeds.

• First herbicides

2,4-D, the first chemical herbicide, was discovered during the Second World War.

Although research into herbicides began in the early 20th century, the first major breakthrough was the result of research conducted in both the United Kingdom and the United States during the Second World War into the potential use of herbicides in war.



THE FIRST HERBICIDES 2 4 D WAS DISCOVERED BY W.G. TEMPLEMAN

The first modern herbicide, 2,4-D, was first discovered and synthesized by W. G. Templeman at Imperial Chemical Industries. In 1940, he showed that "Growth substances applied appropriately would kill certain broad-leaved weeds in cereals without harming the crops." By 1941, his team succeeded in synthesizing the chemical. In the same year, R. Pokorny in the US achieved this as well.]

Independently, a team under Juda Hirsch Quastel, working at the Rothamsted Experimental Station made the same discovery. Quastel was tasked by the Agricultural Research Council (ARC) to discover methods for improving crop yield. By analyzing soil as a dynamic system, rather than an inert substance, he was able to apply techniques such as perfusion. Quastel was able to quantify the influence of various plant hormones, inhibitors and other chemicals on the activity of microorganisms in the soil and assess their direct impact on plant growth. While the full work of the unit remained secret, certain discoveries were developed for commercial use after the war, including the 2,4-D compound.

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Non-selective herbicides are not specific in acting against certain plant species and control all plant material with which they come into contact. They are used to clear industrial sites, waste ground, railways, and railway embankments. Paraquat, glufosinate, and glyphosate are non-selective herbicides.

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➢ Timing of application

Preplant: Preplant herbicides are nonselective herbicides applied to soil before planting. Some preplant herbicides may be mechanically incorporated into the soil. The objective for incorporation is to prevent dissipation through photodecomposition and/or volatility. The herbicides kill weeds as they grow through the herbicide treated zone. Volatile herbicides have to be incorporated into the soil before planting the pasture. Agricultural crops grown in soil treated with a preplant herbicide include tomatoes, corn, soybeans, and strawberries. Soil fumigants like metam-sodium and dazomet are in use as preplant herbicides.[9]

Preemergence: Preemergence herbicides are applied before the weed seedlings emerge through the soil surface. Herbicides do not prevent weeds from germinating but they kill weeds as they grow through the herbicide treated zone by affecting the cell division in the emerging seedling. Dithiopyr and pendimethalin are preemergence herbicides. Weeds that have already emerged before application or activation are not affected by pre-herbicides as their primary growing point escapes the treatment.[9]

Postemergence: These herbicides are applied after weed seedlings have emerged through the soil surface. They can be foliar or root absorbed, selective or nonselective, and contact or systemic. Application of these herbicides is avoided during rain since being washed off the soil makes it ineffective. 2,4-D is a selective, systemic, foliar absorbed postemergence herbicide.[9]

➢ Method of application

Soil applied: Herbicides applied to the soil are usually taken up by the root or shoot of the emerging seedlings and are used as preplant or preemergence treatment. Several factors influence the effectiveness of soil-applied herbicides. Weeds absorb herbicides by both passive and active mechanisms. Herbicide adsorption to soil colloids or organic matter often reduces its amount available for weed absorption. Positioning of the herbicide in the correct layer of soil is very important, which can be achieved mechanically and by rainfall. Herbicides on the soil surface are subjected to several processes that reduce their availability. Volatility and photolysis are two common processes that reduce the availability of herbicides. Many soil applied herbicides are absorbed through plant shoots while they are still underground leading to their death or injury. EPTC and trifluralin are soil applied herbicides.[9]

Foliar applied: These are applied to portion of the plant above the ground and are absorbed by exposed tissues. These are generally postemergence herbicides and can either be translocated (systemic) throughout the plant or remain at specific site

➢ Persistence

of dicot plants. 2,4-D, 2,4,5-T, and Aminopyralid are examples of synthetic auxin herbicides.

Photosystem II inhibitors reduce electron flow from water to NADP+ at the photochemical step in photosynthesis. They bind to the Qb site on the D1 protein, and prevent quinone from binding to this site. Therefore, this group of compounds causes electrons to accumulate on chlorophyll molecules. As a consequence, oxidation reactions in excess of those normally tolerated by the cell occur, and the plant dies. The triazine herbicides (including atrazine) and urea derivatives (diuron) are photosystem II inhibitors.[11]

Photosystem I inhibitors steal electrons from ferredoxins, specifically the normal pathway through FeS to Fdx to NADP+, leading to direct discharge of electrons on oxygen. As a result, reactive oxygen species are produced and oxidation reactions in excess of those normally tolerated by the cell occur, leading to plant death. Bipyridinium herbicides (such as diquat and paraquat) inhibit the FeS to Fdx step of that chain, while diphenyl ether herbicides (such as nitrofen, nitrofluorfen, and acifluorfen) inhibit the Fdx to NADP+ step.

HPPD inhibitors inhibit 4-hydroxyphenylpyruvate dioxygenase, which are involved in tyrosine breakdown.[12] Tyrosine breakdown products are used by plants to make carotenoids, which protect chlorophyll in plants from being destroyed by sunlight. If this happens, the plants turn white due to complete loss of chlorophyll, and the plants die.[13][14] Mesotrione and sulcotrione are herbicides in this class; a drug, nitisinone, was discovered in the course of developing this class of herbicides.

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❖ VISIT TO KISAN AGRICULTURAL CENTER

We are the student from B.Sc III. We were visited to kisan Agricultural Center in Armori for gathering and survey of some information about herbicides.Under the guidance of Prof.S.M.SONTAKKE.

The purpose of visit that we wanted to know about herbicides which are used by farmer in Armori Tehsil. We visited among 2-3 agricultural center.

In it they given a information knowledge about some mainly used herbicides,their uses,composition and brief information about it.

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Kisan agricultural center.

NIRANKARI AGRICULTURAL CENTER

TIRUPATI AGRICULTURAL CENTER.

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➢ List of common herbicides

- **Brand Name: Gajab(PLANT GROWTH REGULATOR)**
  - ➢ Product Category : Agrochemicals,
  - ➢ Chemical Name : GIBBERELLIC ACID (TECHNICAL)
  - ➢ Group : Plant Hormone GA3
  - ➢ Formulation :GR- granules
  - ➢ Description : Essential Plant hormone that helps plant functioning right from germination to Flowering and fruiting. It helps increase yield and also fights against stress and physiological diseases.

- **CHEMICAL COMPOSITION**

  ➢ Gibberline acid(based on purity100%), Protein (hydrolyzed)2.500%, Yeast extract seaweeds(marina brown algae extract)3.000%,feSO7H2O(min.95%)2.300%, MnSO4 3H2O 1.400%, ZnSO4 7H2O3.900%, MgSO4 7H2O 4.300%, Emulsifier Tween 80 1.000%, solvent (water) 100.000%.

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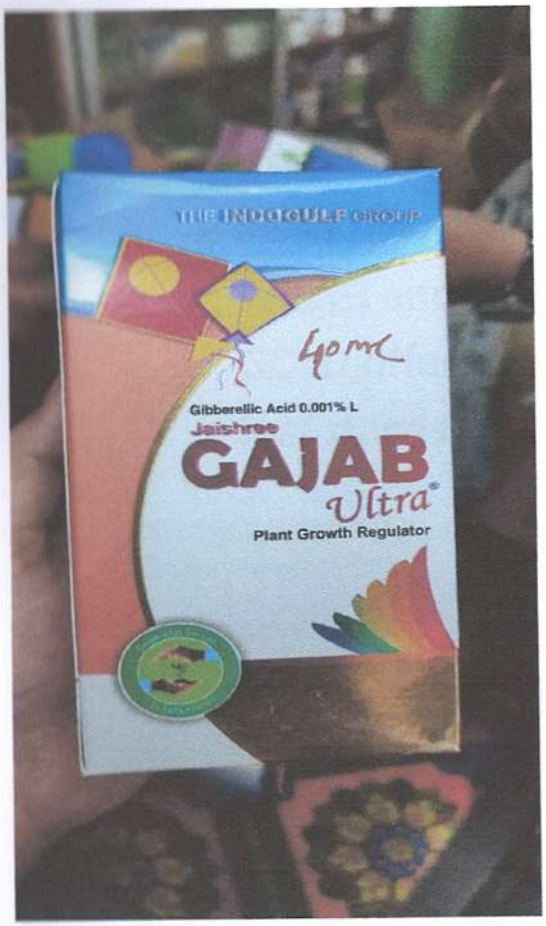
- manufacturing date: 20/01/2021
- expiry date: 01/01/2023



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HERBICIDE

BLAID

PRETILACHLOR 50% EC

Pretilachlor 50% EC is a selective pre-emergence broad spectrum herbicide with excellent action against annual grasses, sedges and broad leaved weeds.

Recommendation :

Crop(s)	Weeds	Dose/Acre (ml)	Water Required/Acre (in Litres)
Transplanted rice	Echinocloa crusgalli, Echinochloa colonum Cyperus difformis, Cyperus iria, Fimbristylis miliacea, Eclipta alba, Ludwigia Parviflora Leptochloa chinensis,Monochorea vaginalis panicum repens	400-600	200-300

Chemical Composition :

Pretilachlor a.i- Min purity 94 % W/W a.i	50.00%w/w
Emulsifing agent- Ethoxylated vegetable oil	4.40%w/w
Wetting agent- Alkyl aryl sulphonate of calcium salt	3.60%w/w
Stabiliser- Epoxised vegetable oil	3.00%w/w
Solvent C-IX	Q.S to make
Total	100.00%w/w

Antidote :

No specific Antidote is known. Treat symptomatically.

GHARDA CHEMICALS LIMITED

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❖CONCLUSION

Group (III) of chemistry project title ***"Types of herbicides in agriculture used by farmer in Armori Tehsil".*** Visited to various agricultural center in Armori town. We gathered information regarding different herbicides using farmer of Armori on various Weeds. Nowadays use of herbicides by the farmer increasing to destroy unwanted plants. Some organic cost effective herbicides are present which can be used as fertilizers as well as herbicides in present scenerio to save environment . From survey it is observed that herbicides Nominee Gold is frequently using than the rest of herbicides.

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B.Sc.
Botany
Project Work

Field Visit Report

Study of Aquatic Plants of Arsoda Pond

Organized by

Department of Botany

M. G. Arts, Science and Late N. P. Commerce College, Armori

Academic Session 2020-21

To,

The Principal,

Mahatma Gandhi Arts, Science &

Late N. P. Commerce College, Armori

Subject: - To receive permission for field visit.

Respected Sir,

Our Department of Botany organised the field visit for B.Sc. Botany students on dated 07/08/2021 at Arsoda pond for the study of aquatic plants. So kindly give permission for this field visit.

Thanking you.

Yours faithfully

Date: - 05/08/2021

Place: - Armori

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Mahatma Gandhi Arts, Science and Late N. P. Commerce College
Armori, Dist. – Gadchiroli

Field Visit

Department of Botany

B. Sc. II

List of Students (2020-21)

Sr. No.	Name of Student	Signature
1	Mr. Purushottam G. Kamdi	
2	Mr. Bhushan N. Madhumatke	
3	Ku. Mayuri K. Gurnule	
4	Ku. Martina R. Ghonmode	
5	Ku. Lina K. Kinchak	
6	Ku. Ashwini Y. Dahare	
7	Ku. Asmita T. Gedam	
8	Ku. Nikhita D. Khewale	
9	Ku. Diksha N. Kahalkar	
10	Ku. Shubhada S. Ale	
11	Ku. Shivani A. Dhakate	
12	Ku. Kalyani R. Jumnake	
13	Ku. Nikhita T. Bhisnurkar	
14	Ku. Saradhanjali H. Matere	
15	Ku. Sakshi S. Sontakke	
16	Ku. Venu A. Donadkar	
17	Ku. Dipali S. Shende	
18	Ku. Gauri N. Tijare	
19	Ku. Shivani W. Boga	
20	Ku. Vaidavi V. Badwaik	
21	Ku. Revata S. Sondarkar	

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Dept. of Botany
M. G. College, Armori.

Field Visit Report

Study of aquatic plants of Arsoda Pond

Field study tour is arranged for the B. Sc. II Students. Botany as per the instructions given in the syllabus of Gondawana University. The field excursion is arranged to botanically significant area for the study of pond Ecology and identification of aquatic plants. Students prepared list of aquatic plants found in Arsoda pond. This imparts knowledge about the new trends in the field of botanical research. Students observed different stages of plant succession floating hydrophytes, submerged hydrophytes and emergent hydrophytes. The tour successfully skilled the students practically of different theoretical concepts of ecology and identification of local flora.

List of plant species

Sr.No.	Family	Botanical Name	Local name
1	Nelumbonaceae	*Nelumbo nucifer*	Kamal
2	Nymphaeaceae	*Nymphaea nouchal*	Kamal
3	Lythraceae	*Ammania baccifera*	-
4	Onagraceae	*Ludwewigia*	-
5	Trapaceae	Trapa natans	Shingada
6	Asteraceae	*Spilanthus paniculata*	Akkalkara
7	Menyanthaceae	*Nymphoides indicum*	Water lily
8	Menyanthaceae	*Nymphoides hydrophylla*	Water lily
9	Convolvulaceae	*Ipomoea aquatica*	-
10	Lentibulariaceae	*Utricularia*	-
11	Acanthaceae	*Hygrophilla schulli*	Kate-korenti
12	Amaranthaceae	*Alternanthera sessilis*	-
13	Hydrocharitaceae	*Hydrilla verticillata*	Chilla
14	Hydrocharitaceae	*Ottelia alismoides*	-
15	Commelinaceae	*Murdania nudiflora*	-
16	Lemnaceae	*Spirodela polyrhiza*	-
17	Aponogetonaceae	*Aponogeton undulatus*	-
18	Najadaceae	*Najas* sp.	-
19	Cyperaceae	*Eleocharis acutangula*	-

20		*Eleocharis dulcis*	
21		*Eleocharis geneculata*	
22		*Furena cilaris*	
23		*Scirpus articulatus*	
24		*Scirpus lateriflorus*	
25	Poaceae	*Cynadon dactylon*	Durva
26		*Sacciolepis indica*	
27	Marsileaceae	*Marsilea minuta*	Pteridophyte
28	Azollaceae	*Azolla* sp.	Pteridophyte

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Project Work

Mahatma Gandhi Arts, Science and Late N.P. Commerce College

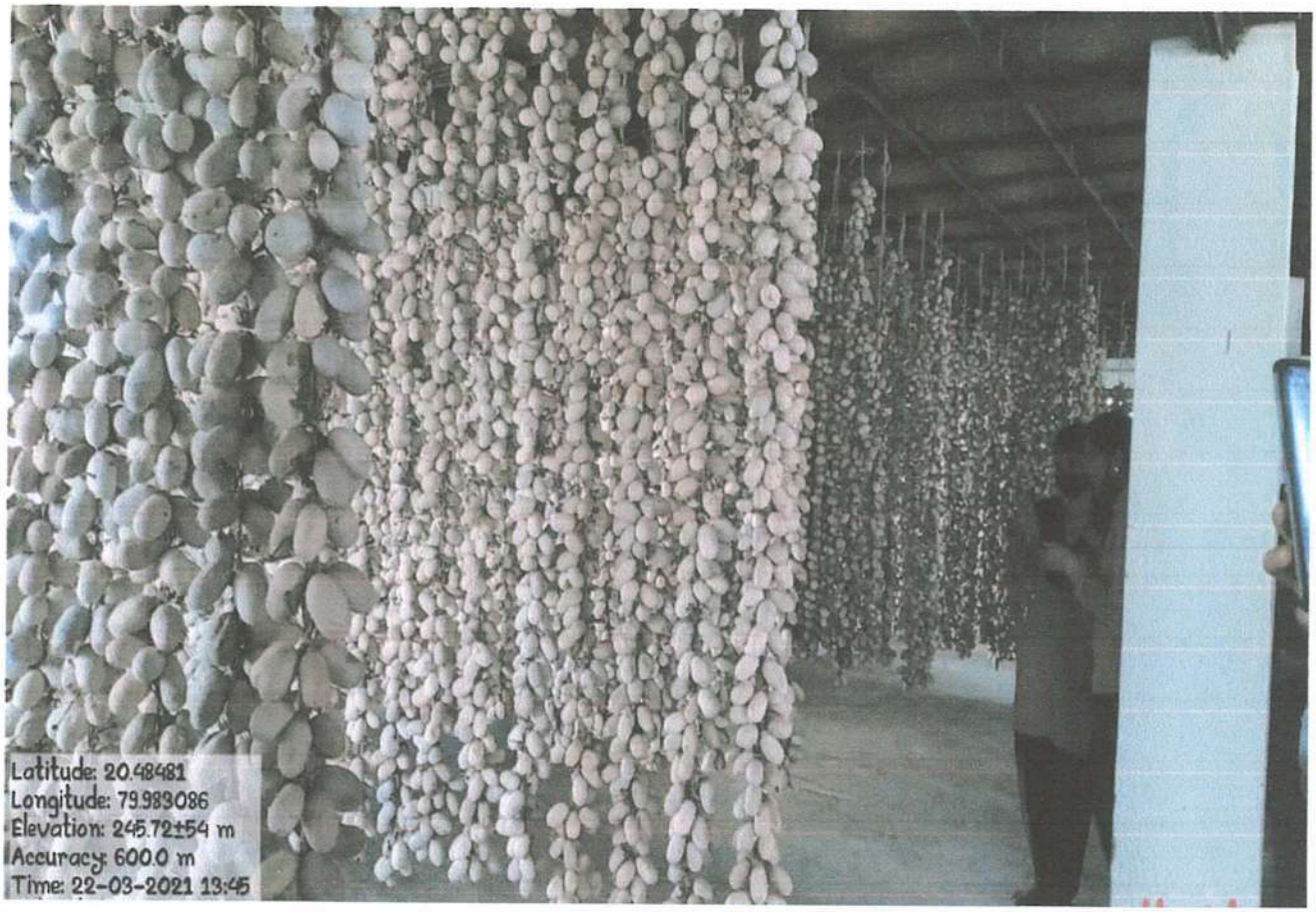
Armori Dist. Gadchiroli (M.S.) 441208

STUDY TOUR REPORT

Topic: sericulture

Session: 2020-21

(Department of Zoology)



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MAHATMA GANDHI ARTS, SCIENCE &

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Re-accredited by NAAC 'A' with 3.02 CGPA

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Office : 266558/266043
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E-mail : mgcollege.armori@gmail.com

Letter No. 187/21
Date 20/03/2021

To,

The Director,
Regional Tasar Sericulture Centre,
Armori Dist. Gadchiroli.

Subject:- Visit for study purpose

Respected sir,

It is stated that, faculty of Zoology department, is showing their interest in "Study of Sericulture in details in respect to self employment (COP-Sericulture)", hence they decided to visit to your esteemed organization with their students of UG/PG courses in zoology for this purpose.

Proudly, saying that UGC, New Delhi sponsored carrier oriented programme in sericulture has been sanctioned earlier to the Zoology Department of our college.

Kindly permit to visit to your Kosa Vikas Regional TASAR Centre (sericulture centre) Armori along with their students and your help is needed with guidance.

Thanking you.

Yours faithfully,

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ate N.P.Commerce College
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Recived
22.3.21

महाराष्ट्र शासन
रेशीम विकास अधिकारी श्रेणी-१
टसर रेशीम कार्यालय,
आरमोरी
जि. गडचिरोली पिन-४४१ २०८

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INTRODUCTION :

Silk is a natural protein fiber, some forms of which can be woven into textiles and was amongst the earliest fiber discovered by man. Silk is a fibroin made of proteins secreted in the fluid state as single filament by a caterpillar. The fibroin is produced by a certain insect larva to form cocoons. The best-known silk is obtained from the cocoons of the larvae of the mulberry silkworm. The shimmering appearance of silk is due to the triangular prism-like structure of the silk fiber, which allows silk cloth to refract incoming light at different angles, thus producing different colors.

Silk has high absorbance, lightweight, soft touch and high durability and known as "Queen of Textiles". Silk has important role in the life and culture of Indians. India has a rich and a complex history in silk production and its trade.

Aim and Objectives:

- To motivate students for scientific study in the field of Argo-based Industry by performing simple field visits.
- To develop skill, to earn regular incomes through sericulture in the villages of Armori tehsil, dist. Gadchiroli area dependent on temperature.
  Many Government subsidies and facilities are provided for the farmers, students also get benefited after study tour of sericulture and they can cultivate sericulture crop.

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SERICULTURE

The rearing of silkworms for the production of raw silk is known as Sericulture. Silk is the proteins secreted by larvae lepidopteran moths. It is widely use for the manufacture of clothes silk is derived from silk moths mainly belonging to bombycidae Saturnidae families of Lepidoptera.

Sericulture is the art of rearing silkworms under artificial or domesticated conditions and extraction of the silk fiber from the cocoon. The moths belonging to two major families, Bombycidae and Saturnidae of Lepidoptera group of insects produce commercial silk in India Based on the quality and lusture of the silk fibers 4 types of silk secreting moths. The main species of silk secreting moths and Bombyx sp. Attacus sp. And Anthracea sps.

Sericulture involves

Breeding silkworms

Feeding the larvae

Spinning the cocoon

Stoving the chryasalis

The Filature

Sorting and softening the cocoons

Reeling the filament

Packaging the skeins

Forming silk yarn

Degumming thrown yarn

Finishing silk fabrics

Life Cycle of Tassar Silkworm

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Classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Lepidoptera

Genus: Antheraea

Species: mylitta D

Common name: Tassar silkworm

Introduction

Tassar silk is more popularly known as kosa silk. It is less expensive and durable as compare to cultivated silk because of its short fiber length. Tassar silk is different from the normal silk. Here the silk worm bred on local trees like sal, Arjun and saja and not on mulberry trees that is why it is also known as '**wild silk'.**

The word tassar apparently derives from the Sanskrit word "Trasara". Tassar silk is mentioned in literature dating back to 1590 B.C. The Indian tassar silkworm, Antheraea mylitta is a natural fauna of tropical India. Wide distribution and polyphagy of this insect species had resulted in extensive variation in the population. As high as nineteen ecoraces have been reported in this species which feed primary on Terminalia species and Shorea robusta and also on number of secondary food plants.

The ecoraes are uni, bi or trivoltine depending upon the geo-ecological conditions and differ from each other in qualitative and quantitative traits. Tassar cocoons are reported to be largest among all the silk- producing insects in the world. Tassar silk fiber has its own distinctive colour, is coarse to feel, but has higher tensile strength, elongation, and stress-relaxation values than the mulberry silk fiber secreted by Bombyx mori. These Properties have made tassar silk as competent and desirable as mulberry silk.

Host Plants:

The larvae of Antherae mylitta are polyphagus and can take leaves of several host plants like Arjun, Asan, Ber, Sal, Jam, Sidha, etc.

Distribution:

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This silk moth is available in China, Sri Lanka in addition to India. In India, it is available in the states of Jharkhand, Chattisgarh, Orissa, A.P. and West Bengal.

Life History:

The tassar silkworms are grown only in the wild. So they are cultivated in places where their host plants are available.

Adult tassar moths

- By piercing one end of the cocoon the adult moths come out.
- Adults are very large with colourful wings spanning about 15cm.
- Females has yellowish gery wings and males possess yellowish red wings and males possess yellowish red wings with prominent eye spots on each wing.
- The males mate the females just after emergence.

Eggs

- After copulation, the female starts laying the eggs. A single female can lay 100-150 eggs.
- The egg is oval, dorsoventrally symmetrical along the anteroposterior axis.
- About 3mm in length and 2.5mm in diameter, it weighs approximately 10mg.
- At oviposition it is dark brown owing to the gummy coating of meconium.
- Two brownish parallel lines along the equatorial plane of the egg divide the surface into three zones; disk, streak and edge.

Larvae

- The eggs hatch within 9-10 days during summer and 15-20 days in winter.
- Following hatching the larvae start taking food leaves from the host plants.
- The larva **is** typically cruciform and has a hypognathous head with biting and chewing mouthparts.
- On hatching it is dull brownish yellow with black head.
- The body normally turns green and the head brown after about 48 hours, but also yellow, blue and almond-colored larvae are met with occasionally.

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Introduction

The worms are generally green in colour with hairs on cuticle.

- It moults 4 times during the whole larval period that continues for 30-55 days during summer and 50-60 days during winter.
- Body coloration is retained throughout the larval period.
- The tassar larvae are stout and smooth, and have rudiment or scoli.

Tassar Cocoon

- The mature larvae spin cocoons hard with different colours according to the type of plant leaves they fed.
- Some are light green, others are yellow, and some are grey and others almost white.
- Unlike mulberry coocons, the tassar cocoon has a stalk which helps in fixing the cocoons with the twig of host plant. The tassar cocoons attains a size like that of hen's egg.

Life History

Pupa:

- The worms grow into pupae within the cocoon.

Cultivation of tassar worm:

- The tassar rearer collets the female moth from the wild and keeps it tied with the twig of host plant carefully.
- The, males are then attracted by the pheromone secreted by the female and start copulation.
- After mating the female lays eggs which are collected by the farmers and are gummed on long strips of paper – or leaf –made cup which are then hung on suitable host trees, where they hatch quite naturally.
- A barrier of some sort is coiled around the host tree trunks to prevent the caterpillars from wandering
- The worms after hatching start feeding the leaves.

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- During the larval stage, which occupies up to eight weeks, guard is kept against the insect's natural enemies such as bats, birds and beetles.
- On completion of the spinning, the cocoons from the wild instead of eggs.
- Sometimes farmers may collect cocoons from the wild instead of eggs.
- Nowadays from many places, government breeding centers also supply disease-free tassar eggs of desired breeds to the rearers.

Tassar silk

- By two methods, reeling and spinning, yarn can be produced from the cocoons.
- Tassar filaments show the greatest length among the non-mulberry silks, 700m.
- The spun yarn is generally coarse with a denier of 270-280, while the reeled yarn is fine and thin with a denier value of 80-100.
- Tassar silk has natural shades of pale gold, pinkish honey, creamy copperish, etc.
- It is less lustrous but coarse than mulberry silk. The fabric is light, airy, and has its own feel and appeal.

Oak tassar silk moth

- A fine variety of tassar silk is generated by the silkworm *Antheraea proyeli* and *A. pernyi.*
- **China is the major producer** of the tassar but in **India** it is available in **Manipur, Assam, Meghalaya, Himachal Pradesh, Jammu & Kashmir.**
- These moths feed on leaves of **oak**, are found in abundance in sub-Himalayan belt.
- The oak tassar is finer than common tassar silk.

Tassar silk production

- In India, the production of tropical tassar silk remained next to mulberry silk for decades, consisting about 4% of the total silk production.
- There is an ever- increasing demand for tassar silk owing to its strength, luster and copper brown colour.
- The tassar silk production has stagnated and declined in the recent past though the demand is increasing.
- The important reasons for low production are attributed to traditional method of silkworm rearing on tall trees in natural habitat, which exposes the larvae to a number of predators, parasites and disease apart from natural vagaries.

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Policy initiatives for the development of silk industry

- Sericulture is the purposeful area under the Ministry of Textitles. Few of the recent policy initiatives taken by the Ministry to promote sericulture unit are as follows.
- Sericulture is considered as agriculture allied activity under RKVY. This enables the Sericulturists to avail the advantages of the theme for the complete sericulture activities up to reeling.
- The CSB (Amendment) Act, Rules and regulations are notified by the govt. of country to bring quality standards in egg production.
- Amendment in the Forest Conservation Act to treat non mulberry Sericulture as forest-based activity enabling the farmers to undertake enabling the farmers to undertake Vanya silkworm rearing in the natural host plantation in the forests.
- Antidumping duty on Chinese raw silk – The Director General of Antidumping and Allied duties (DGAD), New Delhi has recommended imposition of antidumping duty on Chinese raw silk of 3A Grade & Below in the form of fixed duty of US$ 1.85 per kg on the landed price of imported raw silk.
- CDP-MGMREGA convergence guideline have been finalized and issued jointly by the MOT and MORD. Farmers can avail assistance from MGNREGA scheme to get benefit from these guidelines.

Production in India

India is the second-largest producer of tassar silk, and exclusive producer of Indian tassar (also known as tropical tassar), which is largely tended to by tribals. Much of it is produced in Bhagalpur (Where it is called Bhagalpur silk), Bihar, and Malda district of West Bengal. Tassar silk is also used for Orissa's pattachitra and West Bengal's kantha stitches. Chhattisgarh and Madhya Pradesh also produce tassar silk. In recent years, the state of Jharkhand has emerged as the biggest producer of tassar silk.

Bhagalpur silk

The tassar silk-weaving industry in Bhagalpur, more than a century old, has about 30,000 handloom weavers working on some 25,000 handlooms. The total value of annual trade is around Rs 100 crores, about half to which comes from exports.

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Visit to the Kosa Vikas Center Armori

By - Petkar Sir

Petkar Sir explained us about 4 types of silk, Tassar, Eri, Muya, Mulberry.

Armori Kosa Vikas Produces tassar silk. The adult moths comes out of cocoons in the month of (). The male mate with the females just after emergence.

Eggs

After copulation the female starts laying eggs. A single female can lay upto 100-150 eggs. The eggs hatch within 9-10 days during summer and 15-20 days in winter. Following hatching the larva start taking food leaves from the host plants. The worms are generally green in colour with hair, on cuticle. It moults 4 times during the whole larval period that continues for 30-35 day during summer and 50-60 days in winter.

Pupa

The worm grows into pupa within the cocoon.

Petkar Sir also updates us that the eggs are also given to the farmers who are willing to growth the cocoons for the silk, farmers take the eggs and grow them, after the cocoons are done, they bring back the cocoons to the Kosa Vikas Center.

Outcomes:

- Job opportunities in different sectors in the field of sericulture.
- Student can start own farming and crop cultivation and they get self-employment opportunities.

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नवराष्ट्र दि. 27/3/2021

प्राणिशास्त्र विद्यार्थ्यांची कोसा विकास विभागाला भेट

वार्ताहर@आरमोरी

स्थानिक महात्मा गांधी कला, विज्ञान व स्व. न. प वाणिज्य महाविद्यालयातील प्राणिशास्त्र विभाग अभ्यासमंडळाचे चमूने प्राचार्य डॉ. लालसिंग खालसा यांच्या मार्गदर्शनाखाली सेरीकल्चर करिअर ओरिएंटेड कोर्सच्या विद्यार्थ्यांनी कोसा विकास रिजनल टसर सेंटरला भेट देऊन अभ्यासदौरा पूर्ण केला.

सायंकाळी विद्यार्थ्यांना रेशीमचे विविध प्रकार, किटकांचे खाद्य, अंडीपुंज, ककून फॉरमेशन व कीटकांचे जीवनचक्राबद्दलची माहिती टसर अधिकारी पेटकर यांनी विद्यार्थ्यांना दिली. अभ्यास दौऱ्यातून विद्यार्थ्यांना कोसा फुलपाखराच्या जीवनचक्राबद्दल सविस्तर परिचय झाला. या अभ्यास दौऱ्यात प्राणिशास्त्र विभागाचे प्रमुख प्रा. डॉ. जयेश पापडकर, प्रा. डॉ. राजेंद्र चव्हाण, प्रा. डॉ. सुनंदा कुमरे यांच्यासह एकूण 22 विद्यार्थ्यांनी सहभाग घेतला. अभ्यास दौऱ्याचे आयोजन यूजीसी पुरस्कृत करिअर ओरिएंटेड कोर्स इन सेरीकल्चरचे तज्ज्ञ, प्राध्यापक, विद्यार्थी व प्रयोगशाळा सहायक खुशाल रामटेके यांनी केले.

लोकशाही वार्ता दि. 28/3/21

विद्यार्थ्यांनी जाणली कोसा उत्पादनाची माहिती

आरमोरी - महात्मा गांधी महाविद्यालयातील प्राणीशास्त्र विभाग अभ्यासमंडळाच्या विद्यार्थ्यांनी येथील कोसा विकास रिजनल टसर सेंटरला भेट देऊन माहिती जाणून घेतली. या अभ्यासदौऱ्यात प्राणीशास्त्र विभागाचे प्रमुख प्रा. डॉ. जयेश पापडकर, प्रा. डॉ. राजेंद्र चव्हाण, प्रा. डॉ. सुनंदा कुमरे याच्यासह २२ विद्यार्थ्यांनी सहभाग घेतला होता. विद्यार्थ्यांनी रेशीमचे विविध प्रकार, किटकांचे खाद्य, अंडीपुंज, ककून फॉरमेशन व किटकांच्या जीवनचक्राबद्दलची माहिती टसर आयोजन प्रयोगशाळा सहायक खुशाल रामटेके यांनी दिली.

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B.Sc.
Physics
Project Work

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SKILL ENHANCEMENT COURSE

PROJECT - PHYSICS

B.Sc- III RD YEAR (SEM- V)

SUBJECT – PHYSICS

SESSION- 2020-2021

Head of Department – **Dr. R. M. THOMBRE**

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Page No. 1
Date

Introduction of Measurement

Measurement is the basis of all the scientific study and experimentation. It plays an important role in our daily life. Physics is a quantitative science and physicists always deal with numbers which are the measurement of physic quantities

Measuring units :

A physical quantity is a quantity that can be measured.

Length, time, mass and temperature ar the fundamental physical quantities these can be measured directly using suitable measuring instruments.

1) length is a measure of the distance between two points which is measured using a outer or a measuring tape.
2) Time is the interval between two events. whic is measured using a clock.
3) Mass of a body is the amount of matter contained in it and is measured with the help of a balance
4) Temperature is a measure of the degree of hotness of a body and is measured wih a thermometer

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The measure of every physical quantity requires a unit. A unit is the standard quantity with which unknown quantities are compared one of the standard sets of units used to measure the fundamental physical quantities length, time, mass and temperature is called the SI system of units or the standard international system of units.

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NO.	Quantity	Symbol	Diamensions	Units
1)	length	L	[L]	metre (m)
2)	mass	M	[M]	kilogram (kg)
3)	Time	T	[T]	second (s)
4)	current	I	[I]	Ampere (A)
5)	Temperature	T	–	Kelvin degrees
6)	Area	A	$[L^2]$	m^2
7)	volume	V	$[L^3]$	m^3
8)	wavelength	λ	[L]	m
9)	Displacement	S	[L]	m
10)	velocity	v	$[LT^{-1}]$	m/s
11)	Acceleration	a	$[LT^{-2}]$	m/s^2
12)	momentum	P	$[mLT^{-1}]$	kg·m/s
13)	Force	F	$[mLT^{-2}]$	Newton (N), kg·m/s
14)	work	W	$[mL^2T^{-2}]$	Jowe (J)
15)	Energy	E	$[mL^2T^{-2}]$	J
16)	Power	P	$[mL^2T^{-3}]$	watt (W), J/s
17)	Density	ρ	$[mL^{-3}]$	kg/m^3
18)	Period	T	[T]	s
19)	Frequency	f, v	$[T^{-1}]$	hertz (Hz)
20)	Angular Displacement	θ	–	radian (rad)
21)	Angular velocity	ω	$[T^{-1}]$	rad/s
22)	Angular speed and Angular Frequency	ω	$[T^{-1}]$	rad/s
23)	Angular momentum	L	$[mL^2T^{-1}]$	$kg·m^2/s$
24)	Angular Acceleration	α	$[T^{-2}]$	rad/s^2
25)	Torque.	τ	$[mL^2T^{-2}]$	N·m
26)	Rotational inertia	I	$[mL^2]$	$kg·m^2$
27)	~~Gravitational field strength~~	g	$[LT^{-2}]$	N/kg

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No.	Quantity	Symbol	Diamension	Units.
27]	Pressure	P	$[ML^{-1}T^{-2}]$	N/m^2
28]	Entropy	S	$[ML^2T^{-2}]$	$J/^\circ K$
29]	Internal energy	U	$[ML^2T^{-2}]$	J
30]	Heat	Q	$[ML^2T^{-2}]$	J
31]	charge	Q	$[IT]$	Coulumb (C)
32]	Voltage	V	$[ML^2T^{-3}I^{-1}]$	Volt (V)
33]	Resistance	R	$[ML^2T^{-3}I^{-2}]$	ohm (Ω)
34]	Resistivity	ρ	$[ML^3T^{-3}I^{-2}]$	$\Omega \cdot m$
35]	Electromotive force	e	$[ML^2T^{-3}I^{-1}]$	V
36]	Gravitational field strength	g	$[LT^{-2}]$	N/kg
37]	Electric field strength	E	$[MLT^{-3}I^{-1}]$	N/C , V/m
38]	Gravitational potential	V	$[L^2T^{-2}]$	J/kg
39]	Electric potential	V	$[ML^2T^{-3}I^{-1}]$	V
40]	Capacitance	C	$[M^{-1}L^{-2}T^4I^2]$	Farad (F)
41]	Inductance	L	$[ML^2T^{-2}I^{-2}]$	henry (H)
42]	Conductivity	σ	$[M^{-1}L^{-3}T^3]^2$	siemens/metre
43]	current Density	j	$[IL^{-2}]$	A/m^2
44]	Electric dipole moment	P	$[LIT]$	C.m
45]	Electric Displacement	D	$[L^{-2}IT]$	C/m^2
46]	Electric polarization	P	$[L^{-2}IT]$	C/m^2
47]	Electric flux	ϕ_E	$[ML^3T^{-3}I^{-1}]$	Nm^2/C
48]	Magnetic Dipolemoment	μ	$[L^2I]$	$A \cdot m^2$
49]	magnetic field strength	H	$[L^{-1}I]$	A/m
50]	magnetic flux	ϕ_B	$[ML^2T^{-2}I^{-1}]$	weber (Wb)

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Vernier Callipers:

A quick guide on how to read a vernier callipers. A vernier caliper outputs measurement readings in centimeters (cm) and it is precise up to 2 decimal places.

How to Read vernier Calipers:

In order to read the measurement readings from vernier calipers properly you need to remember two things before we start for example if a vernier caliper output a measurement reading of 2.13 cm this means that

1) The main scale contributes the main number (s) and one decimal place to the reading Ie. 2.1 cm, where by 2 is the main number and 0.1 is the one decimal place to the reading
2) To obtain the main scale reading look at the diagram 2.1 cm is to the immediate left of the zero on the vernier scale. Hence the main scale reading is 2.1 cm.
3) To obtain the vernier scale reading look at the image above and look closely for an alignment of the scale image above, the aligned line correspond to 3 Hence the vernier scale reading is 0.003.

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In order to obtain final measurement reading we will add the main scale reading and vernier scale reading together. This will give 2.1 cm + 0.03 cm = 2.13 cm

Observation

Sr No	Quantity	main sale	vernier Scale	Fraction n x Vc	Total R=R+Vc	Correction R=R+nxVc
1	length	2.5	12	12X0.5 =0.6 cm	2.5+0.6 =3.1 cm	3.1 cm
2	Diameter	0.7	15	15X0.05 =0.75	0.7+0.75 =1.45	1.45

Result :

volume of cylinder = V = 5.16 cm^3

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Screw Gauge:

The screw gauge is an instrument used for measuring accurately the diameter of a thin wire or the thickness of a sheet of metal it consists of a U-shaped frame fitted with a screwed spindle which is attached to a thimble.

Parallel to the axis of the thimble a scale graduated in mm is engraved this is called pitch scale. A sleeve is attached to a head of the screw.

The head of the screw has a ratche which avoids undue tightening of the screw. on the thimble there is a circular scale known as head scale which is divided into 50 or 100 equal parts when the screw is worked the sleeve moves over the pitch scale.

A stand with a plane end surface called the anvil is fixed on the 'U' frame exactly opposite to the tip of the screw when the tip of the screw is in contact with anvil usually the zero of the head scale coincides with the zero of the pitch scale.

Pitch of the screw Gauge:

The pitch of the screw is the distance moved by the spindle per revolution to find this, the distance advanced

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by the head scale over the pitch scale for a definite number of complete rotation of the screw is determined
The pitch can be represented as

$$\text{Pitch of the screw} = \frac{\text{Distance moved by screw}}{\text{No. of full rotations given}} \quad \text{— (1)}$$

Least count of the Screw Gauge:

The least count (LC) is the distance moved by the tip of the screw when the screw is turned through 1 division of the head scale.
The least count can be calculated using formula

$$\text{Least count} = \frac{\text{Pitch}}{\text{Total no. of divisions on circular scale}} \quad \text{— (2)}$$

Sr No.	mm N	n	(n × LC) mm	Observed (mm) $D_o = N + n\,(L.C)$	Corrected (mm) $D = D_o + C$
1	0	58	0.58	0.58	0.6
2	0	56	0.56	0.56	0.58
3	0	57	0.57	0.57	0.59
4	0	57	0.57	0.57	0.59
5	0	56	0.56	0.56	0.58

Length of wire = i] 31.3 cm ii] 31.3 cm iii] 31.3 cm
mean length of the wire = 31.3 cm = 0.313 mm

mean diameter of the wire

$$= \frac{0.6 + 0.58 + 0.59 + 0.59 + 0.58}{5}$$

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$= 0.59 \text{ mm}$

$= 0.59 \times 10^{-3} \text{ m}$

$= 0.59 = 10^{-5} \text{ m}$

$Vol = \pi \left(\frac{D}{2}\right) l$

$= \frac{22}{7} \times \frac{59}{2} \times \frac{59}{2} \times 0.313 \times 10^{-10} \text{ m}3$

$= 856.077 \times 10^{-10} \text{ m}3$

$= 8.561 \times 10^{-8} \text{ m}^3$

$= 8.561 \times 10^{-8} \text{ m}^3$

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Electrical and Electronical skill:

Use of Multimeter:

A Multimeter is an electronic instrument every electronic technician and engineers widely used piece of test enquipment multimeter is mainly used to measure the three basic electrical characteristics of voltage, current and resistance is can also be used to test continuity between two points in a electrical circuit this post mainly introduces the basic information of multipmeter.

Operation of Oscilloscope:

An Oscilloscope can be used to measure voltage it does this by measuring the voltage dro across a resistor and in the process draws a small current the voltage drop is amplified an used to deflect an electron beam in either th X chorizantal or Y (vertical) axis using an electri field the electron beam creates a bright dot on the face of the cathode ray tube (CRT) where it hits the phosphorous the deflection du to an applied voltage can be measured with th aid of the calibrated lines on the gratitude

The deflection of the oscilloscope beam is proportional to the input voltage carrie ac or dc coupling the amount of deflection (volts/Division) upon the setting of the AMPL ▽ IV control for that channel.

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Two types of Multimeter :

1) Analog Multimeter

2) Digital multimeter

1] Analog multimeter :

Are instruments that use to measu electrical quantities such as voltage, current resistance, frequency and signal power.

Basic functionality includes measure ment of potential in volts, resistance in ohms and current in ampere.

2] Digital multimeter :

A digital multimeter is a test tool used to measure two or more electrical values. Principally voltage (volts), current (amp and resistance (ohms) ; it is a standard diagnostic tool for technician in the electrical industries.

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Working of Half Wave Rectifier :

During the positive half cycle the diode is under forward bias condition and it conducts current to RL (load Resistance) A voltage is developed across the load, which is same as the input AC signal of the positive half cycle.

Alternatively during the negative half cycle the diode is under reverse bias condition and there is no current flow through the circ only the AC input voltage appears across the load and it is the net result which is positi during the positive half cycle. the output voltage pulsates the DC voltages.

operation of Half-wave Rectifier:

PN Junction diode conducts only during the forward bias condition half ward rectifier uses the same principle as PN Junction diode and this converts AC to DC in a half-wave rectifier circuit a load resistance is connect in a series with the PN Junction diode. Alternating current is the input of the half wave rectifier a step down transformer takes input voltage and the resulting output of the transformer is given to the load resist and to the diode

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Designing of basic gates:

1) AND gate:

The AND gate is an electronic circuit that gives a high output (1) only if all its inputs are high. A dot (·) is used to show the AND operation ie. A·B Bear in mind that this dot is sometimes omitted ie. AB

2) OR gate:

The OR gate is an electronic circuit that gives a high output (1) one or more of its inputs are high. A plus (+) is used to show the OR operation.

3) NOT gate:

The not gate is an electronic circuit that produces an inverted version of the put at its output. It is also known as an inverter if the input variable is A. the inverted output is known as NOT A. This is also shown as 'A' or A with a bar over the top as shown at the outputs the diagrams below show two ways that the NAND logic gate can be configured to produce a NOT gate it can also be done using NOR logic gates in the same way.

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4) NOR gate:

This is a NOT-OR gate which is equa to an OR gate followed by a NOT gate. The outputs of all NOR gates are low if any of the inputs are high the symbol is an OR gate with a small circle on output the small circle represents invesion

5) NAND gate:

This is a NOT-AND gate which is equal to an AND gate followed by a NOT gate. the outputs of all NAND gates are high if ary of the inputs are symbol is an AND gate with a small circle on output the small circle represent invesion.

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SKILL ENHANCEMENT COURSE

PROJECT – **PHYSICS**

B.Sc- III YEAR

SUBJECT – PHYSICS

SESSION **-2020-21**

Head of Department - **Dr. R.M THOMBRE SIR**

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5.	KRUNAL RAVINDRA HARSHE	

Que 1

What are errors in measurement of quantity

Errors in measurement of quantity are as follows

(i) Absolute error :- The amount of error in your measurement.

(ii) Greatest possible error :- defined as a one half of the measuring unit

(iii) Instrument error :- error caused by an inaccurate instrument or a poorly worded question naire

(iv) Margin of error :- an amount above and below your measurement

(v) Measurement location error :- Caused by an instrument being placed some when it should Like a thermometer left o thermometer out in full sun.

(vi) Operator error:- humem Factor that causc error, likc reading a scale in correctly.

(vii) percent error:- Another way of expressi measurement error

(viii) percent error:-

$$\frac{\text{Measured value - actual value}}{\text{actual value}}$$

(ix) Relative error:- The ratio of the absolut error to the accepted measurement As a Formula thats

$$\epsilon \text{ relative} = \frac{\epsilon \text{ absolute}}{\epsilon \text{ measured}}$$

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Que 2

Define the precision and sensitivity of the instrument

Precision of the instrument

(i) precision is defined as the closenese between two or more measured value to each other

(ii) suppose we weight the same box five times and get close results like 3.1, 3.2, 3.22, 3.4 and 3.0 then the measurement are precise

(iii) It is the measurement of consistency or repeatability of measurement successive reading in an instrument not differ

(iv) Sensitivity of an instrument.

The sensitivity of an instrument is the changes of output divided by

change of the measured

As an example consider a pressure sensor that has a measurement range of 0-5 V Its sensitivity is 0-100 psi and output range of 0-5 V Its sensitivity is 0.05V / psi

It is the ratio of change in output of the instrument to change in output or measured variable

A higher sensitivity indicates that the system can respond to even smallest input

Que 3

What are the advantages For the eoventional multimeter For voltage measurement

- Advantages For conventional multimeter For voltage measurement

(I) It reduce reading and interpopulation errors.

(II) The auto polarity Function can prevent problems From connecting the meter to a test circuit with the wrong polarity

(III) parallel error are eliminated

(IV) The reading speed is increased as it easier to read.

(V) Digital output is suitable For further processing or recording and can be

in a rapidly increasing range of computer controlled applications

(vi) Accuracy is increased due to digita readout

(vii) The auto-ranging feature of digita multimeter helps in seleing different measurement ranges

(viii) portable size makes it easy to carr anywhere

(ix) It cause less meter loading effect on the circuit being tested

(x) some advanced digital multimeter have microprocessors and can stor then reading for further processing

(xi) It have very high input impedance

Que 4

Define amplifire rectifire and Oscillator

Amplifire :-

An electronic device for increasing the amplitude of electrical signals used cheifly in sound reproduction.

The power amplifier works as converting the Dc power drawn from supply into an Ac voltage signal delivered to the load Although efficien the amplification is high the conversi on from the Dc power supply from the power supply input to the voltage signal output is usually power

Rectifire :-

An electrical device which converts an alternating current into a direct one by allowing a current to flow through it it one directions only.

A rectifire is an electrical device composed of one or more diodes that convert alternating current (AC) to direct current (DC). A diode is a like a one-way valve that allow an electric current to flow in only one direction.

Oscillator:-

A device for generating oscillator electric current or voltage by non-mechan-ical means.

An oscillator is a circuits which produces a continuous respect alternating wave from. without any input oscillators without any output oscillators basically convert unidirection current flow from a D.C source into an alternating wavelength which is of an desired frequency decided by its circuits components.

Que. 6

What is cathode ray oscilloscope? Draw block diagram of CRO

Cathode ray oscilloscope (CRO):-

The cathode ray oscilloscope is a common laboratory instrument that provides accurate time and amplitude measurement of voltage signals over a wide range of frequencies.

Its reliability, stability and ease of operation make it suitable as a general purpose laboratory instrument.

It consist of a following parts, with the help of these we derive block diagram of CRO.

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(i) Cathode ray tube
(ii) Vertical amplifier
(iii) Delay line
(iv) Time base generator
(v) Horizontal amplifier
(vi) Trigger circuit
(vii) Power Supply

Que. 7

Comparison of digital and analog instrumen

Comparison of digital and analog instrument are as follows:

	Digital instrument	Analog instrument
(i)	The instrument which give output that varies in discrete steps and only has finite no. of value its known as digital instrument.	The instrument which give output that continuosly as quantity to be measured is known as analog instrument.
(ii)	The accuracy of digital instrument is more.	The accuracy of analog instrument is less.
(iii)	The digital instrume -nt required less power.	The analog instrument required more power

(iv)	Sensitivity of digital instrument is less.	Sensitivity of analog instrument is more.
(v)	The digital instrument are expensive.	The analog instrument are cheap.
(vi)	The digital instrument are easily portable.	The analog instrument are extremely portable.

Que. 8

Block diagram and working of digital multimeter.

Block diagram of digital multimeter:-

In digital multimeter, we can incorporate many type of meters like ohmeter, ammeter, a voltmeter for the measurement of electrical parameter. Its block diagram shown in fig.

(i) Digital voltmeter (DVM):-

Digital voltmeter is the basic instrument used for measurement of voltage through use of analog to digital converter, the basic principal behind digital converter because without these we are not able to convert the analog into digital form.

Que. 9

What are the types of A.C. millivoltmeter

Types of A.C multivoltmeter are as follows:

(i) A.C. voltmeter using half wave rectifier:-

It is a half wave rectifier connected already of d.c. voltmeter, then that entire combination together is called AC. voltmeter using Half wave rectifier as shown in fig.

The above block diagram consist of two blocks half wave rectifier and A.C voltmeter we will get the corresponding circuit diagram.

(ii) A.C. voltmeter using full wave rectifier:-

It is a full wave rectifier is a connected ahead of D.C. voltmeter then that entire combination together is called AC voltmeter using wave rectifier the block diagram of A.C voltmeter using full wave rectifier is shown in figure.

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B.Sc. – III YEAR

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SESSION – **2020-21**

Head of Department – **Dr. R.M THOMBRE SIR**

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Page No. :
Date :

EXCELLENT

Page No. :
Date :

Introduction of Measurement

Measurement is the basis of all Scientific Study and Experimentation. It plays an important role in our daily life physics is a quantitative Science and physicists always deals with numbers which are the measurment of physical quantities.

Measuring Units:-

A physical quantity is a quantity that can be measured length, time, mass and temperature are the fundamental physical quantities these can be measured directly. Using Suitable measuring Instruments.

* Length is the measure of the distance between two points, which is measured using a ruler or a measuring tape.
* Time is the interval between two events which measured by using clock.
* Mass of the body is the amount of matter contained in it and it measured with the help of a balance.
* Temperature is the measure of degree of hotness of a body. and is measured using a Thermometer.

Shree Radhe

Page No. :
Date :

Working of Half wave rectifier

During the positive half cycle the diode is under forward bias condition and it conduct currents to RL (Load Resistance) A voltage is developed across the load which is same as the input AC signal of the positive half cycle.

Alternatively doing the negative half cycle the diode is under reverse bias condition and there is no current flow through the diode only the AC voltage appear across the load and it is the net result which is positive during the positive half cycle the output voltage pulsates the DC voltage.

Operation of Half wave Rectifier

PN Junction diode conducts only during the forward bias condition half wave rectifier uses the same principle of PN junction diode and this converts AC to DC in a half wave rectifier circuit a load resistance is connected in series with PN junction diode. Alternating current is the input of the half wave rectifier a step down transformer takes input voltage and the resulting output of the transformer is given to the load resistor and to the diode.

Shree Radhe

Page No. :
Date :

Uses of bread ~~Boarded~~ Board :

A Breadboard is an inexpensive easy to use piece of hardware for wiring electrical circuits Breadboard aquired their ~~Nam~~ names because they are similar in shape to cutting boards used for cutting unsliced bread the past hobbyists and engineers nailed metal spikes into cutting breads when wiring circuits.

A breadboard is usually covered with lined with metal in which wires and electrical components such as resistors diodes can be plugged.

Designing of circuits :-

* Half wave Rectifiers :-

A rectifier is an electrical device that convert AC voltage into DC voltage in other words it covers alternating current to direct current. A Rectifier is used in almost all the electronic device mostly is used to convert. * The main voltage into DC voltage in the power supply section by using DC voltage supply electronic device work according to period of conduction rectifieres are classified into two categories :-

① Half wave rectifier ② full wave rectifier.

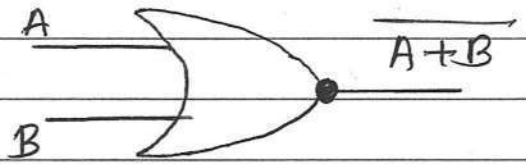
Shree Radhe

Page No. :
Date :

* NOR Gate :-

A NOR Gate is logical gate that produce high output (1) only if all its inputs are false, and low output (0) otherwise Hense the NOR gate is the inverse of an OR gate, and its circuits are produced by connecting an OR gate to a NOT gate. Just like an OR Gate may have any number of input probes but only one output probe.

The Basic Construction of the NOR gate -



NOR Gate truth table

Input		Output
A	B	$X = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

A NOR Gate is also referred to as a Universal gate.

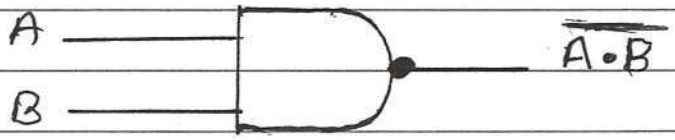
Shree Radhe

Page No. :
Date :

* NAND gate :-

A NAND gate is a logical gate that produce a low output (0) only if its all inputs are too, and high output (1) Otherwi Hence the NAND gate is inverse AND gate and its circuits are prouduced by connecting and gate to a NOT gate. Just like an and gate, Just like an AND gate, a NAND gate may have any Number of input probes but only one output probe.

The basic logical construction of NAND gate is shown below:-



NAND GATE

Truth table of NAND gate.

Inputs		Output
A	B	$X = \overline{A \cdot B}$
0	0	1
0	1	1
1	0	1
1	1	0

Shree Radhe

A NAND is also referred as Universal logic gate.

Page No. :
Date :

	Quantity	symbol	Dimention	units
1.	Length	L	$[L]$	Meter
2.	mass	M	$[M]$	Kilogram
3.	Time	T	$[T]$	Second (s)
4.	Current	I	$[I]$	ampeare
5.	Temparature	T		Kelvin
6.	Area	A	$[L^2]$	m^2
7.	Volume	V	$[L^3]$	m^3
8.	Wavelength	A	$[L]$	m
9.	Displacement	S	$[L]$	m
10.	Velocity	v	$[LT^{-1}]$	m/s
11.	Acceleration	a	$[LT^{-2}]$	m/s^2
12.	momentum	p	$[mLT^{-1}]$	$kg \cdot m/s$
13.	Force	F	$[mLT^{-2}]$	N
14.	Work	W	$[mL^2T^{-2}]$	J
15.	Energy	E	$[mL^2T^{-3}]$	J
16.	power	P	$[mL^2T^{-3}]$	Watt ($m^2 \cdot kg \cdot s^{-3}$)
17.	Density	D	$[mL^{-3}]$	kg/m^3
18.	Period	T	$[T]$	s
19.	Frequancy	F	$[T^{-1}]$	hertz (Hz)
20.	Angular Displacement		-	Radian or Degree
21.	angular velocity	ω	$[T^{-1}]$	Radians per Second
22.	angular speed or angular frequency	ω	$[T^{-1}]$	Rad/sec
23.	Angular momentum	L	$[mL^2T^{-1}]$	$kg \cdot m^2/s$
24.	Angular Acclaration	α	$[T^{-2}]$	Rad/s^2
25.	Torque.	T	$[mL^2T^{-2}]$	$N \cdot m$

Shree Radhe

Page No. :
Date :

Two type of multimeter:

1) Amlog multimeter:

2) Digital Multimeter.

1) Amlog Multimeter:

That instrument that use: to measure electric quantities such as voltage, current, resistence, frequency and signal power.

Basic fanctionality include mesurment of potential in volts, resistence in ohm (Ω) and current in amps.

2) Digital Multimeter:

A Digital multimeter is a test tool used to measure two or more electric values, principally voltage (volt) current (amp) and resistone (ohm) is a standard dignostic tool for technician in the electric industries.

EXCELLENT

Page No. :
Date :

Vernier calliper :

A quick guide on how to read varnier scale. A vernier calliper output measmeut reading in centimeter (cm) and it is precise up to 2 decimal place.

How to read varnier calliper :.

In order to read the measurmeat reading from vernier calliper properly you need to remember two thing. before we start for example vernier calliper output a measurmeut reading of 2.13 cm this mean that.

- The main scale contribute the main number as and one decimal place to the reading (i.e) 2.1 cm whereby 2 is the main nuber and 0.1 is the one decimal place to reading.

- To obtain the main scale reading look at the diagram 2.1 cm is to immedicate left of zero on the vernier scale. Hence the main scale reading is 2.1 cm.

EXCELLENT

Page No. :
Date :

- To obtain the vernier scale reading look at the image above and look closely for alignment of the second line of the main scale and vernier scale in the image above the alignment line compressed to 3. Hence the.

Page No. :
Date :

Screw Gauge:-

A micrometer, sometime known as micrometer screw gauge. is a divice incorporting a calibrated screw widly use for accurate measument of component.

screw guage. use the screw transform small distance (that are too small to ~~operate~~ measure directly) into large rotation of the screw that are big engough to read from scale. The accuraney of micrometer derives from the accuraney of the thread-form that are centred to the core of its design.

These are too type of incide micrometer capital type inside micrometer and tubular rand rod inside micrometers.

A screw gauge work on the principle of screw. This screw principle help to convert smaller distance into longer ones by measuring the rotation of the screw

Pitch of the screw gauge:
Is the distance between screw groove and commonly used with inch sized products and specified as threads per inch.

EXCELLENT

Page No. :
Date :

Lead the linear travel the nut makes per one screw ∴ revolution and how ball screw are typically specified. the pitch and lead are equal with sigle start screw.

pitch scale measure the distance in millimeter (mm) travelled by the spindle per revolution. The pitch of the screw gauge is calculate given below-

$$\text{Pitch of th screw gauge} = \frac{\text{Distance travell by screw}}{\text{No. of rotation.}}$$

In order to measure the dimension of a thin wire or thin sheet using screw gauge one need to know the least count. The least count of the screw gauge.

$$\text{Least count} = \frac{\text{Pitch of the screw}}{\text{No. of division of circular scale.}}$$

onece least count calculate final reading is calculate as below

Total Reading = Pitch scale + circular scale Reading + LC of the gauge.

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Introduction of Measurement :-

Measurement is the basis of all scientific study & experimentation. It plays & an imp role in our daily life. Physics is a quantitative science & physicists always deal with numbers which are the measurement of physical quantities.

Measuring units :-

A Physical quantity is quantity that can be measured.

length, time, mass & temp° are the fundamental Physical quantities. these can be measured directly using suitable measuring instruments

- length is a measure of the distance between two points, which is measured using a ruler or a measuring tape.
- Time is the interval between two events, which is measured using a clock.
- Mass of a body is the amount of matter contained in it & is measured with the help of a balance.
- Temprature is a measure of the degree of hotness of a body & is measured using thermometer.

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Teacher's Signature

Page No.
Date

The measurement of every physical quantity requires a unit A. unit is standard quantity with which known quantities are compared. one of the standard sets of units used to measure the fundamental physical quantities length time, mass & tempreature is called the S.I system of units are the standard internation system of units.

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	Quantity	Symbol.	Dimensions	Units
1.	length	L	[L]	Meter (m)
2.	Mass	M	[M]	Kilogram (kg
3.	Time	T	[T]	Second (S)
4.	Current	I	[I]	ampere (A)
5.	Temperature	T	–	kelvin degree
6.	Area	A	$[L^2]$	m^2
7.	Volume	V	$[L^3]$	m^3
8.	Wavelength	λ	[L]	m
9.	Displacement	S	[L]	m
10.	Velocity	r	$[LT^{-1}]$	m/s
11.	Acceleration	a	$[LT^{-2}]$	m/s^2
12.	momentum	P	$[MLT^{-1}]$	kg m/s
13.	force	F	$[MLT^{-2}]$	Newton (N) kgm
14.	work	W	$[ML^2T^{-2}]$	joule (J)
15.	Energy	E	$[ML^2T^{-2}]$	J
16.	Power	P	$[ML^2T^{-3}]$	watt (W), J/s
17.	Density	ρ	$[M[^{-3}]$	kg/m^3
18.	Period	T	[T]	s
19.	Faequncy	f	$[T^{-1}]$	Hertz (HZ)
20.	Angular displacement	θ	–	radian (rad)
21	Angular velocity	ω	$[T^{-1}]$	rad/s
22.	Angular speed & faequency	ω	$[T^{-1}]$	rad/s
23.	Angular momentum	L	$[ML^2T^{-1}]$	$kg \cdot m^2/s$
24.	Angular accln	α	$[T^{-2}]$	rad/s^2
25.	Torque.	T	$[ML^2T^{-2}]$	N.m

Teacher's Signature

Page No.
Date

	Quantity	symbol	Dimensions	units
26.	Rotational Inertia	I	$[ML^2]$	$kg\ m^2$
27.	Pressure	P	$[ML^{-1}T^{-2}]$	N/m^2
28.	Entropy	S	$[ML^2T^{-2}]$	$J/°K$
29.	Internal energy	U	$[ML^2T^{-2}]$	J
30.	Heat	Q	$[ML^2T^{-2}]$	J
31.	Charge	Q	$[IT]$	coulomb (C)
32.	Voltage	V	$[ML^2T^{-3}T^{-1}]$	volt (V)
33	Resistance	R	$[ML^2T^{-3}I^{-2}]$	ohm (Ω)
34.	Resistivity	ρ	$[M^3T^{-3}I^{-2}]$	$\Omega \cdot m$
35.	Electromotive force	e	$[ML^2T^{-3}I^{-1}]$	V
36.	Gravitational field strength	g	$[LT^{-2}]$	N/kg
37.	Electric field strength	E	$[MLT^{-3}I^{-1}]$	N/C, V/m
38.	Gravitational potential	V	$[L^2T^{-2}]$	J/kg
39.	Electric potential	V	$[ML^2T^{-3}I^{-1}]$	V
40.	capacitance	C	$[M^{-1}L^{-2}T^4I^2]$	farad (F)
41.	Inductance	L	$[ML^2T^{-2}I^{-2}]$	henry (H)
42.	conductivity	σ	$[M^{-1}L^{-3}T^3I^2]$	$(\Omega m)^{-1}$
43.	current density	J	$[IL^{-2}]$	A/m^2
44.	Electric Dipole moment	P	$[LIT]$	$C.m$
45.	Electric displacement	D	$[L^{-2}IT]$	C/m^2
46.	Electric polarization	P	$[L^{-2}IT]$	C/m^2
47.	Electric Flux	Φ_E	$[ML^3T^{-3}I^{-1}]$	$N \cdot m^2/C$
48.	magnetic Dipole moment	μ	$[L^2I]$	$A \cdot m^2$
49.	magnetic field strength	H	$[L^{-1}I]$	A/m
50.	magnetic flux.	Φ_B	$[ML^2T^{-2}I^{-1}]$	webee (Wb)

Teacher's Signature

Page No.
Date

Varnier calliper :- A quick guide on how to read a vernier calliper. A vernier calliper outputs measurment readings in centimeters (cm) & it is precise upto 2 decimal places.

How to read varnier calliper :-

In order to read the measurement readings from vernier calliper properly you need to remember two things before we start, for example If a vernier calliper output a measurement reading of 2.13 cm this means that.

- The Main scale contributes the main number (s) & decimal place to the reading (i.e, 2.1 cm, where by 2 is the main number & 0.1 is the decimal place to the reading).
- To obtain the main scale reading look at the diagram 2.1 cm is to the immediate left of the zero on the vernier cal. scale. hence the main scale reading is 2.1 cm.
- In obtain the vernier scale reading look at the image above & look closely for an alignment of the scale lines of the main scale & vernier scale in the image. above the aligned line correspon to 3 Hence the vernier scale readis is 0.03

In order to obtain the final measurement reading we will add the main scale reading & vernier scale reading together. This will give 2.1 cm + 0.03 = 2.13 cm.

Teacher's Signature

Page No.
Date

Observation :-

Sr. No	Quantity	Main scale	Vernier Scale	fraction n x VC	Total R = R + Vc	R = R + Vc
1	length	25	12	12 x 0.05 = 0.6 cm	2.5 + 0.6 = 3.1 cm	3.1 cm
2	Diameter	0.7	15	15 x 0.05 = 0.75	0.7 + 0.75 = 1.45	1.45

Result :- Volume of Cylinder = V = 5.16 cm3.

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Page No.
Date

screw gauge :-

The screw gauge is an instrument used for measuring accurantely the diameter of a thin wire or the thickness of a short of metal. It consists of a U-shaped frame fitted with a screwed spindle which is attached to a thimble. parallel to the axis of the thimble a scale graduated in mm is engraved this is called Pitch scale. A sleeve is attached to a head of the screw.

The head of the screw has a ratchet which avoids undue fightening of the screw on the thimble there is a circular scale known as head scale which is divided into 50 or 100 equal parts when the screw is worked the sleeve moves over the pitch scale.

A stud with a plane end surface called the anvil is fixed on the 'U' frame exactly opposite to the tip of the screw. when the tip of the screw is in contanct with anvil usally the zero of the head scale coincides with the zero of the pitch scal

Pitch of the screw gauge :- The pitch of the screw is the distance moved by the spindle per revolution. to find this the distance advanced by the head scale over the pitch scale for a definte number of complete rotation. of screw is determined.

The pitch can be represented as

Teacher's Signature

Page No.
Date

Pitch of the screw = Distance moved by screw / No. of full rotation given — (1)

Least count of the screw gauge :-

The least count (L.C) is the distance moved by the tip of the screw when the screw is turned through 1 division of the head scale.

The least count can be calcuted using the formulae :-

Least count = Pitch / total no. of divisions on the circular scale — (2)

Sr. No	MSR (N)	n	(n × L.C) mm	observed $D_o = N + n(L.C)$	corrected $D = D_o + c$ (mm)
1.	0	58	0.58	0.58	0.6
2.	0	56	0.56	0.56	0.58
3.	0	57	0.57	0.57	0.59
4.	0	57	0.57	0.57	0.59
5.	0	56	0.56	0.56	0.58

length of wire = i] 31.3 cm ii] 31.3 cm iii] 31.3 cm

mean length of the wire = 31.3 cm = 0.313 mm

mean diameter of the wire

$$= \frac{0.6 + 0.58 + 0.59 + 0.59 + 0.58}{5}$$

$$= 0.59 \text{ mm}$$

$$= 0.59 \times 10^{-3} \text{ m}$$

$$= 0.059\ 10^{-5} \text{ m}$$

Teacher's Signature

Page No.
Date

$$\text{Vol} = \pi \left(\frac{D}{2}\right) l$$

$$= \frac{22}{7} \times \frac{59}{2} \times \frac{59}{2} \times 0.313 \times 10^{-10}\ m^3$$

$$= 856.077 \times 10^{-10}\ m^3$$

$$= 8.561 \times 10^{-8}\ m^3$$

$$= 8.561 \times 10^{-8}\ m^3$$

Teacher's Signature

Page No.
Date

Electrical & Electronical Skill :-

Use of Multimeter :- A multimeter is an electronic instrument every electronic technician & engineers widely used piece of test equipment, multimeter is mainly used to measure the three basic electrical characteristics of voltage, current & resistance it's can also be used to test continuit between two points in electrical circuit. this post mainly introduce the basic information of multimete

Operation of oscilloscope :-

An oscilloscope can be used to measure voltage it does this by measuring the voltage drop across a register & the process draws a small current. The voltage drop is amplified & used to deflect an electron beam in other the X (horizontal) Y (vertical) axis using an electric feild the electron beam creates a bright dot on the face of the cathode ray tube (CRT) where it hits the Phosphorous the deflection due to an applied voltage can be measured with the aid of the calibrated line on the graticule.

The deflection of the oscilloscope beam is proportional to the input voltage (after ac or coupling) the amount of deflection (volts/division depends upon the setting of the AMPL/DIV control for the channel.

Teacher's Signature

Page No.
Date

Two Types of Multimeters :-

1. Analog Multimeters
2. Digital Multimeters

- **Analog Multimeter :-** A instrument that use to measure electrical quantities such as voltage, current, resistance, & singal power.

  Basic functionality includes measurment of potential in volts, resistance in ohms & current im amps.

- **Digital Multimeter :-** A Digital multimeter is a test tool used to measure two or more electrical values principally voltage (volts), current (amps), & resistance (ohms)

  Is a standard diagnostic tool & for technician in the electrical industries.

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Page No.
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Uses of bread Board :- A Bredboard is an inexpensive, easy-to-use piece of hardware for wiring electrical circuit Breadborad acquired thier name because they are similar in shape to cutting boards used for cutting unsliced bread. In the past hobbyists & engineers naile metal spikes into cutting boards when ~~writi~~ wiring circuits.

A breadboard is usally covered with holes lined with metal, in which wires & electrical components such as resistors, diodes & capacitors can be plugged.

Designing of circuit

- Half Wave rectifier :- A rectifier is an electric device that convert A.c voltage int D.c voltage in other words it convert alternating current to direct current. A recifier is used in almost all the electronic devices mostly is used to convert the main voltage into D.C voltage in the power supply section. by using DC voltage supply electronic device work according to the peeiod of conduction, rectifier are classified into the two categries : Half wave rectifier & full ware Rectifier.

Teacher's Signature

Page No.
Date

Working of Half Wave Rectifier :-

During the positive Half cycle the diode is under forword bias condition & it conducts currents to RL (Load resistance) A voltage is developes across the load, which is same as the input A.c singnal of positive half cycle.

Alternatively, during the negative half cycle the diode is under reverse bias condition & there is no current flow through the diode only the A.c input voltage appears across the bad & it is the net result which is positive during the positive half cycle the output voltage pulsates the DC voltage.

Operation of Half - Wave Rectifier :-

PN Juction diade conducts only during the forward bias condition Half wave rectifies was the same principle as PN juction diode & thus converts Ac to Dc in a Half - wave rectifier circuit a load ristance is connected in series with the PN juction diode. Alternating current is the input of the Half wave rectifies a step down transformer takes input voltage & the resulting output of the transformer is given to the load resistar & to the diode.

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Page No.
Date

Designing of basic gates :-

- **AND gate**

The gates AND gate is an electronic circuit gives a high output (1) only if all its inputs are high A dot (.) is used to show that AND operation i.e, A.B Bear in that this is sometimes omitted i.e. AB

- **OR gate**

The OR gate is an electronic circuit that gives a high output (1) or more if its input are high A plus (+) is used to show OR operation.

- **Not gate**

The NOT gate is an electronic circuit that produce an inverted version of the input at its output It is also known as an inverter If the input varible is A the inverted output is known as NOT A this is also shown as $\bar{A}$ OR A with a bar over the top as shown . all the outputs the diagrams below show two ways that the NAND logic gate can be configured to produce a NOT gat it can also be done using NOR logic gates in the same way.

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Page No.
Date

NoR gate :- This is a NOT - OR gate which is equal to an OR gated followed by NoT gate. The output of all NoR gates are low if any of the inputs are high th symbol is an OR gate with a small circle on the output the small circle represents inversion.

NAND gate :- This is a NOT-AND gate which is equal to an AND gate followed by a Not gate by outputs of all NAND gates are high if any of the input s are low, the symbol is an AND gate with a small circle on the Output the small circle represents inversion.

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4.	KHUSHBOO MURLIDHAR BAWANGADE	
5.	PRASHANT SUNIL BORKAR	

PAGE NO.

DATE : / /

Que. 1

What are errors in measurement of quantity.

Errors in measurement of quantity are as follows:

(i) Absolute error - The amount of error in your measurement.

(ii) Greatest possible Error - defined as a one half of the measuring unit.

(iii) Instrument error - error caused by an inaccurate instrument or a poorly worded question naire.

(iv) margin of error - an amount above and below your measurement.

(v) Measurment location Error - Caused by an instrument being placed some when it should like a thermometer left a thermometer out in the full sun.

PAGE NO.

DATE : - / /

(VI) Operator error - human factor that cause error, like reading a scale in correctly.

(VII) percent error - Another way of expressi measurement error.

(VIII) Percent error - .

$$\frac{\text{Measured value - actual valu}}{\text{actual value}}$$

(IX) Relative error - The ratio of the absolute error to the accepted measurment As a formula thats.

$$\text{E relative} = \frac{\text{E absolute}}{\text{E measured}}$$

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PAGE NO.

DATE : / /

Que.2

Define the precision and sensitivity of the instrument.

Precision of the instrument

(i) Precision is defined as the closeness between two or more measured value to each other.

(ii) Suppose we weight the same box five times and get close results like 3.1, 3.2, 3.22, 3.4 and 3.0 then the measurement are precise.

(iii) It is the measure of consistency or repeatability of measurements i.e. successive reading in an instrument not differ.

(iv) Sensitivity of an Instrument

The sensitivity of an instrument is the change of output divided by

PAGE NO.

DATE : / /

change of the measured.

As an example, Consider a Pressure Sensor that has a measurement range of 0-5V. Its sensitivity is 0-100 PSI and output range of 0-5V its sensitivity is 0.05V / PSI.

It is the ratio of change in out-put of the instrument to change in output or measured variable.

A higher sensitivity indicates that the system can respond to even smallest input.

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PAGE NO.

DATE : / /

Que-3

What are the advantages for the conventional multimeter for voltage measurement.

- Advantages for conventional multimeter for voltage measurement.

i) It reduce reading and interpopulation errors.

ii) The 'auto-polarity' function can prevent problems from connecting the meter to a test circuit with the wrong polarity.

iii) parallel Error are eliminated

iv) The reading speed is increased as it is easier to read.

v) Digital output is suitable for further processing or recording and can be

PAGE NO.

DATE : / /

in a rapidly increasing range of computer controlled applications.

iv) Accuracy is increased due to digital readout.

vii) The auto-ranging feature of a digital multimeter helps in seteling different measurement ranges.

viii) Portable size makes it easy to carry anywhere.

ix) It cause less meter loading effect on the circuits being tested.

x) Some advanced digital multimeter have microprocessors and can stor the readings for further processing.

xi) It have very high input impedence

PAGE NO.

DATE : / /

Que-4

Define amplifire, rectifire and oscillator

Amplifire -

An electronic device for increasing the amplitude of electrical signals used cheifly in sound reproduction.

The power amplifire works as converting the DC power drawn from the power supply into an AC voltage signal delivered to the load Although efficiency the amplification is high the conversion from the DC power supply from the DC power supply input to the AC voltage signal output is usually power.

Rectifire :-

An electrical device which converts an alternating current into a direct one by allowing a current to flow through it in one direction only.

PAGE NO.

DATE : / /

A rectifire is an electrical device composed of one or more diodes that converts alternating current (AC) to direct current (DC) A diode is like a one-way valve that allow an electrical current to flow in only one direction.

Oscillator :-

A device for generating oscillatory electric current or voltage by non-mechanical means.

An oscillators is a circuits which produces a continueous respect alternating waveform without any input oscillators without any output oscillators basically convert unidirectional current flow from a D.C. source into an alternating waveleng which is of the desired frequency as decided by its circuit components.

PAGE NO.

DATE : / /

Que. 6.

What is cathod ray oscillascope? Draw block diagram of CRO.

Cathod ray oscillascope. (CRO)

The cathode -ray oscilloscope is a common laboratory instrument that povides accurate time and amplitude measurment of voltage signals over a wide range of frequencies.

Its versobility stubillity and ease of operation make it suitable as a general purpose laboratory instrument.

It consist of following parts, with the help of these we derive help of these we derive block diagram of CRO.

PAGE NO.

DATE : / /

I) Cathod ray tube
II) Vertical amplifie.
III) Delay line
IV) Time base generator
V) Horizontal amplifire
VI) Trigger circuite.
VII) power supply.

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PAGE NO.

DATE : / /

Que. 7

comparison of Digital and Analog instrument.

·comparision of :Digital and Analog instrument are as follows.

Digital instrument	Analog instrument
i) The instrument which give output that varies in discrete steps and only has finite no. of value is known as digital instrument.	i) The instrument which gives output that varies out that continuously as quantity to be measured is known as analogs instrument.
ii) The accuracy of digital instrument is more	ii) The accurancy of analog instrument is less.
iii) The digital instrument required less power	iii) The analog instrument required more power.

PAGE NO.

DATE : / /

iv) sensitivity of digital instrument is less.	iv) sensitivity of analog instrument is more.
v) The digital instru-ment are expensive.	v) The analog instrumen are cheap.
vi) The digital instrument are easily portable	vi) The analog instrumen are extremenly portable.
vii) The resolution of digital instrument is more.	vii) The resolution of analog instrument is less.

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PAGE NO.

DATE : / /

Que-8

Block diagram and working of digital multimeter.

Block diagram of digital multimeter

In digital multimeter, we can incorporate many type of meters like ohmeter, ammeter, a voltmeter for the measurement of electrical parameter. Its block diagram shown below in. fig.

1) Digital voltmeter (DVM)

Digital voltmeter is the basic instrument used for measurement of voltage through use of analog to Digital converter, the basic principle, behind digital converter because without this we are not able to conv the analog into digital form.

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PAGE NO.

DATE : / /

Que-9

What are the types of A-C milivoltmeter.

Types of A-C multivoltmeter are as follows.

(1) **A-C. voltmeter using half wave rectifier.**

It is half wave rectifier is connected already of DC voltmeter, then that entire combination to gether is called AC voltmeter using half wave rectifier. The block diagram of A-C. voltmeter using Half wave rectifier as shown in fig.

The above block diagram consist of two blocks half wave rectifier and a-c. voltmeter we will get the corresponding circuit diagram. just by replacing each block with the respective component in above block diagram so the circuit diagram of AC voltmeter

PAGE NO.

DATE : / /

circuit diagram of Ac voltmeter using Half wave rectifier will look like shown below.

② Ac voltmeter using Full wave rectifier.

If a Full wave rectifier is connected ahead of DC voltmeter then that entire combination together is called Ac voltmeter. using Full wave rectifier, the block diagram of Ac voltmeter using Full wave rectifier is shown in fig.

So the circuit diagram of Ac voltmeter using Full wave rectifier will look like as in below.

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Mathematics
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Group - A

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SKILL ENHANCEMENT COURSE

PROJECT WORK

B.SC- Mathematics Sem VI

Session- 2020-2021

Topic- Fundamentals of graph Theory

Guidence By- Kharwade Sir

(Group A)

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28-7-21

FUNDAMENTALS OF GRAPH THEORY

INDEX

A GRAPH IS A DIAGRAM OF POINTS AND LINES CONNECTED TO THE POINTS. IT HAS AT LEAST ONE LINE JOINING A SET OF TWO VERTICES WITH NO VERTEX CONNECTING ITSELF. THE CONCEPT OF GRAPHS IN GRAPH THEORY STANDS UP ON SOME BASIC TERMS SUCH AS POINT, LINE, VERTEX, EDGE, DEGREE OF VERTICES, PROPERTIES OF GRAPHS, ETC.

Point

A point is a particular position in a one-dimensional, two-dimensional, or three-dimensional space. For better understanding, a point can be denoted by an alphabet. It can be represented with a dot.

Example:

HERE, THE DOT IS A POINT NAMED 'A'.

Line

A **Line** is a connection between two points. It can be represented with a solid line.

Example:

Here, 'a' and 'b' are the points. The link between these two points is called a line.

Vertex

A vertex is a point where multiple lines meet. It is also called a **node**. Similar to points, a vertex is also denoted by an alphabet.

Example:

HERE, THE VERTEX IS NAMED WITH AN ALPHABET 'A'.

Edge

An edge is the mathematical term for a line that connects two vertices. Many edges can be formed from a single vertex. Without a vertex, an edge cannot be formed. There must be a starting vertex and an ending vertex for an edge.

Example:

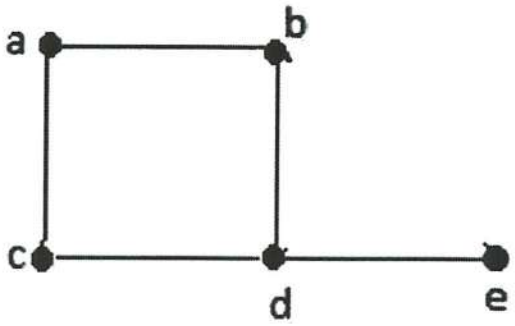
Here, 'a' and 'b' are the two vertices and the link between them is called an edge.

WHAT IS GRAPH?

A graph is a pictorial representation of a set of objects where some pairs of objects are connected by links. The interconnected objects are represented by points termed as **vertices,** and the links that connect the vertices are called **edges**.

Formally, a graph is a pair of sets **(V, E),** where **V** is the set of vertices and **E** is the set of edges, connecting the pairs of vertices.

TAKE A LOOK AT THE FOLLOWING GRAPH:



In the above graph,

Set of vertices, V = {a, b, c, d, e}

Set of edges, E = {ab, ac, bd, cd, de}

TYPES OF GRAPH

SIMPLE GRAPH	MULTIGRAPH	NULL GRAPH
DIRECTED GRAPH	NON-DIRECTED GRAPH	COMPLETE GRAPH
EULER GRAPH	HAMILTONIAN GRAPH	CONNECTED GRAPH
DISCONNECTED GRAPH	PLANAR GRAPH	CYCLIC GRAPH

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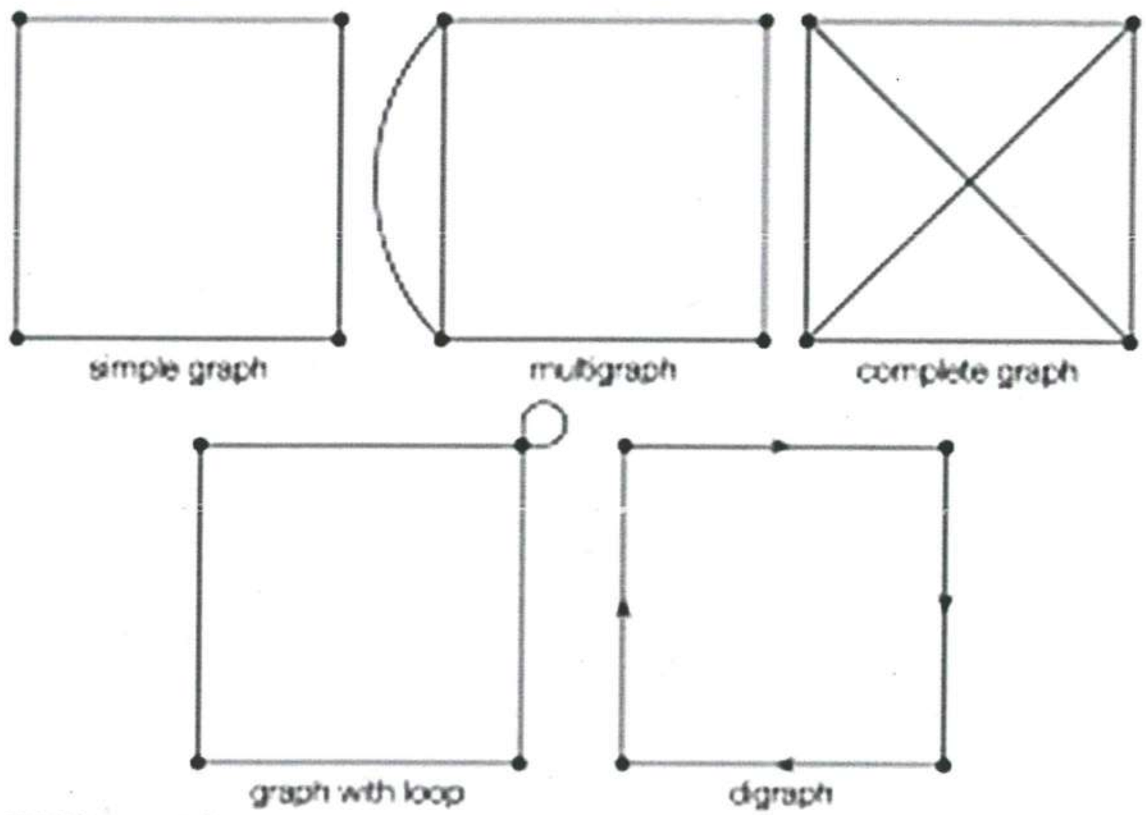
SOME EXAMPLES OF GRAPH



APPLICATION OF GRAPH THEORY

GRAPH THEORY HAS ITS APPLICATIONS IN DIVERSE FIELDS OF ENGINEERING-

- **Electrical Engineering:** The concepts of graph theory is used extensively in designing circuit connections. The types or organization of connections are named as topologies. Some examples for topologies are star, bridge, series, and parallel topologies.

- **Computer Science**: Graph theory is used for the study of algorithms.

For example,

- Kruskal's Algorithm
- Prim's Algorithm
- Dijkstra's Algorithm

- **Computer Network:** The relationships among interconnected computers in the network follows the principles of graph theory.

- **Science:** The molecular structure and chemical structure of a substance, the DNA structure of an organism, etc., are represented by graphs.

- **Linguistics:** The parsing tree of a language and grammar of a language uses graphs.

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- **General:** Routes between the cities can be represented using graphs. Depicting hierarchical ordered information such as family tree can be used as a special type of graph called tree.

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CERTIFICATE

THIS IS TO CERTIFY THAT ...GroupA...

1). Nakul Santosh Kandalkar
2). Pradnya Harinath Kura
3). Arti Gurudev Saundarkar
4). Laxmi Dharma Sayam
5). Shahin Jakir sheikh

OF CLASS B.SC. SEM-VI (SUMMER-21) HAS SUCCESSFULLY COMPLETED THEIR PROJECT WORK ON THE TOPIC ...'Fundamentals of Graph theory'... UNDER THE GUIDANCE OF PROF. ARPIT KHARWADE FOR THE **'SKILL ENHANCEMENT COURSE'** (SESSION 20-21).

A.A.K. 28-7-21
PROF. ARPIT KHARWADE

HEAD OF THE DEPARTMENT
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B.Sc.
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Project Work
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2021

MATHEMATICS

B.SC. – III

SEMESTER: VI

SESSION: 2020-21

Skill Enhancement Course
Project Work

TOPIC :-GRAPHS AND ITS TYPES

Participate Students Name:- (Group B)

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2) Sidam Khushal Rushiji
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4) Thakare Prachi Bhaurao
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A.A.K. 28-7-21

Guidance By: Kharwade Sir

GRAPHS AND ITS TYPES

INDEX

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DEFINITION OF GRAPH

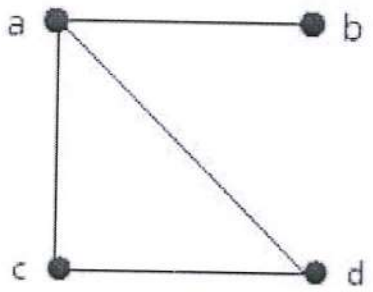
A graph 'G' is defined as G = (V, E) Where V is a set of all vertices and E is a set of all edges in the graph.

- ***Ex-1:***

In the above graph G=(V, E), E={ab, ac, cd, bd}

V={a, b, c, d}.

- ***Ex-2:***



In the graph G=(V, E), V={ a, b, c, d}

E={ ab, ac, ad, cd}.

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❖ *There are various types of graphs depending upon the number of vertices, number of edges, interconnectivity, and their overall structure.*

TYPES OF GRAPHs

A) NULL GRAPH

B) TRIVIAL GRAPH

C) DIRECTED GRAPH

D) NON-DIRECTED GRAPH

E) SIMPLE GRAPH

F) CONNECTED GRAPH

G) DISCONNECTED GRAPH

H) COMPLETE GRAPH

I) CYCLIC GRAPH

J) ACYCLIC GRAPH

1.Null Graph

*A **graph having no edges** is called a Null Graph.*

- ***EX-1***

In the above graph, there are three vertices named 'a', 'b', and 'c', but there are no edges among them. Hence it is a Null Graph.

- ***EX-2***

In the above graph, there are fours vertices named 'a', 'b', 'c' and 'd' but there are no edges among them. Hence it is a Null Graph.

2.Trivial Graph

*A **graph with only one vertex** is called a Trivial Graph.*

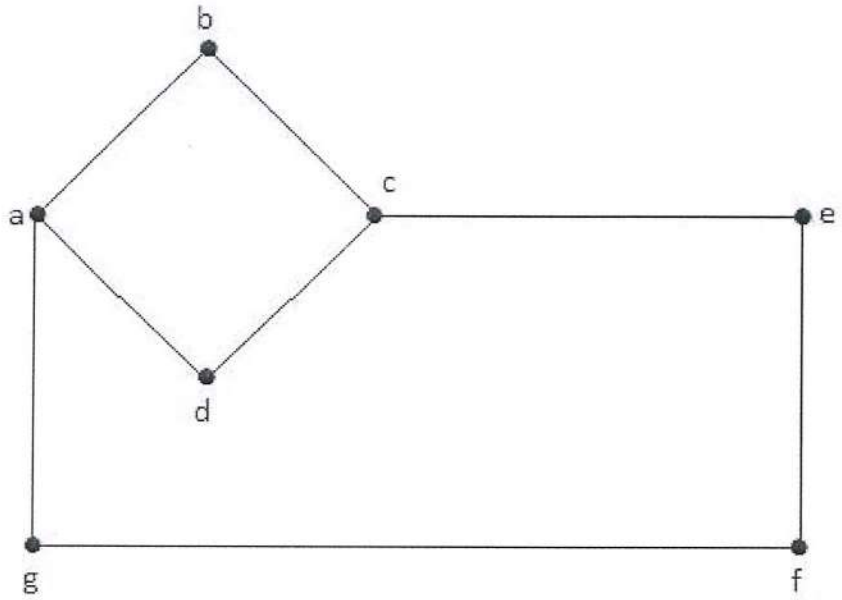
- ***EX.***

In the above shown graph, there is only one vertex 'a' with no other edges. Hence it is a Trivial graph.

3.Non-Directed Graph

A non-directed graph contains edges but the edges are not directed ones.

- ***EX.***



In this graph, 'a', 'b', 'c', 'd', 'e', 'f', 'g' are the vertices, and 'ab', 'bc', 'cd', 'da', 'ag', 'gf', 'ef' are the edges of the graph. Since it is a non-directed graph, the edges 'ab' and 'ba' are same. Similarly other edges also considered in the same way.

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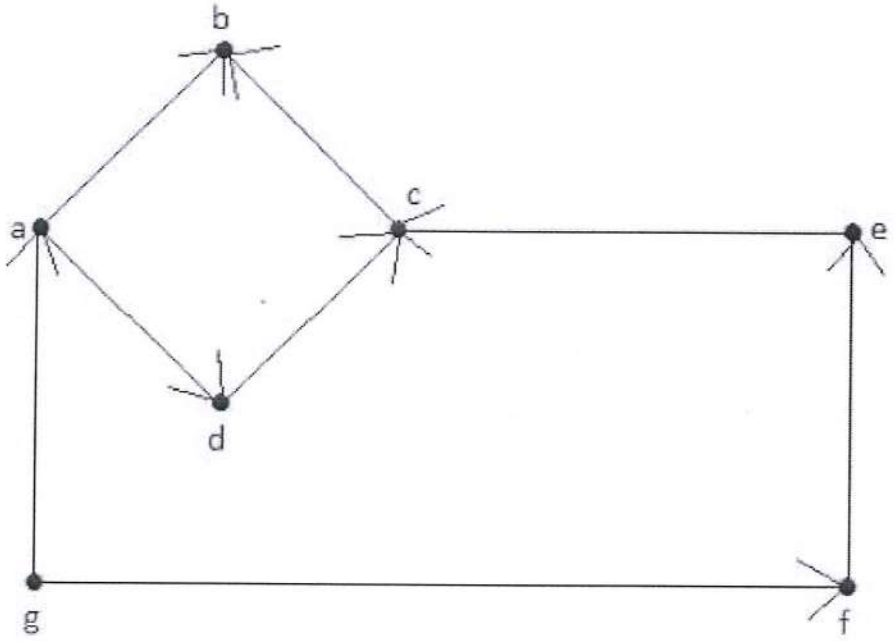
4.Directed Graph

In a directed graph, each edge has a direction.

- ***Ex.***

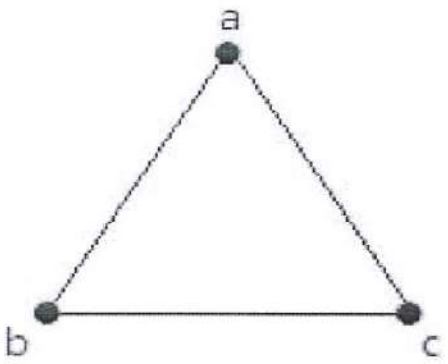


In the above graph, we have seven vertices 'a', 'b', 'c', 'd', 'e', 'f', and 'g', and eight edges 'ab', 'cb', 'dc', 'ad', 'ec', 'fe', 'gf', and 'ga'. As it is a directed graph, each edge bears an arrow mark that shows its direction. Note that in a directed graph, 'ab' is different from 'ba'.

5.Simple Graph

*A graph **with no loops** and **no parallel edges** is called a simple graph.*

- ***EX.***



In the above graph, there are no loops and no parallel edges and hence it is a simple graph.

- *The maximum number of edges possible in a single graph with 'n' vertices*

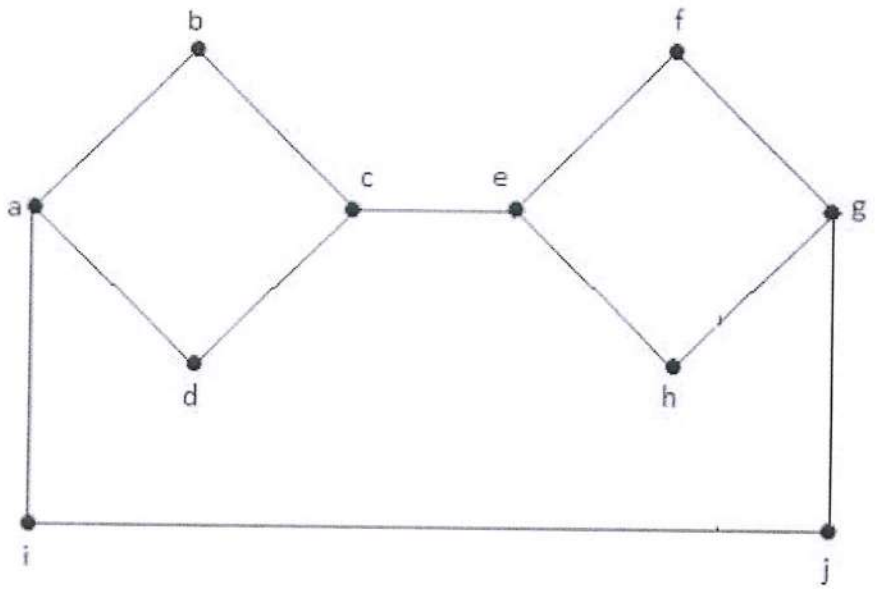
  is ${}^nC_2$ where ${}^nC_2 = n(n-1)/2$.

- *The number of simple graphs possible with 'n' vertices = $2^{{}^nc_2} = 2^{n(n-1)/2}$.*

6.Connected Graph

A graph G is said to be connected ***if there exists a path between every pair of vertices****. There should be at least one edge for every vertex in the graph. So that we can say that it is connected to some other vertex at the other side of the edge.*

- ***Ex***



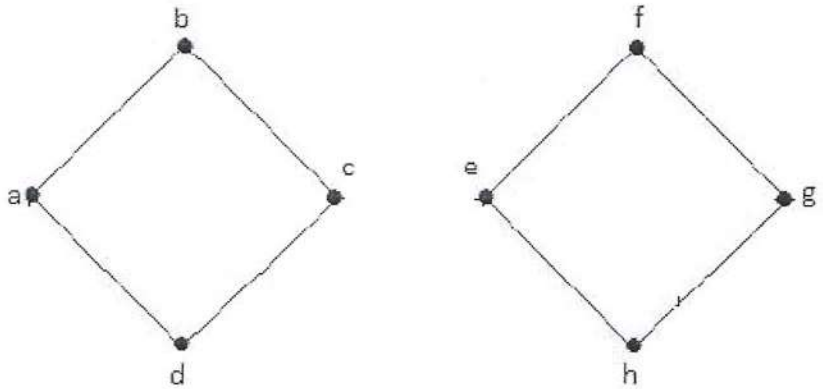
In the above graph, each vertex has its own edge connected to other edge. Hence it is a connected graphs.

7.Disconnected Graph

A graph G is disconnected, if it does not contain at least two connected vertices.

- ***EX.1***

The following graph is an example of a Disconnected Graph, where there are two components, one with 'a', 'b', 'c', 'd' vertices and another with 'e', 'f', 'g', 'h' vertices.



I II

The two components are independent and not connected to each other. Hence it is called disconnected graph.

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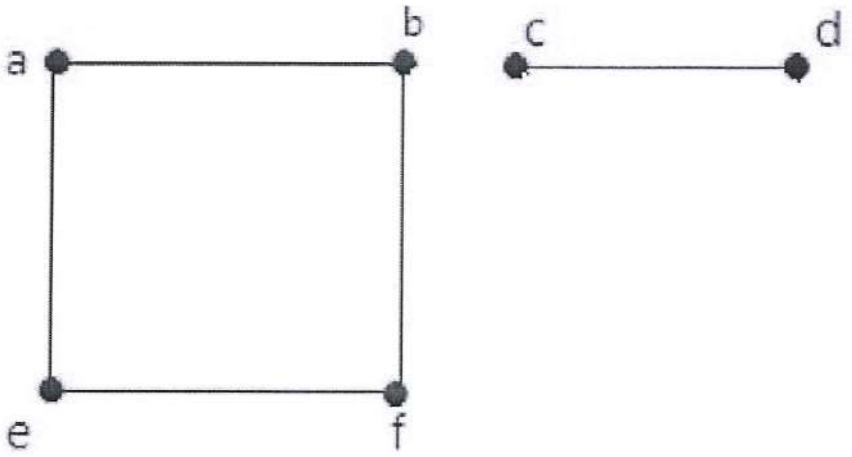
- ***Ex.2***



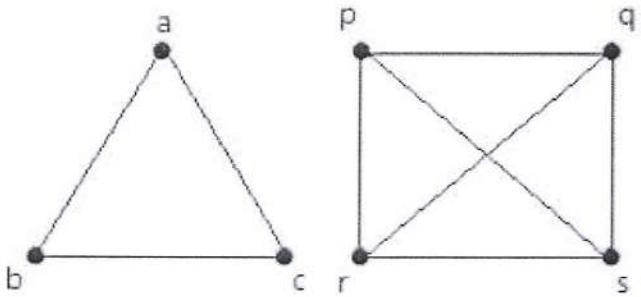
In this example, there are two independent components, a-b-f-e and c-d, which are not connected to each other. Hence it is a disconnected graph.

8.Complete Graph

A simple graph with 'n' mutual vertices is called a complete graph and it is ***denoted by 'K_n'.*** *In the graph,* ***a vertex should have edges with all other vertices,*** *then it called a complete graph.*

- *In other words, if a vertex is connected to all other vertices in a graph, then it is called a complete graph.*

- ***Ex.***



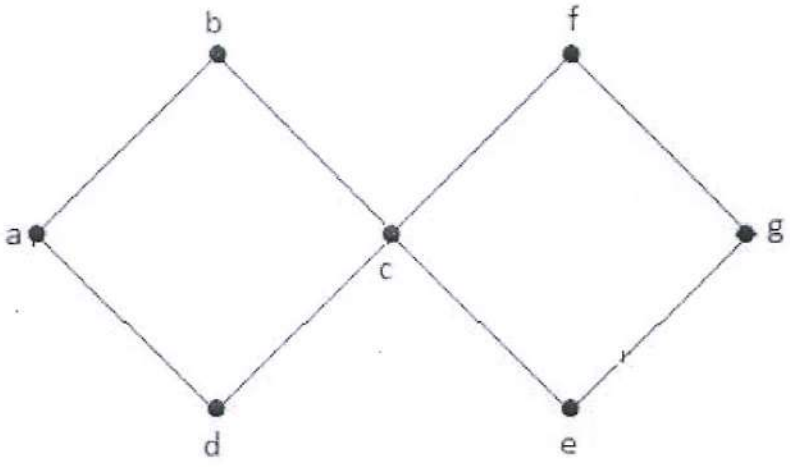
I II

In the above graphs, each vertex in the graph is connected with all the remaining vertices in the graph except by itself. Hence, they are complete graphs.

9.Cyclic Graph

*A graph **with at least one** cycle is called a cyclic graph.*

- ***Ex.***

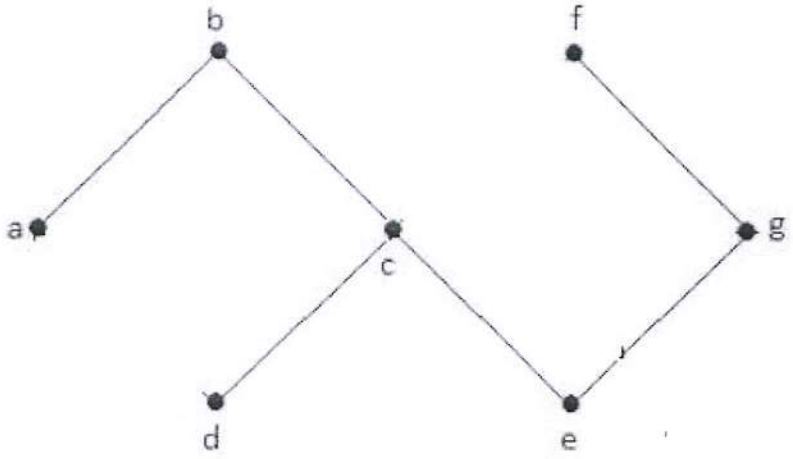


In the above example graph, we have two cycles a-b-c-d-a and c-f-g-e-c. Hence it is called a cyclic graph.

10.Acyclic Graph

*A graph **with no cycles** is called an acyclic graph.*

- ***Ex.***



In the above example graph, we do not have any cycles. Hence it is a non-cyclic graph.

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OF CLASS B.SC. SEM-VI (SUMMER-21) HAS SUCCESSFULLY COMPLETED THEIR PROJECT WORK ON THE TOPIC 'Graphs and its types' *UNDER THE GUIDANCE OF PROF. ARPIT KHARWADE FOR THE* **'SKILL ENHANCEMENT COURSE'**

(SESSION 20-21).

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Project Work
Group - C

MAHATMA GANDHI ARTS, SCIENCE AND LATE N.P. COMMERCE COLLEGE, ARMORI

Skill Enhancement Course Project Work

B.Sc. Semester: VI

Subject: Mathematics

Session: 2020-21

Topic: vertices of graph

Guidance by: Kharwade Sir

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3. Shreyash shrihari paulbuddhe
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28-7-21

VERTICES OF GRAPH

INDEX

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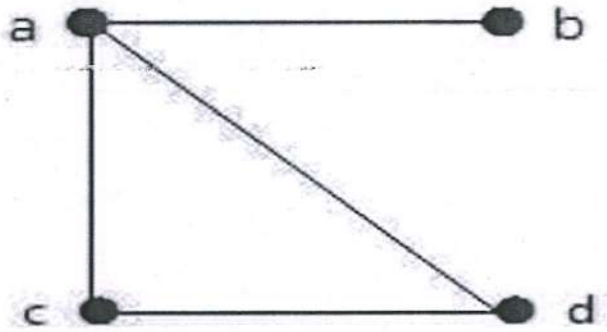
GRAPH

A graph is a pictorial representation of a set of objects where some pairs of objects are connected by links. The interconnected objects are represented by points termed as **vertices,** and the links that connect the vertices are called **edges**.

- **In mathematical language, a graph is a pair of sets (V, E), where V is the set of vertices and E is the set of edges, connecting the pairs of vertices.**

For ex.



In the above graph G=(V, E), SET OF VERTICES, V={a, b, c, d}

SET OF EDGES, E={ab, ac, cd, ad}

DEFINITION OF VERTEX OF A GRAPH

A vertex is a point where multiple lines meet. It is also called a **node**. Similar to points, a vertex is also denoted by an alphabet.

- **Ex.**

• a

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Here, the vertex is named with an alphabet 'a'.

- ❖ By using degree of a vertex, we have a two special types of vertices:

1.Pendent Vertex

A vertex with degree one is called a pendent vertex.

EX.

Here, in this example, vertex 'a' and vertex 'b' have a connected edge 'ab'. So with respect to the vertex 'a', there is only one edge towards vertex 'b' and similarly with respect to the vertex 'b', there is only one edge towards vertex 'a'. Finally, vertex 'a' and vertex 'b' has degree as one which are also called as the pendent vertex.

2.Isolated Vertex

A vertex with degree zero is called an isolated vertex.

Ex.

Here, the vertex 'a' and vertex 'b' has a no connectivity between each other and also to any other vertices. So the degree of both the vertices 'a' and 'b' are zero. These are also called as isolated vertices.

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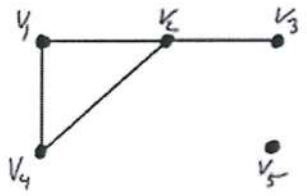
Degree of Vertex

It is the number of vertices adjacent to a vertex V.

Notation :deg(V).

EX.



$deg(v_1) = 2$
$deg(v_2) = 3$
$deg(v_4) = 2$
$deg(v_3) = 1$
$deg(v_5) = 0$

- In a simple graph with n number of vertices, the degree of any vertices is: $deg(v) \leq n - 1 \; \forall \; v \in G$

A vertex can form an edge with all other vertices except by itself. So the degree of a vertex will be up to the **number of vertices in the graph minus 1**. This 1 is for the self-vertex as it cannot form a loop by itself. If there is a loop at any of the vertices, then it is not a Simple Graph.

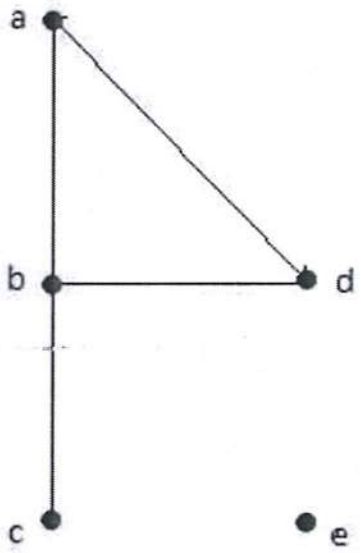
- Degree of vertex can be considered under two cases of graphs:
  - Undirected Graph
  - Directed Graph

• Degree of Vertex in an Undirected Graph

An undirected graph has no directed edges. Consider the following example.

Ex.

Take a look at the following graph:



In the above Undirected Graph,

- deg(a) = 2, as there are 2 edges meeting at vertex 'a'.
- deg(b) = 3, as there are 3 edges meeting at vertex 'b'.
- deg(c) = 1, as there is 1 edge formed at vertex 'c' □ So 'c' is a **pendent vertex**.
- deg(d) = 2, as there are 2 edges meeting at vertex 'd'.
- deg(e) = 0, as there are 0 edges formed at vertex 'e'. So 'e' is an **isolated vertex**.

• *Degree of Vertex in a Directed Graph*

In a directed graph, each vertex has an **indegree** and an **outdegree**.

Indegree of a Graph

- Indegree of vertex V is the number of edges which are coming into the vertex V.

Notation: $\deg^{-}(V)$.

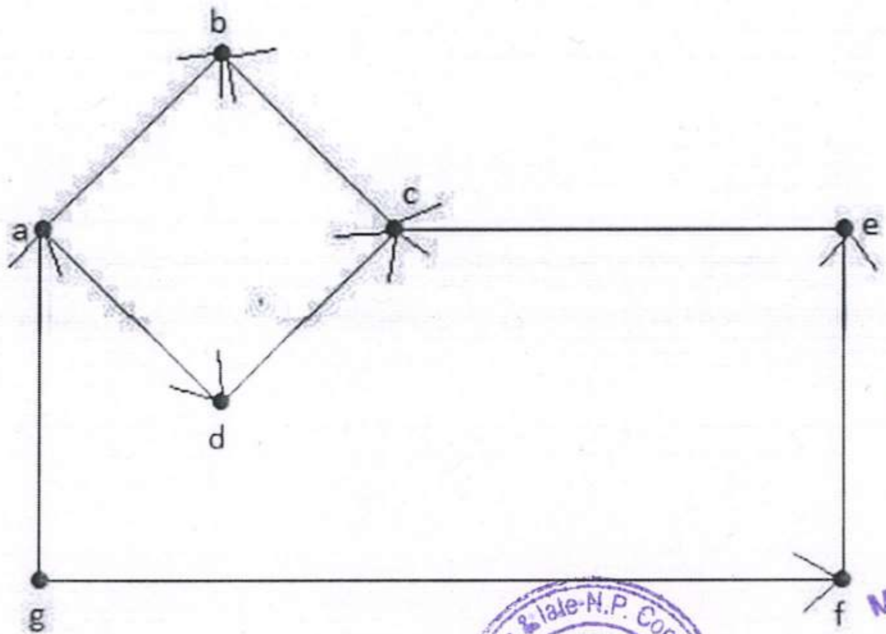
Outdegree of a Graph

- Outdegree of vertex V is the number of edges which are going out from the vertex V.

Notation: $\deg^{+}(V)$.

Ex .

Take a look at the following directed graph. Vertex 'a' has two edges, 'ad' and 'ab', which are going outwards. Hence its outdegree is 2. Similarly, there is an edge 'ga', coming towards vertex 'a'. Hence the indegree of 'a' is 1.



The indegree and outdegree of other vertices are shown in the following table:

Vertex	Indegree	Outdegree
a	1	2
b	2	0
c	2	1
d	1	1
e	1	1
f	1	1
g	0	2

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• Cut Vertex

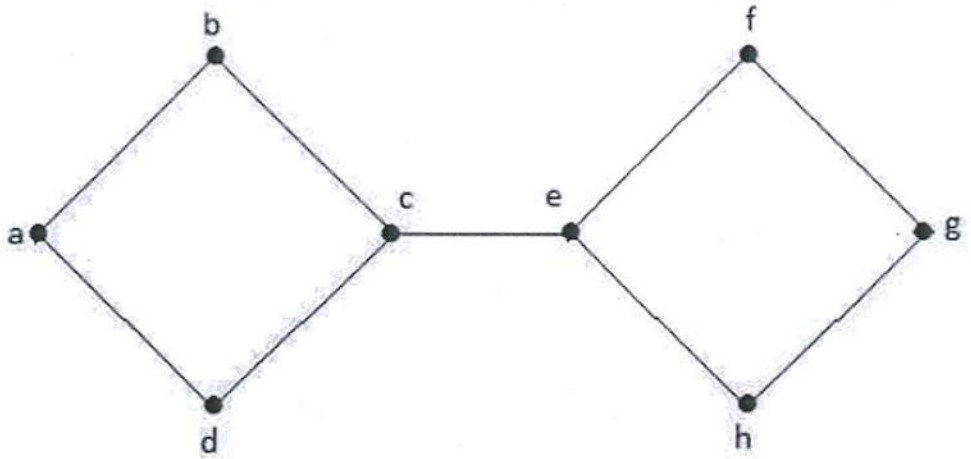
Let 'G' be a connected graph. A vertex V ∈ G is called a cut vertex of 'G', if 'G-V' (Delete 'V' from 'G') results in a disconnected graph. Removing a cut vertex from a graph breaks it in to two or more graphs.

- **Note**: Removing a cut vertex may render a graph disconnected.

- A connected graph 'G' may have at most (n–2) cut vertices.

Ex.

In the following graph, vertices 'e' and 'c' are the cut vertices.



By removing 'e' or 'c', the graph will become a disconnected graph.

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CERTIFICATE

THIS IS TO CERTIFY THAT ...GroupC...

1) ...Sanket Tejrao Akare...
2) ...Chaple Nikesh Homdeo...
3) ...Shreyas shrihari Paulbudhhe...
4) ...Niraj Ravi Pittulwar...
5) ...Santoshi Hemant Potekar...

OF CLASS B.SC. SEM-VI (SUMMER-21) HAS SUCCESSFULLY COMPLETED THEIR PROJECT WORK ON THE TOPIC...'Vertices of Graph'...

...UNDER THE GUIDANCE OF PROF. ARPIT KHARWADE FOR THE **'SKILL ENHANCEMENT COURSE'** (SESSION 20-21).

R.A.K. 28-7-21

PROF. ARPIT KHARWADE

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Mahatma Gandhi Arts, Science & Late N. P. Commerce College, Armori, Dist - Gadchiroli

B.Sc.
Mathematics
Project Work
Group - D

MAHATMA GANDHI ARTS SCIENCE AND LATE N.P. COMMERCE COLLEGE, ARMORI

Skill Enhancement Course

Project Work

B.SC.:- III YEAR (SEM-VI)

SUBJECT :- MATHEMATICS

TOPIC :- ISOMORPHISM OF GRAPHS

SESSION :- 2020-2021

GUIDANCE BY:- KHARWADE SIR

PARTICIPANTS NAMES : (Group D)

1] Bhojraj Dilip Khobragade

2] Pranay Sheshrao Kamble

3] Rohan Diwakar Kasture

4] Sahil Pramod Juare

5] Yash Kishor Kuthe

R.A.K. 28-7-21

INDEX

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ISOMORPHISM OF GRAPHS

A graph can exist in different forms having the same number of vertices, edges, and also the same edge connectivity. Such graphs are called isomorphic graphs.

Isomorphic Graphs

Two graphs G_1 and G_2 are said to be isomorphic if:

- Their number of components (vertices and edges) are same.
- Their edge connectivity is retained.

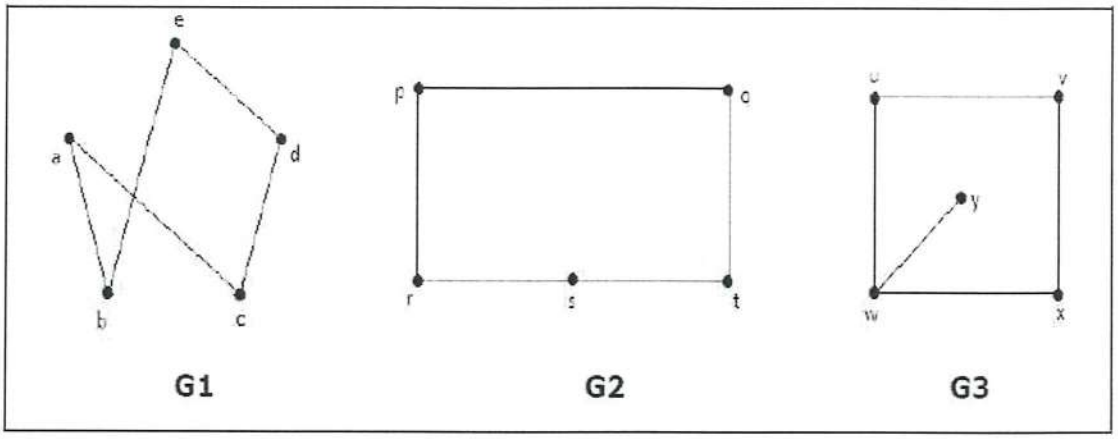
And we write it as $G_1 \equiv G_2$.

❖ THEOREM: If $G_1 \equiv G_2$ then-

1. $|V(G_1)| = |V(G_2)|$
2. $|E(G_1)| = |E(G_2)|$
3. Degree sequences of G_1 and G_2 are same.

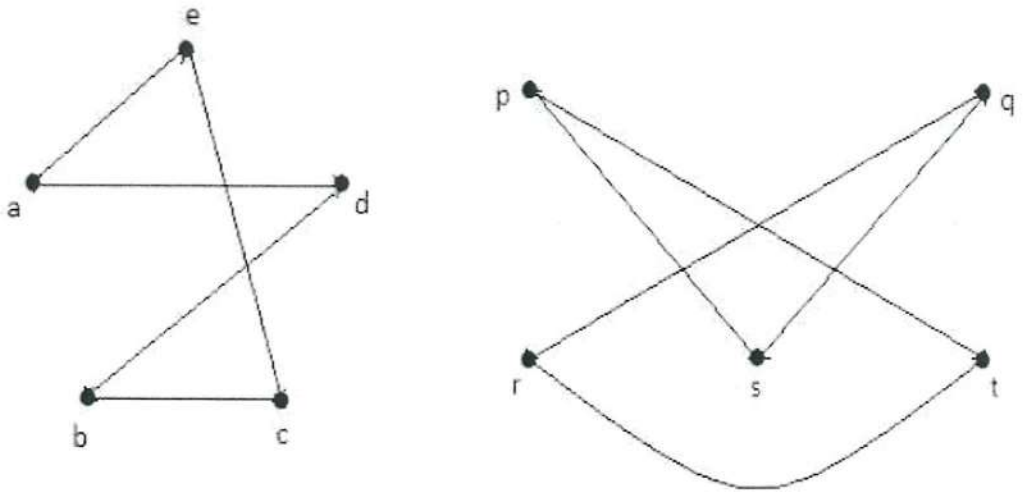
Example

Which of the following graphs are isomorphic?



In the graph G_3, vertex 'w' has only degree 3, whereas all the other graph vertices has degree 2. Hence G_3 not isomorphic to G_1 or G_2.

Taking complements of G_1 and G_2, you have:

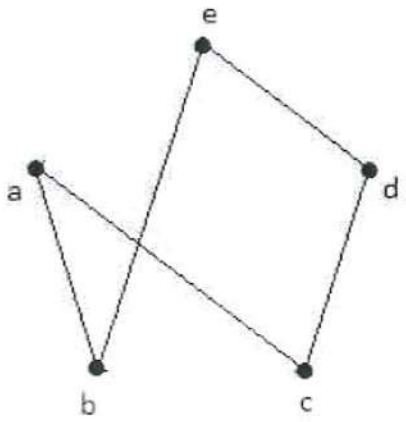


Here, (G_1– ≡ G_2–), hence (G_1 ≡ G_2).

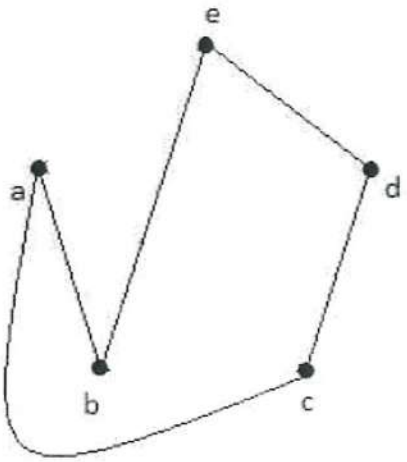
Planar Graphs

A graph 'G' is said to be planar if it can be drawn on a plane or a sphere so that no two edges cross each other at a non-vertex point.

➢ Example



NON - PLANAR GRAPH



PLANAR GRAPH

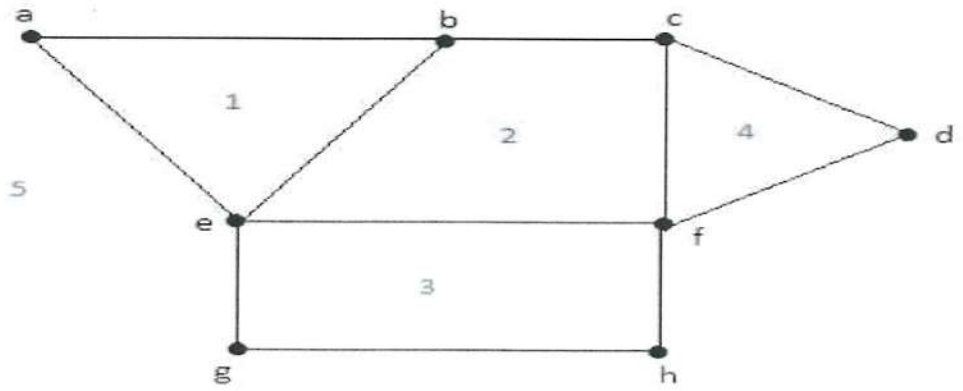
Regions

Every planar graph divides the plane into connected areas called regions.

NOTE: 1)Degree of a bounded region **r = deg(r)** = Number of edges enclosing the region **r.**

2)Degree of an unbounded region **r = deg(r)** = Number of edges enclosing the region **r.**

Ex.1



Here,areas 1, 2, 3, 4 and 5 are the regions.

In the above graph, deg(1)=3

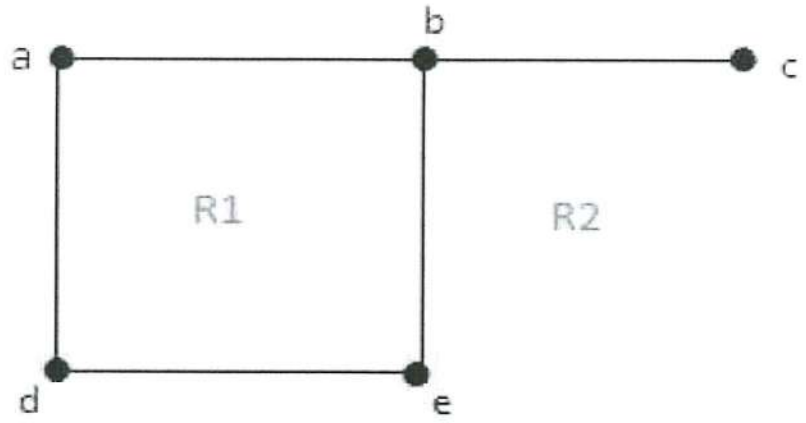
deg(2)=4

deg(3)=2

deg(4)=3

deg(5)=8

EX.2



Here, R_1 and R_2 are the regions.

In the above graph, $\deg(R_1)=4$

$\deg(R_2)=5$

PROPERTIES OF A PLANAR GRAPH

1.In a planar graph with 'n' vertices, sum of degrees of all the vertices is:

$$\sum_{i=1}^{n} \deg(V_i) = 2|E|$$

2. According to **Sum of Degrees of Regions** Theorem, in a planar graph with 'n' regions, Sum of degrees of regions is:

$$\sum_{i=1}^{n} \deg(r_i) = 2|E|$$

3. According to **Euler's Formulae** on planar graphs,

a.If a graph 'G' is a connected planar, then

$$|V| + |R| = |E| + 2$$

b.If a planar graph with 'K' components, then

$$|V| + |R| = |E| + (K+1)$$

Where, |V| is the number of vertices, |E| is the number of edges, and |R| is the number of regions.

4. **Edge Vertex Inequality**

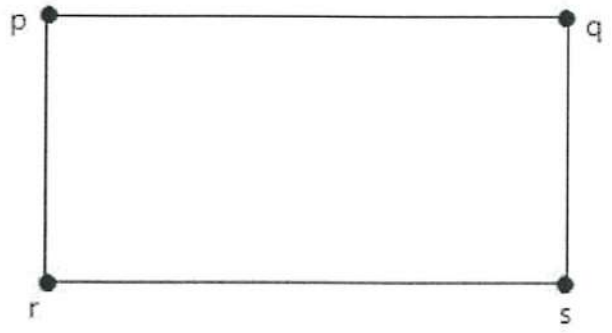
If 'G' is a connected planar graph with degree of each region at least 'K' then,

$|E| \leq k / (k-2) \{|v| - 2\}$

Homomorphism

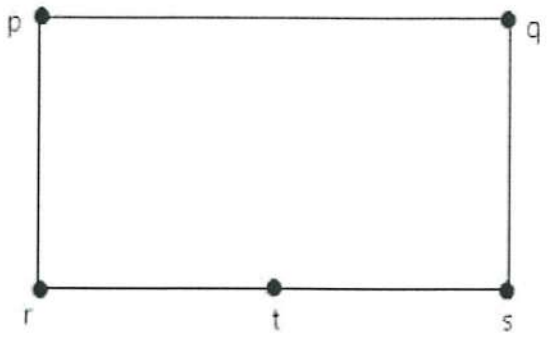
Two graphs G_1 and G_2 are said to be homomorphic, if each of these graphs can be obtained from the same graph 'G' by dividing some edges of G with more vertices.

Take a look at the following example:

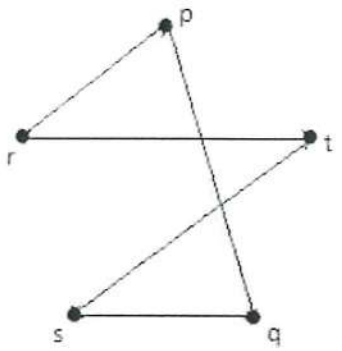


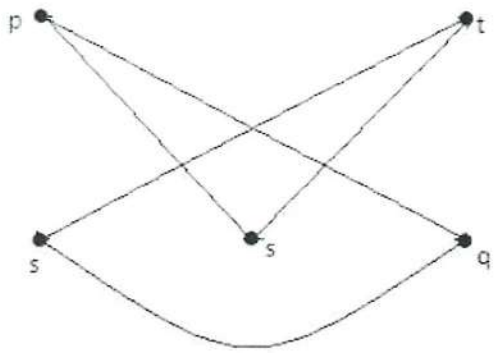
G

Divide the edge 'rs' into two edges by adding one vertex.



The graphs shown below are homomorphic to the first graph.





NOTE: If G_1 is isomorphic to G_2, then G is homeomorphic to G_2 but the converse need not be true.

- Any graph with 4 or less vertices is planar.
- Any graph with 8 or less edges is planar.
- A complete graph K_n is planar if and only if $n \leq 4$.

Polyhedral Graph

A simple connected planar graph is called a polyhedral graph if the degree of each vertex is ≥ 3, i.e. $\deg(V) \geq 3, \forall V \in G$.

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2) Pranay Sheshrao kamble
3) Rohan Diwakar Kasture
4) Bhojraj Dilip Khobragade
5) Yash Kishor kuthe

OF CLASS B.SC. SEM-VI (SUMMER-21) HAS SUCCESSFULLY COMPLETED THEIR PROJECT WORK ON THE TOPIC.... 'Isomorphism of Graphs' ....UNDER THE GUIDANCE OF PROF. ARPIT KHARWADE FOR THE **'SKILL ENHANCEMENT COURSE'** (SESSION 20-21).

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Project Work
Group - E

Mahatma Gandhi Arts, Science and Late N.P. Commerce College, Armori

Skill Enhancement Course Project Work

B.Sc. Semester: VI

Subject: Mathematics

Session: 2020-21

Topic: Traversability of Graphs

Guidance by: Kharwade Sir

Names: 1) Ajay Ramesh Akare

GroupE 2) Chandu Digamber Dhote

3) Priyanka Shamrao Meshram

4) Kalyani Vasant Pradhan

5) Roshani Murlidhar Pustode

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R.A.K.
28-7-21

TRAVERSABILITY OF GRAPHS

INDEX

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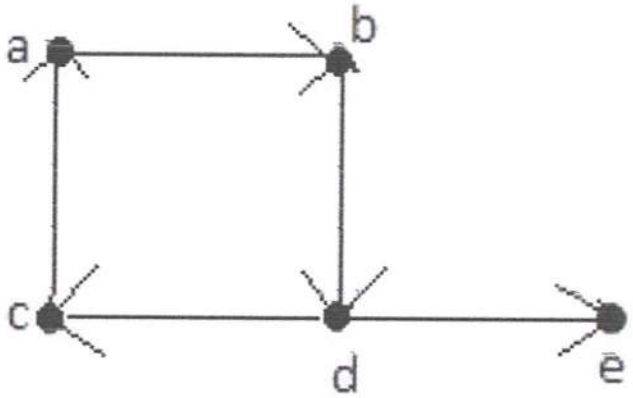
TRAVERSABLE GRAPH

A graph is traversable if you can draw a path between all the vertices without retracing the same path. Based on this path, there are some categories like Euler's path and Euler's circuit which are described in this chapter.

Euler's Path

An Euler's path contains each edge of 'G' exactly once and each vertex of 'G' at least once. A connected graph G is said to be traversable if it contains an Euler's path.

❖ **Example**



Euler's Path = d-c-a-b-d-e.

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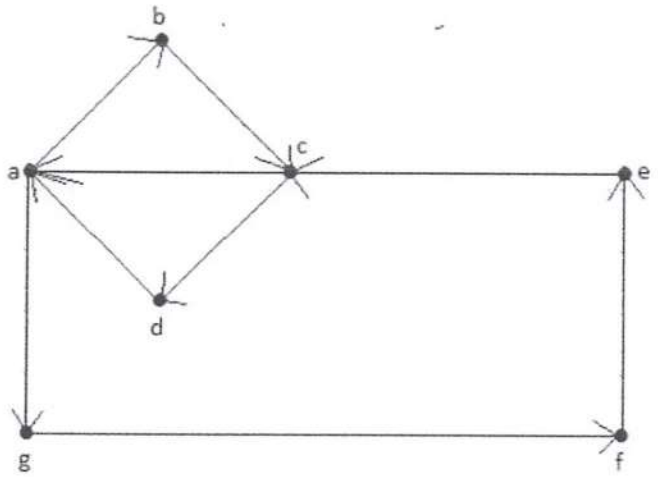
Euler's Circuit

In a Euler's path, if the starting vertex is same as its ending vertex, then it is called an Euler's circuit.

❖ **Example**



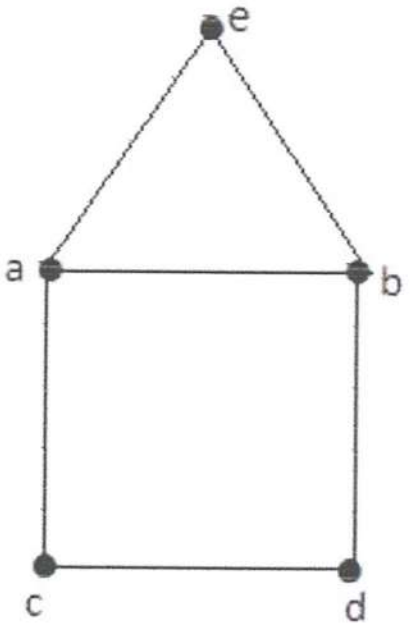
Euler's Path = a-b-c-d-a-g-f-e-c-a.

Euler's Circuit Theorem

A connected graph 'G' is traversable if and only if the number of vertices with odd degree in G is exactly 2 or 0. A connected graph G can contain an Euler's path, but not an Euler's circuit, if it has exactly two vertices with an odd degree.

Note: This Euler path begins with a vertex of odd degree and ends with the other vertex of odd degree.

- **Example**



Euler's Path – b-e-a-b-d-c-a is not an Euler's circuit, but it is an Euler's path. Clearly it has exactly 2 odd degree vertices.

Note: In a connected graph G, if the number of vertices with odd degree = 0, then Euler's circuit exists.

Hamiltonian Graph

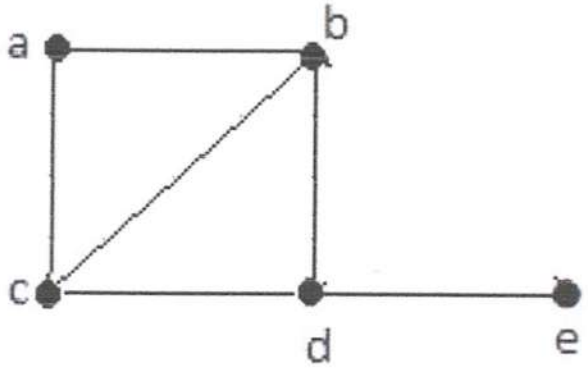
A connected graph G is said to be a Hamiltonian graph, if there exists a cycle which contains all the vertices of G.

- Every cycle is a circuit but a circuit may contain multiple cycles. Such a cycle is called a **Hamiltonian cycle** of G.

Hamiltonian Path

A connected graph is said to be Hamiltonian if it contains each vertex of G exactly once. Such a path is called a **Hamiltonian path**.

- **Example**



Hamiltonian Path – e-d-b-a-c.

Note:

1.Euler's circuit contains each edge of the graph exactly once.

2.In a Hamiltonian cycle, some edges of the graph can be skipped

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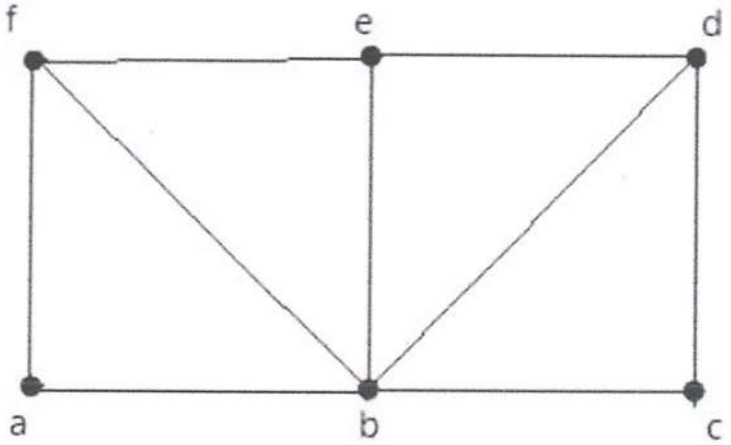
❖ **Example**

Take a look at the following graph:



For the graph shown above:

a) Euler path exists – false
b) Euler circuit exists – false
c) Hamiltonian cycle exists – true
d) Hamiltonian path exists – true

G has four vertices with odd degree, hence it is not traversable. By skipping the internal edges, the graph has a Hamiltonian cycle passing through all the vertices.

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3). Priyanka shamrao Meshram
4). Kalyani Vasant Pradhan
5). Roshani Murlidhar Pustode

OF CLASS B.SC. SEM-VI (SUMMER-21) HAS SUCCESSFULLY COMPLETED THEIR PROJECT WORK ON THE TOPIC.... 'Traversability of Graphs' ....UNDER THE GUIDANCE OF PROF. ARPIT KHARWADE FOR THE **'SKILL ENHANCEMENT COURSE'** (SESSION 20-21).

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B.Sc.
Geology
Project Work

Project Report

on

"The Concept and Significance of Renewability"

Submitted by

Miss Tilottama D. Bante **Mr.Pranay A. Bagade**

Miss. Payal V. Bhandekar **Mr. Nikhil V. Bodne**

Mr. Pankaj K. Barsagade

B.Sc. Final Year (Semester VI)

Submitted to

Department of Geology
M.G. College Armori
Gondwana University, Gadchiroli

Guided by

Prof. Dr. C.P. Dorlikar
Professor and Head
P.G. Department of Geology

P.G. DEPARTMENT OF GEOLOGY M.G. COLLEGE ARMORI
GONDWANA UNIVERSITY, GADCHIROLI

Year 2020-2021

CERTIFICATE

This is Certified that Tilottama D. Bante , Mr.Pranay A. Bagade, Miss. Payal V. Bhandekar , Mr. Nikhil V. Bodne,Mr. Pankaj K. Barsagade has carried out project work on **"The Concept and Significance of Renewability"**

Under the concern faculty supervision for the partial fulfilment of the Post Graduation of B.Sc. She/He has carried out project work in the field and laboratories of the department of Geology. Mahatma Gandhi College Armori and Gondwana University Gadchiroli.

She/He fulfiled all the necessary requirements of the regultion related to the nature the prescribed period of work as per rules required under the ordinance related to the post Graduation department of Geology of the M.G. College Armori Gondwana University Gadchiroli

Internal Examiner

External Examiner

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I must express my science and whole hearted thanks to M.G.College Armori, Gondwana University for giving this opportunity to submit the project.

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I specially acknowledge with thanks to asst. Prof. P.S. Ganvir Post Graduation Department of Geology for his helping nature and efforts which solve all difficulties.

One again I pledge my sincere gratitude to all other who helped me directly and indirectly for the accomplishment of my goal.

Date :

Place : Armori

1) Tilottama D. Bante Bante.

2) Pranay A. Bagade Bagde.

3) Payal V. Bhandekar

4) Nikhil V. Bodne

5) Pankaj K. Barsagade P. Barsagad

B.sc Final Year Sem VI

Contents

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The concept of renewable resources

Essentially, a renewable resource, such as solar energy, wind energy, and geothermal pressure**, has an endless supply . Other resources are considered renewable even though some time or effort must go into their renewal (e.g., wood, oxygen, leather, and fish). Most precious metals are renewable also.**

Water resources

Water can be considered a *renewable* material when carefully controlled usage and temperature, treatment, and release are followed. If not, it would become a non-renewable resource at that location. For example, as groundwater is usually removed from an aquifer at a rate much greater than its very slow natural recharge, it is a considered non-renewable resource. Removal of water from the pore spaces in aquifers may cause permanent compaction (subsidence) that cannot be renewed. 97.5% of the water on the Earth is salt water, and 3% is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps.[4] The remaining unfrozen freshwater is found mainly as groundwater, with only a small fraction (0.008%) present above ground or in the air.[5]

Water pollution is one of the main concerns regarding water resources. It is estimated that 22% of worldwide water is used in industry.[6] Major industrial users include hydroelectric dams, thermoelectric power plants (which use water for cooling), ore and oil refineries (which use water in chemical processes) and manufacturing plants (which use water as a solvent),it is also used for dumping garbage.

Desalination of seawater is considered a renewable source of water, although reducing its dependence on fossil fuel energy is needed for it to be fully renewable.[

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Hydropower

Global electricity power generation capacity	1,211 GW (2020)[55]
Global electricity power generation capacity annual growth rate	2.7% (2011-2020)[54]
Share of global electricity generation	16% (2018)[57]
Levelized cost per megawatt hour	USD 65.581 (2019)[56]
Primary technology	Dam
Other energy applications	Pumped storage, mechanical power

Since water is about 800 times denser than air, even a slow flowing stream of water, or moderate sea swell, can yield considerable amounts of energy. There are many forms of water energy:

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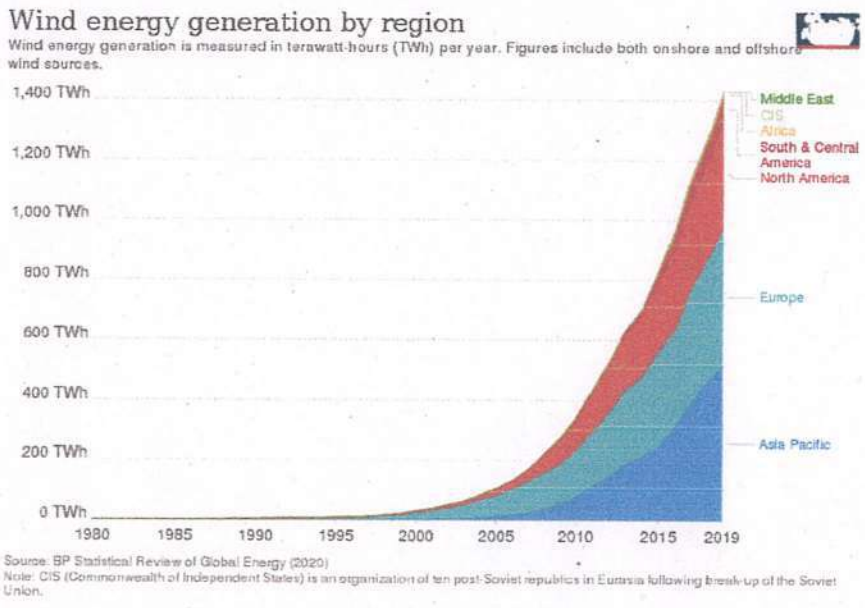
Wind power

Global electricity power generation capacity	733 GW (2020)[67]
Global electricity power generation capacity annual growth rate	14% (2011-2020)[68]
Share of global electricity generation	5% (2018)[67]
Levelized cost per megawatt hour	Land-based wind: USD 30.165 (2019)[69]
Primary technology	Wind turbine
Other energy applications	Windmill, windpump

Air flow can be used to run wind turbines. Modern utility-scale wind turbines range from around 600 kW to 9 MW of rated power. The power available from the wind is a function of the cube of the wind speed, so as wind speed increases, power output increases up to the maximum output for the particular turbine.[70] Areas where winds are stronger and more constant, such as offshore and high-altitude sites, are preferred locations for wind farms. Typically, full load hours of wind turbines vary between 16 and 57 percent annually but might be higher in particularly favorable offshore sites.[71]

Wind-generated electricity met nearly 4% of global electricity demand in 2015, with nearly 63 GW of new wind power capacity installed. Wind energy was the leading source of new capacity in Europe, the US and Canada, and the second largest in China. In Denmark, wind energy met more than 40% of its electricity demand while Ireland, Portugal and Spain each met nearly 20%.[citation needed]



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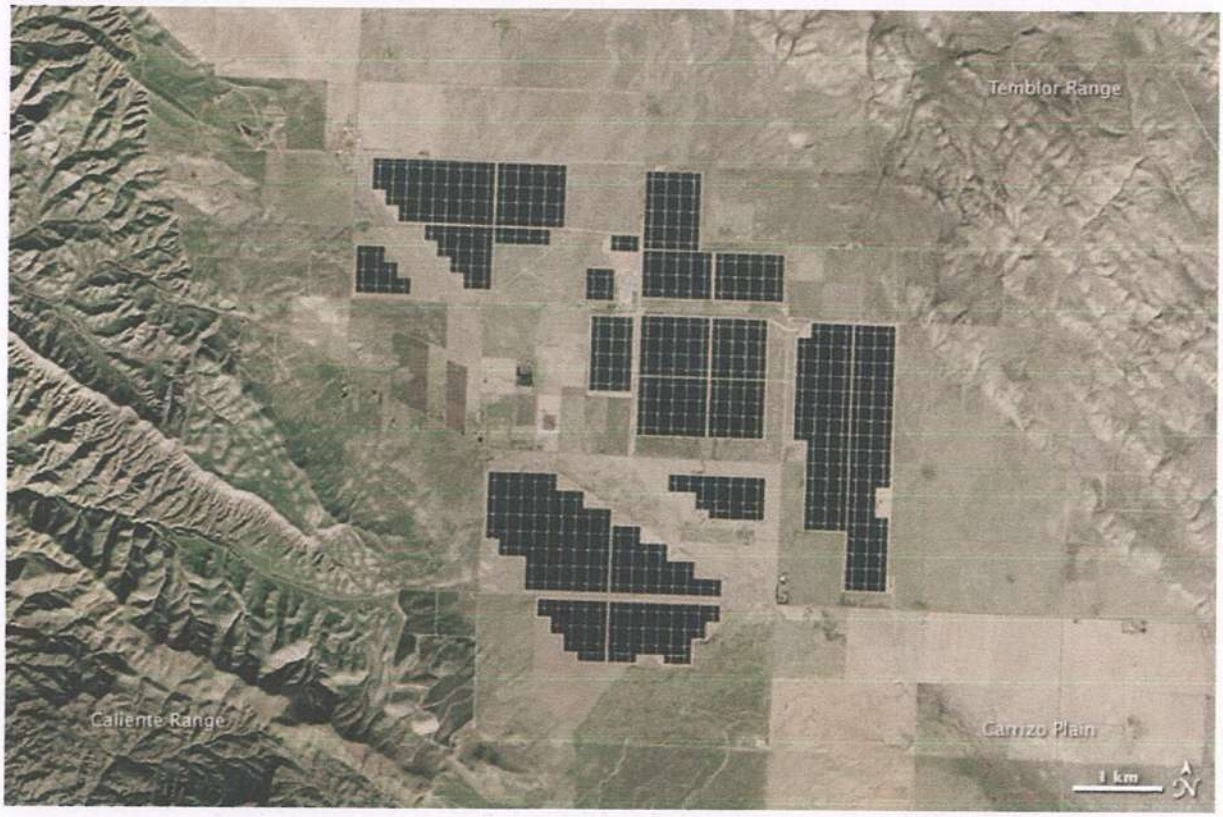
Solar energy

Global electricity power generation capacity	714 GW (2020)[74]
Global electricity power generation capacity annual growth rate	29% (2011-2020)[75]
Share of global electricity generation	2% (2018)[57]
Levelized cost per megawatt hour	Utility-scale photovoltaics: USD 38.343 (2019)[76]
Primary technologies	Photovoltaics, concentrated solar power, solar thermal collector
Other energy applications	Water heating; heating, ventilation, and air conditioning (HVAC); cooking; process heat; water treatment

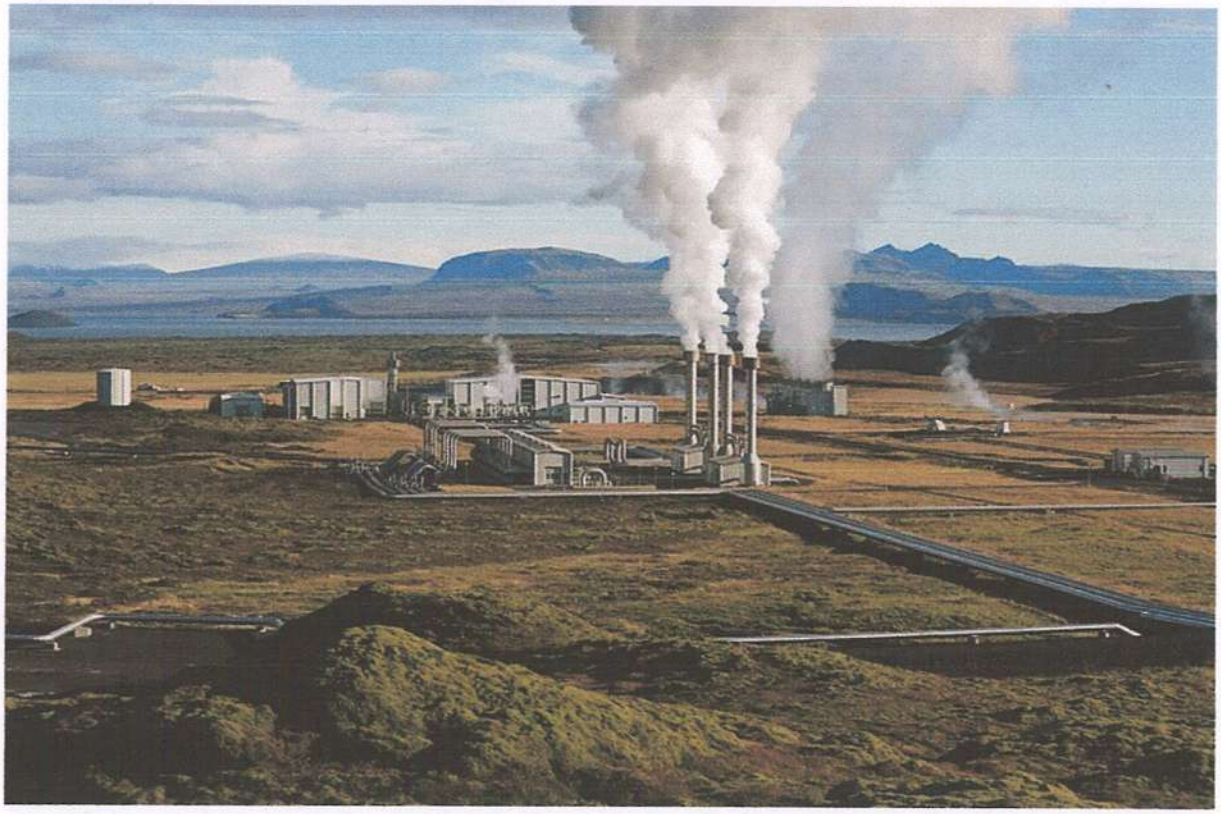
Solar energy, radiant light and heat from the sun, is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, concentrated solar power (CSP), concentrator photovoltaics (CPV), solar architecture and artificial photosynthesis.[77][78] Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert, and distribute solar energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. Active solar technologies encompass solar thermal energy, using solar collectors for heating, and solar power,



Geothermal energy

Global electricity power generation capacity	14 GW (2020)[102]
Global electricity power generation capacity annual growth rate	3.7% (2011-2020)[103]
Share of global electricity generation	<1% (2018)[57]
Levelized cost per megawatt hour	USD 58.257 (2019)[104]
Primary technologies	Dry steam, flash steam, and binary cycle power stations
Other energy applications	Heating

High temperature geothermal energy is from thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter. Earth's geothermal energy originates from the original formation of the planet and from radioactive decay of minerals (in currently uncertain[105] but possibly roughly equal[106] proportions). The geothermal gradient, which is the difference in temperature between the core of the planet and its surface, drives a continuous conduction of thermal energy in the form of heat from the core to the surface. The adjective *geothermal* originates from the Greek roots *geo*, meaning earth, and *thermos*, meaning heat.



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SIGNIFICANCE OF RENEWABLE ENERGY SOURCES IN SUSTAINABLE DEVELOPMENT

sustainable development, renewable energy sources ABSTRACT. Sustainable energy development implies an effective use of economic, human, technological, renewable and non-renewable natural resources. The gradual process of natural environment degradation and the inevitable exhaustion of natural fossil fuel deposits force the search for alternatives. A comparison of alternative opportunities to generate energy allows to identify their advantages and drawbacks. The article attempts a systematic review of factors 'in favour of' and 'against' the use of renewable energy sources (RES) in accordance with the principle of sustainable development. The study applies descriptive methods, including comparisons. CSO and ERO were the sources of data for 1988- 2018. According to sustainable development principles, investments in RE need to be widely promoted and supported by the state, especially in rural areas. The attempt to systematise factors contributing to the use of renewable energy resulted in the identification of: the importance of economic circumstances and the traditional approach to the energy sector; the need to protect the natural environment by the reduction of pollution and mitigation of the greenhouse effect; the need for continuing the education of society on the implementation and fast development of technology and the desire to enhance self-reliance and independence in energy supply with a special consideration of rural areas.

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B.Sc.
Geology
Project Work

Project Report

on

"Ground Water Resources and its Role in Economical Developement of Contry."

Submitted by

Miss Mahima P. Dhore — Mr.Vaibhav B. Dhore

Miss. Achal D. Donadkar — Miss. Purva B. Mane

Miss. Dimpal G. Donadkar — Mr. Pratik N. Mate

B.Sc. Final Year (Semester VI)

Submitted to

Department of Geology
M.G. College Armori
Gondwana University, Gadchiroli

Guided by

Prof. Dr. C.P. Dorlikar
Professor and Head
P.G. Department of Geology

P.G. DEPARTMENT OF GEOLOGY M.G. COLLEGE ARMORI
GONDWANA UNIVERSITY, GADCHIROLI

Year 2020-2021

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This is Certified that 1) Miss Mahima P. Dhore , 2) Mr.Vaibhav B. Dhore 3)Miss. Achal D. Donadkar, 4) Miss. Purva B. Mane , 5) Miss. Dimpal G. Donadkar , 6) Mr. Pratik N. Mate has carried out project work on "**Ground Water Resources and its Role in Economical Developement of Contry**"

Under the concern faculty supervision for the partial fulfilment of the Post Graduation of B.Sc. She/ He has carried out project work in the field and laboratories of the department of Geology. Mahatma Gandhi College Armori and Gondwana University Gadchiroli.

She/He fulfiled all the necessary requirements of the regultion related to the nature the prescribed period of work as per rules required under the ordinance related to the post Graduation department of Geology of the M.G. College Armori Gondwana University Gadchiroli

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External Examiner

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ACKNOWLEDGEMENT

I must express my science and whole hearted thanks to M.G.College Armori, Gondwana University for giving this opportunity to submit the project.

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One again I pledge my sincere gratitude to all other who helped me directly and indirectly for the accomplishment of my goal.

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Place : Armori

1) Mahima P. Dhore

2) Vaibhav B. Dhore

3) Achal D. Donadkar

4) Purva B. Mane

5) Pratik N. Mate

6) Dimpal G. Donadkar

B.sc Final Year Sem VI

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Ground water resources and its role in economical development of country

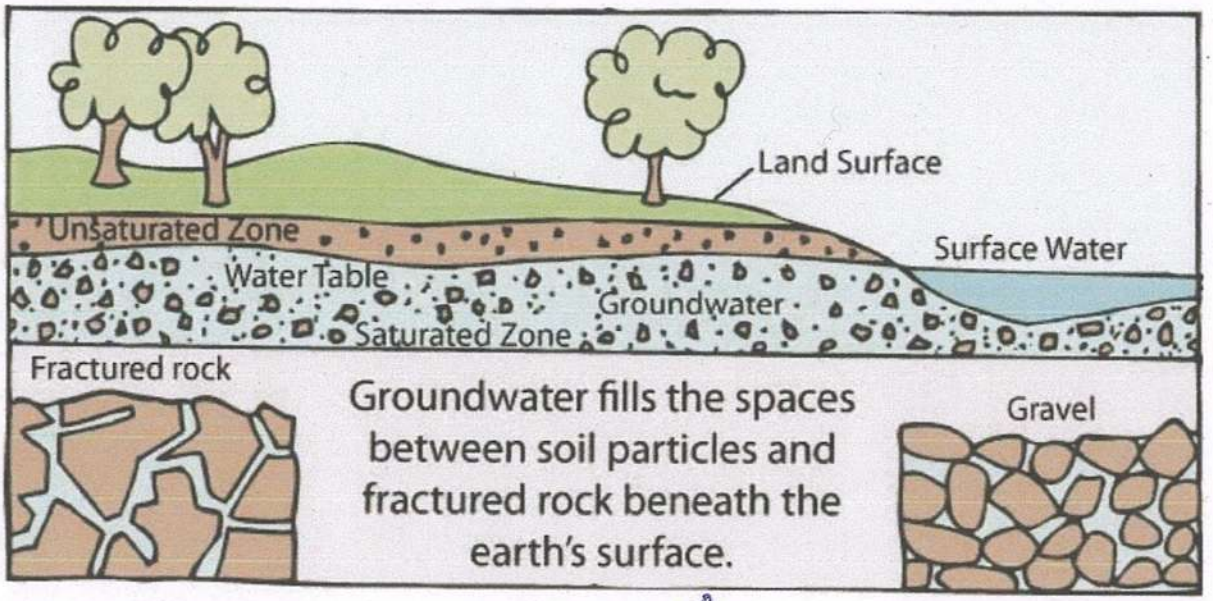
Groundwater is the largest source of freshwater for mankind. ... **Groundwater is often hidden deep in aquifers, permeable rocks and sediments and is extracted using pumping wells. Often, aquifers can be renewable water resources, slowly replenished by rainfall infiltration over hundreds up to many thousands of years.**

HISTORY

Organizational history of the Department of Water Resources, River Development and Ganga Rejuvenation

1. The history of the subject 'Irrigation & Power' dates back to 1855 when it was made the responsibility of the then newly created Department of the Public Works. However, not much importance was given to irrigation work till the famine of 1858, when it was decided to take up canal construction work on an extensive scale and accordingly, an Inspector General of Canals was appointed. In 1863, taking into consideration the importance attached to development of irrigation facilities in the country, it was decided to place this subject under the charge of an irrigation expert, with the designation of Inspector General of Irrigation. He functioned under the administrative control of Secretary, Public Works Department.

2. Under the Government of India Act 1919, irrigation became a Provincial subject and the Government of India's responsibility was confined to advice, co-ordination and settlement of disputes over the rights on the water of Inter-Provincial Rivers. On the recommendations of the In-charge Committee, Public Works Department was merged with the Department of Industry in 1923 and a combined department known as 'Department of Industries and Labour' looked after the subject of 'Irrigation and Power'. A Central Board of Irrigation was also constituted in 1927. In 1937, the Department of Industry and Labour was bifurcated into the Department of Communication and Department of Labour. The latter was assigned the work relating to Irrigation and Power. Thereafter, on the recommendation of the Secretariat Reorganization Committee, Department of Works, Mines and Power, was created which looked after the subject of 'Irrigation and Power'. In 1951, a new Ministry of National Resources and Scientific Research was set up and it took over the subject of 'Irrigation and Power' from the Ministry of Works, Mines .



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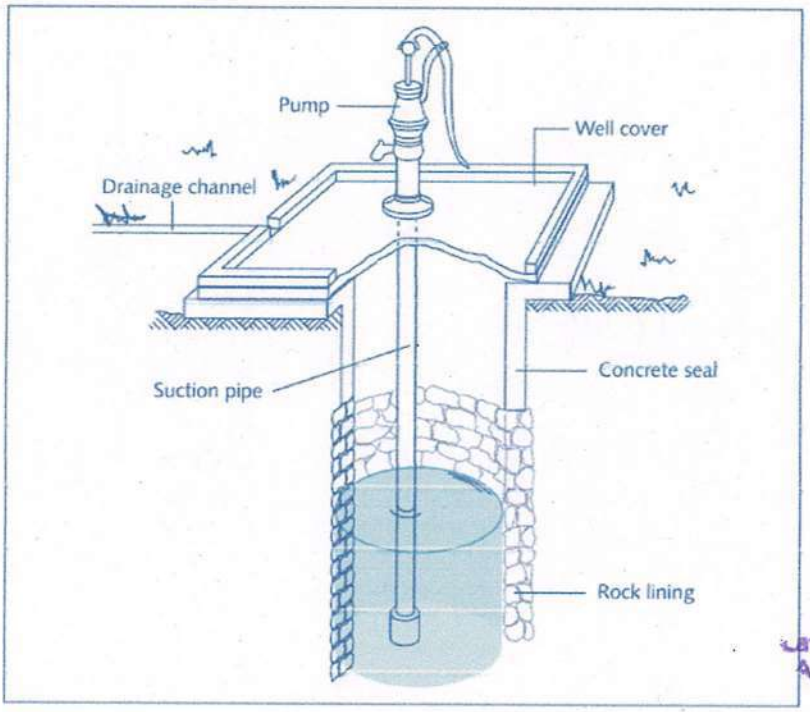
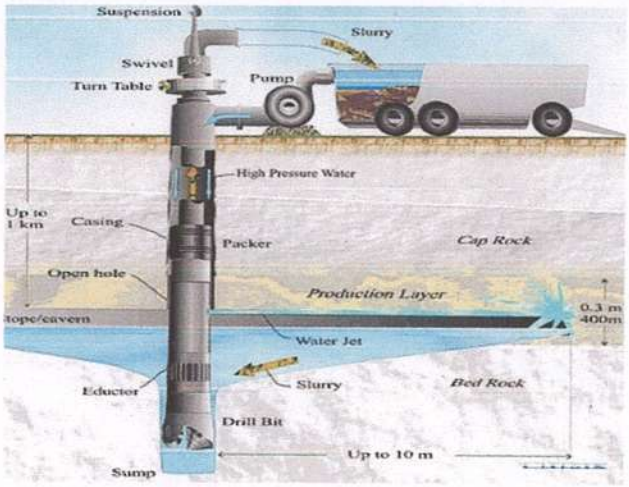
Types of ground water resources

- **Springs** - Are natural flows of groundwater from the underlying rock or unconsolidated sediment. Springs are dependent on the characteristics of the rocks, and their nature and yields are hugely variable. They often occur in specific hydrogeological environments. Because they are open at their source, springs are vulnerable to contamination. No equipment is needed to make a spring, but springs can be improved and made less vulnerable to contamination and drought by various developments, such as constructing a collection tank to store spring water, and installing a protective cover over the spring head.

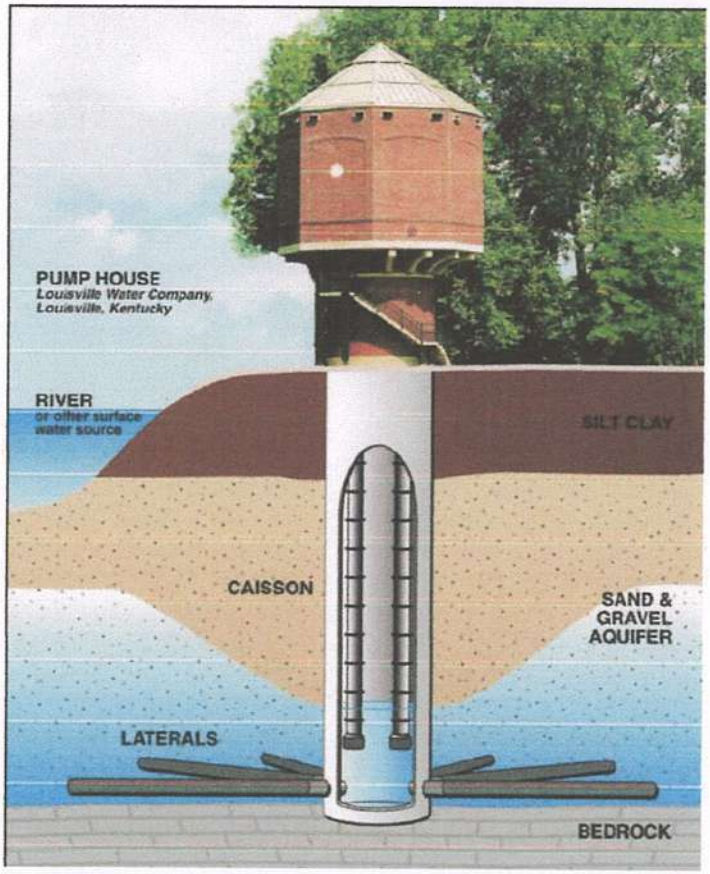
- **Hand-dug wells** - They have been dug to access groundwater for thousands of years. They can only be dug in soft material, such as unconsolidated sediment like sand and gravel, weathered basement, or limestone. They are only appropriate where the groundwater level (water table) is shallow. They are usually less than 20 m deep and 1–2 m in diameter, but can be wider and much deeper. Little or no specialised equipment is needed to construct a well – just something to dig with, and a way of removing the spoil. Wells often need to be lined to keep them open, using materials like brick, stones, concrete rings or even lorry tyres. Open wells are vulnerable to contamination from the surface, and can be improved by installing a concrete apron around the top. Wells have large storage, which helps make them less vulnerable to drought, but because they typically tap only shallow groundwater, they can dry up in dry seasons or longer droughts.



- **Boreholes -** Are narrow diameter tubes drilled into the ground, usually vertically. Boreholes are also called tube wells or simply wells. They can be drilled more quickly and go deeper than hand-dug wells, and so can tap deeper, often more sustainable groundwater; they can be drilled though hard rocks and they can be more easily protected from contamination. There are many different techniques for drilling boreholes, some of which are more suited to certain hydrogeological environments. Usually, a motorised drilling rig is used, operated by specialist drillers. There are also manual drilling techniques.



- **Collector wells - Which are vertical boreholes or wells modified by drilling horizontally out radially below the water table to increase the collection area for groundwater into the central well, from where water is abstracted. They are often constructed in alluvium, next to ephemerally dry ('sand') rivers, with the horizontal radials drilled into the river bed deposits; or in weathered basement.**



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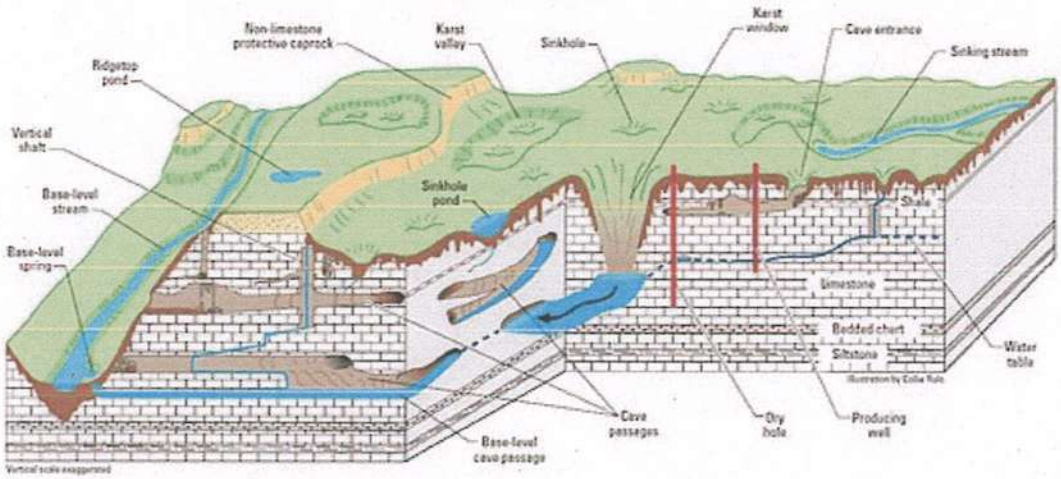
- **Infiltration gallery -** Which is a horizontal trench or drain dug below the water table to abstract shallow groundwater, usually from unconsolidated alluvium, including sand rivers, or windblown deposits. The trench drains into a sump from where water is abstracted. The gallery may have to be lined to keep it open.

- **Qanats -** Which are an ancient method of tapping and transporting groundwater in many parts of North African and the Middle East. A qanat comprises a mother well, often in alluvial deposits at the edge of a mountain range, and a gently inclined covered, underground channel which allows groundwater to flow downhill to a village.

Karst Topography

Karst is a topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes and caves. It has also been documented for more weathering-resistant rocks, such as quartzite, given the right conditions.[1] Subterranean drainage may limit surface water, with few to no rivers or lakes. However, in regions where the dissolved bedrock is covered (perhaps by debris) or confined by one or more superimposed non-soluble rock strata, distinctive karst features may occur only at subsurface levels and can be totally missing above ground

The study of *paleokarst* (buried karst in the stratigraphic column) is important in petroleum geology because as much as 50% of the world's hydrocarbon reserves are hosted in carbonate rock, and much of this is found in porous karst systems



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B.Sc.
Geology
Project Work

Project Report

On

"Current Scenaria & Future Prospect of Solar Power, Hydrogen Power & Fuel Cells."

Miss. Sandhya A. Meshram **Miss.Pratiksha B. Meshram**

Miss.Indrayani V. Nakade

Mr. Jayesh T. Nandanwar **Mr.Gourav D. Nandeshwar**

Mr.Ritesh M. Munjamkar

B.Sc Final Year (Semester VI)

Submitted to

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Guided By

Prof. Dr. C.P. Dorlikar

Professor and Head

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P.G. DEPARTMENT OF GEOLOGY M.G. COLLEGE ARMORI

GONDWANA UNIVERSITY, GADCHIROLI

YEAR 2021-2022

CERTIFICATE

This is to certified that Miss 1) Sandhya A. Meshram 2) Pratiksha B. Meshram 3) Indrayani V. Nakade 4) Jayesh T. Nandanwar 5) Gourav D. Nandeshwar & Ritesh M. Munjamkar has carried out project work on

" Current Scenaria & Future Prospet of Solar Power, Hydrogen Power & Fule Cells"

Under the concern faculty supervision for the partial fulfillment of the Post Graduation in B.Sc. She has carried out Project Work in the Field and laboratories of the department of Geology. Mahatma Gandhi College Armori & Gondwana University Gadchiroli.

She is fulfilled all the necessary requirements of the regulation related to the nature the prescribed period of work as per rules required under the ordinance related to the Post Graduation, Department of Geology of the M.G. College Armori, Gondwana University Gadchiroli.

Internal Examiner **External Examiner**

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ACKNOWLEDGEMENT

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Date :-

Place :-

Sandhya A. Meshram Meshram

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Jayesh T. Nandanwar Nandanwar

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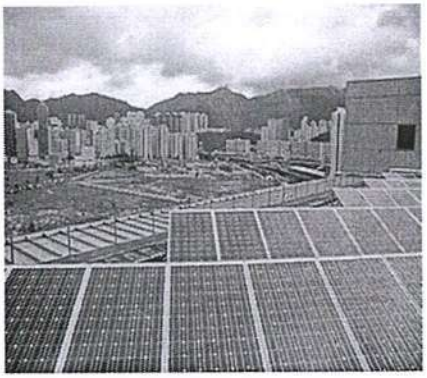
Ritesh M. Munjamkar Ritesh

B.Sc Final Year

Sem (VI)

Solar power



Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and solar tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect.[1]

Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system. Commercial concentrated solar power plants were first developed in the 1980s. As the cost of solar electricity has fallen, the number of grid-connected solar PV systems has grown into the millions and gigawatt-scale photovoltaic power stations are being built. Solar PV is rapidly becoming an inexpensive, low-carbon technology to harness renewable energy from the Sun. The current largest photovoltaic power station in the world is the Pavagada Solar Park, Karnataka, India with a generation capacity of 2050 MW.[2]

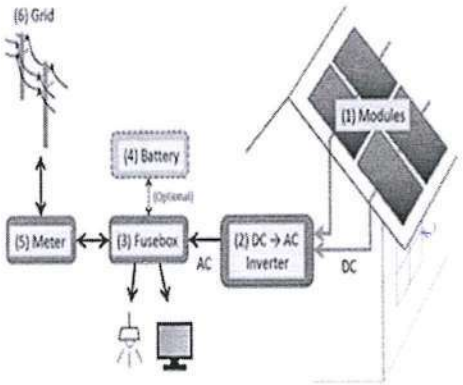
The International Energy Agency projected in 2014 that under its "high renewables" scenario, by 2050, solar photovoltaics and concentrated solar power would contribute about 16 and 11 percent, respectively, of worldwide electricity consumption, and solar would be the world's largest source of electricity. Most solar installations would be in China and India.[3] In 2019, solar power generated 2.7% of the world's electricity, growing over 24% from the previous year.[4] As of October 2020, the unsubsidised levelised cost of electricity for utility-scale solar power is around $36/MWh.

Mainstream technologies

Many industrialized nations have installed significant solar power capacity into their grids to supplement or provide an alternative to conventional energy sources while an increasing number of less developed nations have turned to solar to reduce dependence on expensive imported fuels *(see solar power by country)*. Long distance transmission allows remote renewable energy resources to displace fossil fuel consumption. Solar power plants use one of two technologies:

- Photovoltaic (PV) systems use solar panels, either on rooftops or in ground-mounted solar farms, converting sunlight directly into electric power.
- Concentrated solar power (CSP, also known as "concentrated solar thermal") plants use solar thermal energy to make steam, which is thereafter converted into electricity by a turbine.

Photovoltaic cells



Schematics of a grid-connected residential PV power system

A solar cell, or photovoltaic cell (PV), is a device that converts light into electric current using the photovoltaic effect. The first solar cell was constructed by Charles Fritts in the 1880s.[7] The German industrialist Ernst Werner von Siemens was among those who recognized the importance of this discovery.[8] In 1931, the German engineer Bruno Lange developed a photo cell using silver selenide in place of copper oxide,[9] although the prototype selenium cells converted less than 1% of incident light into electricity. Following the work of Russell Ohl in the 1940s, researchers Gerald Pearson, Calvin Fuller and Daryl Chapin created the silicon solar cell in 1954.[10] These early solar cells cost US$286/watt and reached efficiencies of 4.5–6%.[11] In 1957, Mohamed M. Atalla developed the process of silicon surface passivation by thermal oxidation at Bell Labs.[12][13] The surface passivation process has since been critical to solar cell efficiency.[14]

The array of a photovoltaic power system, or PV system, produces direct current (DC) power which fluctuates with the sunlight's intensity. For practical use this usually requires conversion to certain desired voltages or alternating current (AC), through the use of inverters.[6] Multiple solar cells are connected inside modules. Modules are wired together to form arrays, then tied to an inverter, which produces power at the desired voltage, and for AC, the desired frequency/phase.[6]

Many residential PV systems are connected to the grid wherever available, especially in developed countries with large markets.[15] In these grid-connected PV systems, use of energy storage is optional. In certain applications such as satellites, lighthouses, or in developing countries, batteries or additional power generators are often added as back-ups. Such stand-alone power systems permit operations at night and at other times of limited sunlight.

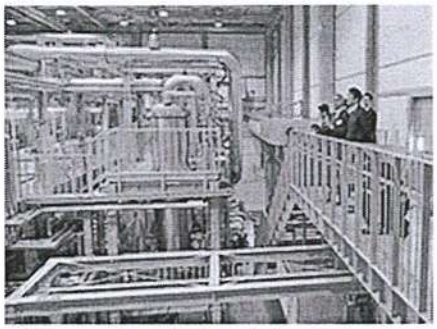
Hydrogen fuel

Hydrogen fuel is a zero carbon fuel burned with oxygen. It can be used in fuel cells or internal combustion engines (see HICEV). Regarding hydrogen vehicles, hydrogen has begun to be used in commercial fuel cell vehicles, such as passenger cars, and has been used in fuel cell buses for many years. It is also used as a fuel for spacecraft propulsion.

In the early 2020s, most hydrogen is produced by steam methane reforming of fossil gas. Only a small quantity is made by alternative routes such as biomass gasification or electrolysis of water[1][2] or solar thermochemistry,[3] a solar fuel with no carbon emissions.

Hydrogen is found in the first group and first period in the periodic table, i.e. it is the lightest and first element of all. Since the weight of hydrogen is less than air, it rises in the atmosphere and is therefore rarely found in its pure form, H_2.[4] In a flame of pure hydrogen gas, burning in air, the hydrogen (H_2) reacts with oxygen (O_2) to form water (H_2O) and releases energy.

$2H_2\,(g) + O_2\,(g) \rightarrow 2H_2O\,(g) + \text{energy}$



If carried out in atmospheric air instead of pure oxygen, as is usually the case, hydrogen combustion may yield small amounts of nitrogen oxides, along with the water vapor.

The energy released enables hydrogen to act as a fuel. In an electrochemical cell, that energy can be used with relatively high efficiency. If it is used simply for heat, the usual thermodynamics limits on the thermal efficiency apply.

Hydrogen is usually considered an energy carrier, like electricity, as it must be produced from a primary energy source such as solar energy, biomass, electricity (e.g. in the form of solar PV or via wind turbines), or hydrocarbons such as natural gas or coal.[5] Conventional hydrogen production using natural gas induces significant environmental impacts; as with the use of any hydrocarbon, carbon dioxide is emitted.[6] At the same time, the addition of 20% of hydrogen (an optimal share that does not affect gas pipes and appliances) to natural gas can reduce CO 2 emissions caused by heating and cooking.[7]

Production

Because pure hydrogen does not occur naturally on Earth in large quantities, it usually requires a primary energy input to produce on an industrial scale.[8] Hydrogen fuel can be produced from methane or by electrolysis of water.[9] As of 2020, the majority of hydrogen (~95%) is produced from fossil fuels by steam reforming or partial oxidation of methane and coal gasification with only a small quantity by other routes such as biomass gasification or electrolysis of water.[1][2][10]

Steam-methane reforming, the current leading technology for producing hydrogen in large quantities,[11] extracts hydrogen from methane. However, this reaction releases fossil carbon dioxide and carbon monoxide into the atmosphere which are greenhouse gases exogenous to the natural carbon cycle, and thus contribute to climate change.[4] In electrolysis, electricity is run through water to separate the hydrogen and oxygen atoms. This method can use wind, solar, geothermal, hydro, fossil fuels, biomass, nuclear, and many other energy sources.[5] Obtaining hydrogen from this process is being studied as a viable way to produce it domestically at a low cost.

The world's largest facility for producing hydrogen fuel is claimed[12] to be the Fukushima Hydrogen Energy Research Field (FH2R), a 10MW-class hydrogen production unit, inaugurated on 7 March 2020, in Namie, Fukushima Prefecture.[13] The site occupies 180,000 square meters of land, much of which is occupied by a solar array; but power from the grid is also used to conduct electrolysis of water to produce hydrogen fuel.[12]

Production is usually classed in terms of colour; 'grey hydrogen' is produced as a by-product of an industrial process, 'blue hydrogen' is produced through a production process where CO 2 is also produced then subsequently captured via CCS, and finally 'green hydrogen' is produced entirely from renewable sources.

Energy

Hydrogen is locked up in enormous quantities in water, hydrocarbons, and other organic matter. One of the challenges of using hydrogen as a fuel comes from being able to extract hydrogen efficiently from these compounds. Now, steam reforming, which combines high-temperature steam with natural gas, accounts for the majority of the hydrogen produced.[14] This method of hydrogen production occurs at temperatures between 700-1100 °C, and has a resultant efficiency of between 60-75%.[15] Hydrogen can also be produced from water through electrolysis, which is less carbon intensive if the electricity used to drive the reaction does not come from fossil-fuel power plants but rather renewable or nuclear energy instead. The efficiency of water electrolysis is between about 70-80%,[16][17] with a goal set to reach 82-86% efficiency by 2030 using proton exchange membrane (PEM) electrolyzers.[18] Once produced, hydrogen can be used in much the same way as natural gas - it can be delivered to fuel cells to generate electricity and heat, used in a combined cycle gas turbine to produce larger quantities of centrally produced electricity or burned to run a combustion engine; all methods producing no carbon or methane emissions.[19] In each case hydrogen is combined with oxygen to form water. This is also one of its most important advantages as hydrogen fuel is environmentally friendly. The heat in a hydrogen flame is a radiant emission from the newly formed water molecules. The water molecules are in an excited state on initial formation and then transition to a ground state; the transition releasing thermal radiation. When burning in air, the temperature is roughly 2000 °C (the same as natural gas). Historically, carbon has been the most practical carrier of energy, as hydrogen and carbon combined are more volumetrically dense, although hydrogen itself has three times the energy density per mass as methane or gasoline. Although hydrogen is the smallest element and thus has a slightly higher propensity to leak from venerable natural gas pipes such as those made from iron, leakage from plastic (polyethylene PE100) pipes is expected to be very low at about 0.001%.[20][21]

The reason steam methane reforming has traditionally been favoured over electrolysis is because whereas methane reforming directly uses natural gas, electrolysis requires electricity. As the cost of producing electricity (via wind turbines and solar PV) falls below the cost of natural gas, electrolysis becomes cheaper than SMR.[22]

Uses

Hydrogen fuel can provide motive power for liquid-propellant rockets, cars, trucks, trains, boats and airplanes, portable fuel cell applications or stationary fuel cell applications, which can power an electric motor.[23] The problems of using hydrogen fuel in cars arise from the fact that hydrogen is difficult to store in either a high pressure tank or a cryogenic tank.[24] Alternative storage media such as within complex metal hydrides are in development. In general batteries are more suitable for vehicles the size of cars or smaller, but hydrogen may be better for larger vehicles such as heavy lorries.[25]

Hydrogen fuel can also be used to power stationary power generation plants, or provide an alternative to natural gas for heating applications.

Fuel cell

A **fuel cell** is an electrochemical cell that converts the chemical energy of a fuel (often hydrogen) and an oxidizing agent (often oxygen[1]) into electricity through a pair of redox reactions.[2] Fuel cells are different from most batteries in requiring a continuous source of fuel and oxygen (usually from air) to sustain the chemical reaction, whereas in a battery the chemical energy usually comes from metals and their ions or oxides[3] that are commonly already present in the battery, except in flow batteries. Fuel cells can produce electricity continuously for as long as fuel and oxygen are supplied.

The first fuel cells were invented by Sir William Grove in 1838. The first commercial use of fuel cells came more than a century later following the invention of the hydrogen–oxygen fuel cell by Francis Thomas Bacon in 1932. The alkaline fuel cell, also known as the Bacon fuel cell after its inventor, has been used in NASA space programs since the mid-1960s to generate power for satellites and space capsules. Since then, fuel cells have been used in many other applications. Fuel cells are used for primary and backup power for commercial, industrial and residential buildings and in remote or inaccessible areas. They are also used to power fuel cell vehicles, including forklifts, automobiles, buses, boats, motorcycles and submarines.

There are many types of fuel cells, but they all consist of an anode, a cathode, and an electrolyte that allows ions, often positively charged hydrogen ions (protons), to move between the two sides of the fuel cell. At the anode a catalyst causes the fuel to undergo oxidation reactions that generate ions (often positively charged hydrogen ions) and electrons. The ions move from the anode to the cathode through the electrolyte. At the same time, electrons flow from the anode to the cathode through an external circuit, producing direct current electricity. At the cathode, another catalyst causes ions, electrons, and oxygen to react, forming water and possibly other products. Fuel cells are classified by the type of electrolyte they use and by the difference in startup time ranging from 1 second for proton-exchange membrane fuel cells (PEM fuel cells, or PEMFC) to 10 minutes for solid oxide fuel cells (SOFC). A related technology is flow batteries, in which the fuel can be regenerated by recharging. Individual fuel cells produce relatively small electrical potentials, about 0.7 volts, so cells are "stacked", or placed in series, to create sufficient voltage to meet an application's requirements.[4] In addition to electricity, fuel cells produce water, heat and, depending on the fuel source, very small amounts of nitrogen dioxide and other emissions. The energy efficiency of a fuel cell is generally between 40 and 60%; however, if waste heat is captured in a cogeneration scheme, efficiencies of up to 85% can be obtained.[5]

History

The first references to hydrogen fuel cells appeared in 1838. In a letter dated October 1838 but published in the December 1838 edition of *The London and Edinburgh Philosophical Magazine and Journal of Science*, Welsh physicist and barrister Sir William Grove wrote about the development of his first crude fuel cells. He used a combination of sheet iron, copper and porcelain plates, and a solution of sulphate of copper and dilute acid.[6][7] In a letter to the same publication written in December 1838 but published in June 1839, German physicist Christian Friedrich Schönbein discussed the first crude fuel cell that he had invented. His letter discussed current generated from hydrogen and oxygen dissolved in water.[8] Grove later sketched his design, in 1842, in the same journal. The fuel cell he made used similar materials to today's phosphoric acid fuel cell.

In 1932, English engineer Francis Thomas Bacon successfully developed a 5 kW stationary fuel cell.[11] The alkaline fuel cell (AFC), also known as the Bacon fuel cell after its inventor, is one of the most developed fuel cell technologies, which NASA has used since the mid-1960s.[11][12]

In 1955, W. Thomas Grubb, a chemist working for the General Electric Company (GE), further modified the original fuel cell design by using a sulphonated polystyrene ion-exchange membrane as the electrolyte. Three years later another GE chemist, Leonard Niedrach, devised a

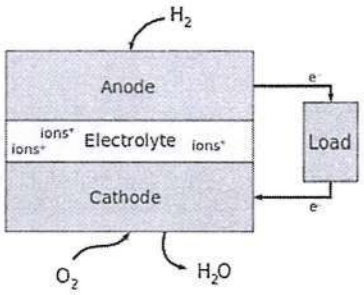
way of depositing platinum onto the membrane, which served as catalyst for the necessary hydrogen oxidation and oxygen reduction reactions. This became known as the "Grubb-Niedrach fuel cell".[13][14] GE went on to develop this technology with NASA and McDonnell Aircraft, leading to its use during Project Gemini. This was the first commercial use of a fuel cell. In 1959, a team led by Harry Ihrig built a 15 kW fuel cell tractor for Allis-Chalmers, which was demonstrated across the U.S. at state fairs. This system used potassium hydroxide as the electrolyte and compressed hydrogen and oxygen as the reactants. Later in 1959, Bacon and his colleagues demonstrated a practical five-kilowatt unit capable of powering a welding machine. In the 1960s, Pratt & Whitney licensed Bacon's U.S. patents for use in the U.S. space program to supply electricity and drinking water (hydrogen and oxygen being readily available from the spacecraft tanks). In 1991, the first hydrogen fuel cell automobile was developed by Roger Billings.[15][16]

UTC Power was the first company to manufacture and commercialize a large, stationary fuel cell system for use as a co-generation power plant in hospitals, universities and large office buildings.[17]

In recognition of the fuel cell industry and America's role in fuel cell development, the US Senate recognized 8 October 2015 as National Hydrogen and Fuel Cell Day, passing S. RES 217. The date was chosen in recognition of the atomic weight of hydrogen

Types of fuel cells

Fuel cells come in many varieties; however, they all work in the same general manner. They are made up of three adjacent segments: the anode, the electrolyte, and the cathode. Two chemical reactions occur at the interfaces of the three different segments. The net result of the two reactions is that fuel is consumed, water or carbon dioxide is created, and an electric current is created, which can be used to power electrical devices, normally referred to as the load.



At the anode a catalyst oxidizes the fuel, usually hydrogen, turning the fuel into a positively charged ion and a negatively charged electron. The electrolyte is a substance specifically designed so ions can pass through it, but the electrons cannot. The freed electrons travel through a wire creating the electric current. The ions travel through the electrolyte to the cathode. Once reaching the cathode, the ions are reunited with the electrons and the two react with a third chemical, usually oxygen, to create water or carbon dioxide.

Design features in a fuel cell include:

- The electrolyte substance, which usually defines the *type* of fuel cell, and can be made from a number of substances like potassium hydroxide, salt carbonates, and phosphoric acid.[19]
- The fuel that is used. The most common fuel is hydrogen.
- The anode catalyst, usually fine platinum powder, breaks down the fuel into electrons and ions.
- The cathode catalyst, often nickel, converts ions into waste chemicals, with water being the most common type of waste.[20]

- Gas diffusion layers that are designed to resist oxidization.[20]

A typical fuel cell produces a voltage from 0.6 to 0.7 V at full rated load. Voltage decreases as current increases, due to several factors:

-
-
- Activation loss
- Ohmic loss (voltage drop due to resistance of the cell components and interconnections)
- Mass transport loss (depletion of reactants at catalyst sites under high loads, causing rapid loss of voltage).[21]

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B.Sc.
Geology
Project Work

PROJECT REPORT

SESSION YEAR - 2020 - 2021

Topic :- MAJOR TYPES OF SOURCES OF ENERGY

SUBMITTED BY :-

Vaibhav B. Dhandare

Mehul A. Dhakate

Pranali H. Chapale

Payal S. Chilbule

Pratima Y. Dhakate

SUBMITTED TO :-

DEPARTMENT OF GEOLOGY (SEM VI)

M. G. COLLEGE, ARMORI (GONDWANA UNIVERSITY, GADCHIROLI)

GUIDED BY –

Prof- Dr. C. P. Dorlikar

Prof- P. S. Ganvir

Dipartment of Geology

CERTIFICATE

This is to certify that **1) Vaibhav B. Dhandare 2) Mehul A. Dhakate 3) Pranali H. Chapale 4) Payal S. Chilbule 5) Pratima Y. Dhakate** has carried out project work on,

"Major types and sources of energy".

Under the concern faculty supervision for the partial fulfilment of the Graduation in B.Sc. We have carried out project work in the field and laboratories of the department of Geology, Mahatma Gandhi College Armori and Gondwana University Gadchiroli.

We have fulfilled all the necessary requirements of the regulation related to nature the prescribed period of work as per rules required under the ordinance related to the Graduation, Department of Geology of the M.G. College Armori, Gondwana University Gadchiroli.

EXTERNEL EXAMINER

INTERNAL EXAMINER

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ACKNOWLEDGEMENT

We five students of B.sc of 3rd year in **M. G. College, Armori** are preparing a final year project name "**Major types and sources of energy**". We whole heartedly express our sincere gratitude to **Dr. C. P. Dorlikar** and **Prof. Priyadarshan Ganvir**. Who guided us for the completion of the final year project. We are also thankful to all our teachers for explaining on critical aspects of topics related to the project. We are also grateful to the assistances of Lab for permitting us to have some help from them. We would like thank all of the faculty member of all other respective departments for their intimate cooperation throughout the period of project completion.

1. **Vaibhav Bhaiyyaji Dhandare**
2. **Pranali Hiraman Chapale**
3. **Payal Sukhdeo Chilbule**
4. **Mehul Anand Dhakate**
5. **Pratima Yogiraj Dhakate**

CONTENTS

PRINCIPAL
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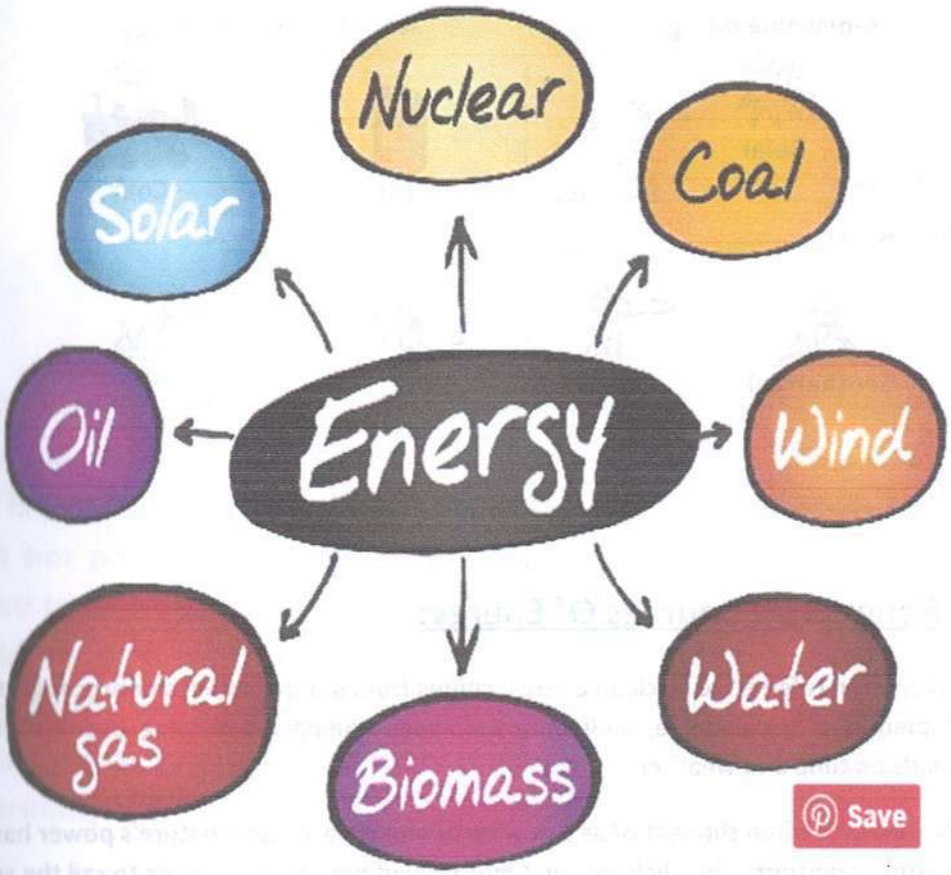
M.G. Art's,Science & late N.P. Commerce College Armori

MAJOR TYPES OF SOURCES OF ENERGY

Energy is simply defined in physics as the ability to do work. Sun is the ultimate source of our energy in our solar system. Energy is the basic need of living things and life cannot exist without energy. Primitive man discovered fire and used it for various reasons and even in today's world energy is the basic need of industrialized world. Plants trap the solar energy for their photosynthesis. In cyclic manner we get the indirect energy from the plants. Like this, other energy sources are developed by human beings for their need.



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1. Wind Energy:

Wind has energy as it moves with high speed and the energy is being harnessed for our needs. Traditional energies used are depleting, hence it is used. Wind power is produced by natural and renewable sources with modern technologies. It does not pollute the environment and a cheap source of energy. The wind mills are used to generate electricity. The huge blades of windmills move with the high speed of the wind to generate required electricity. India is geographically blessed with coastal areas, deserts and hills to utilize this energy. In India, Kerala, Gujarat, Tamil Nadu produce wind energy. Denmark, China, USA and Germany are the main producers of wind energy.

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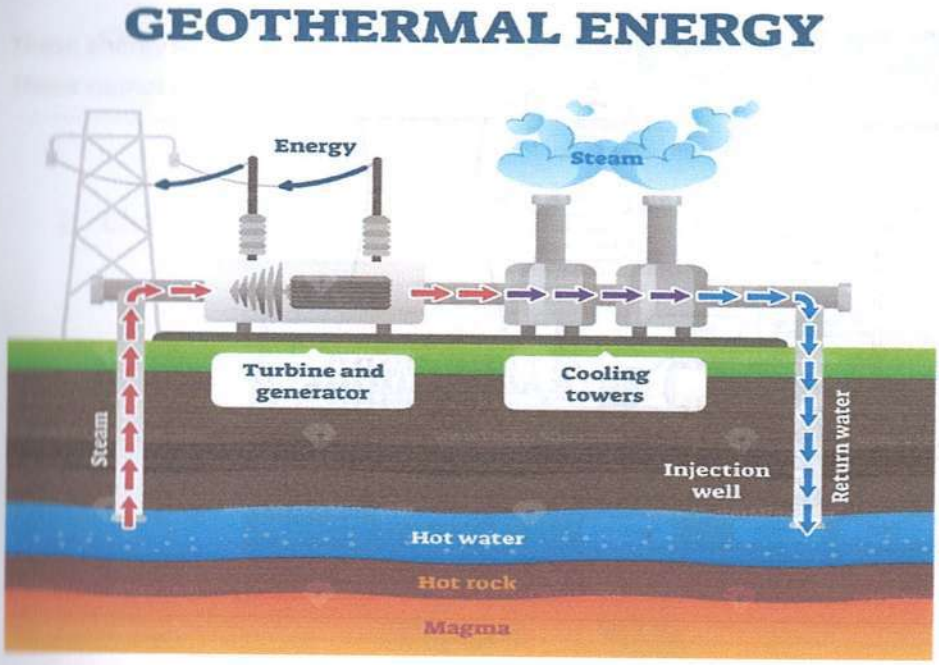
3. Geothermal Energy:



This is the energy produced beneath the Earth surface. Inside the Earth surface the temperature is quite high. This high temperature heats up the underground water and produces stream. This steam is then utilized to run turbines to produce electrical energy. New Zealand, USA and Iceland utilized this source of energy.

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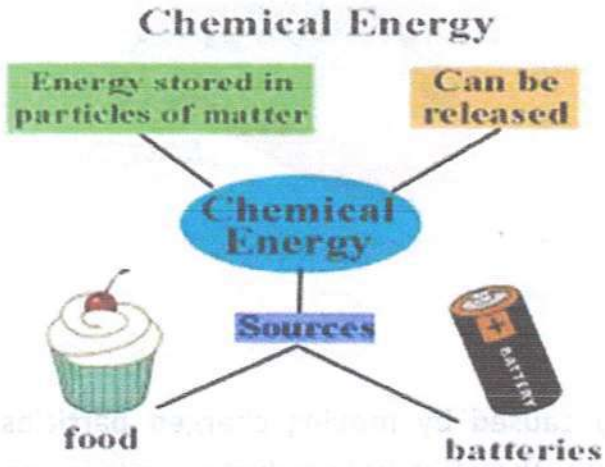
❖ Non-Renewable Sources Of Energy:

These energy sources are formed long ago and are accumulated in nature but are exhausted easily. These cannot be replaced. For example: fossil fuels like coal, natural gas and petroleum.

1. Chemical Energy:



Chemical Energy is the energy released from substances when they undergo a chemical reaction. The sources are batteries, gas, food etc. When these substances go through a chemical transformation, some form of energy is required to break the chemical bonds. This is called Chemical Energy. This is a nonrenewable form of energy, as most substances involved are finite in quantities. Chemical energy is used in explosives, food digestion, Vehicles etc.

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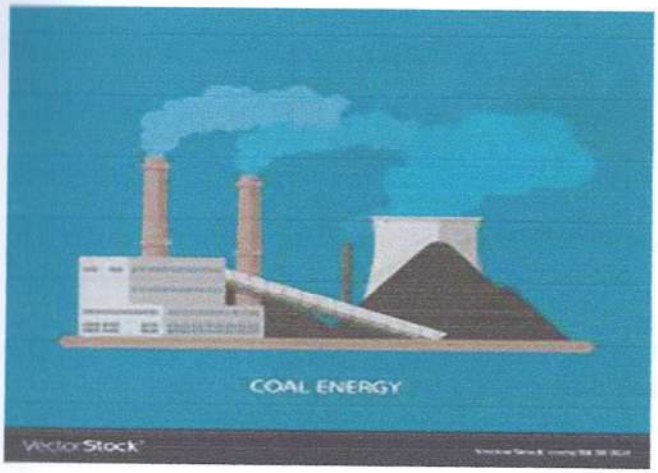
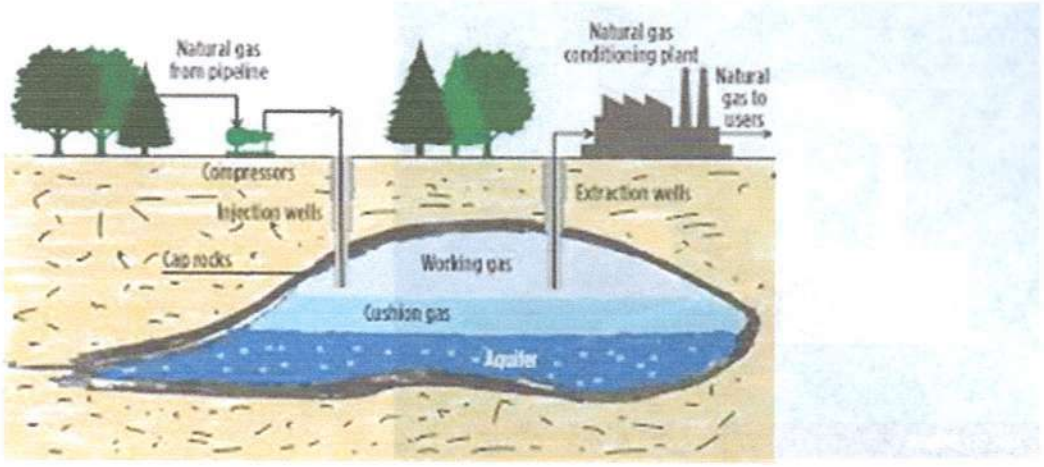
3. Coal:



Coal was formed long ago by degradation of plants under the ground under high pressure and temperature without the presence of air. It is a solid form of brown or brownish black coloured fuel. Coal was widely used conventionally as a energy source. After wood, coal was the main source of energy as a fossil fuel. Coals are of different types according to the carbon content, i.e., anthracite, bituminous and lignite. Coal is used as it can be converted to solid, liquids and gaseous fuel. It is very useful in the production of electricity. Also used as a raw material for drugs, medicines, explosive and fertilizers.

4. Natural Gas:



This gas is produced plentifully in marshy areas. Its main component is methane. This colorless and odourless gas is lighter than air. For this reason before transporting filled in cylinders, it is mixed with a chemical mercaptan to provide strong odour. Natural gas is used for cooking in the form of LPG and also used as a fuel in automobiles. Compressed Natural Gas (CNG) is a clean fuel used in many industries too.

➢ conclusion

The world is quickly moving towards energy sustainability. At the same time, the mankind is trying to re-establish the connection it once had with nature. An energy efficient home is a personal step toward the direction of renewable energy, environmental protection, and sustainable living.

Due to increase in human population and limited source of fossil fuels, renewable energy acts as the alternative for energy requirement. Burning of these fossil fuels causes air pollution and environmental hazards. For these reasons renewable energy sources are opt now a days.

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- https://www.conserve-energy-future.com/different-energy-sources.php

B.Sc. Microbiology Project Work

"Efficacy of Antimicrobial Activity of Aqueous Extract of Garlic and Ginger against Different Bacterial Species"

A Project Submitted To

Gondwana University, Gadchiroli

In Partial Fulfilment of Three Years Full-Time Graduation Degree Program

B.Sc-III (Microbiology)

Submitted By

Sharad S. Bhandekar

(GROUP LEADER)

Under The Guidance of

Prof. Harshala Shende mam

Mahatma Gandhi Arts, Science & Late N. P Commerce College, Armori .

Session 2020-21.

Mahatma Gandhi College , Armori .

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This is certify that they are the Bonafide student of **B.Sc-III (Microbiology)** of this college for the session **2020-2021.** They have completed their dissertation under the guidance of **Prof. Harshala shende** on the project.

"Efficacy of Antimicrobial Activity of Aqueous Extract of Garlic and Ginger against Different Bacterial Species"

This dissertation is being submitted to Gondwana university Gadchiroli for the partial fulfilment of the requirement for the award of degree of Bachelor of Science in Microbiology.

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Introduction :-

Antimicrobial resistance (AMR) is the ability of a microbe to resist the effects of medication previously used to treat them. The increased usage of antibiotics has induced micro-organism to acquire resistance factor which have become a burning predicament.

Resistant microbes are increasingly difficult to treat, requiring alternative medication or higher doses both of which may be more expensive or more toxic. Even in the animal treatment abrupt use of antibiotics is one of the major cause of antimicrobial resistance. The WHO, concluded that inappropriate use of antibiotics in animal husbandry is an underlying contributor to the emergence and spread of antibiotic resistant germs.As a result there is an urgent need to find the alternative of antibacterial drugs for treating the disease especially from plant origin which are easily available and with less side effects.

Many medicinal plants are documented to have antimicrobial activity like ginger and garlic etc. among which Garlic belonging to Alliaceae family. Apart from cooking Garlic also known for its medicinal values. It is most commonly used in Asia also in India. In India it is used in various forms like garlic powder, garlic oil or whole garlic. Property of garlic like anti-tumor, in cardiovascular disorder, in liver damage already documented. It also shows effect on the blood pressure, blood sugar and cholesterol. Apart from its uses in arthritis, cramps, sprain, constipation vomiting, hypertension, fever also have the antimicrobial property. With these information present work is aimed to evaluate the antimicrobial efficacy of aqueous extracts of Garlic & Ginger against E. Coli and Staphylococcus aureus.

CONCLUSION

"EFFICACY OF ANTIMICROBIAL ACTIVITY OF AQUEOUS EXTRACT OF GARLIC AND GINGER AGAINST DIFFERENT BACTERIAL SPECIES"

MAHATMA GANDHI ARTS , SCIENCE AND N.P COMMERCE COLLEGE , ARMORI .

SESSION 2020-21

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6 . Conclusion :-

The result of this present study have proven that the all solutions extraction of have great potential as antibacterial agents in the treatment of infectious organism further, detailed investigation of the active compound of the Ginger and Garlic for the exact mechanism of action will contribute greatly to the development new pharmaceuticals

.

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B.Sc. Microbiology Project Work

DISSERTATION

"Isolation and Identification of Pathogenic Bacteria From College Premises."

A Project Submitted To
Gondwana University, Gadchiroli
In Partial Fulfillment of Three Years Full-Time Graduation Degree Program
B.Sc. III (MICROBIOLOGY)

SUBMITTED BY
Ms. Reshma R. Vakkayil
(Group leader)
UNDER THE GUIDANCE OF
Prof. Ms. Harshala Shende

Mahatma Gandhi Arts, Science & Late N.P. Commerce College, Armori

SESSION 2020-2021

MAHATMA GANDHI COLLEGE
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UNDER GRADUATE DEPARTMENT OF MICROBIOLOGY

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This is to certify that they are Bonafide student of B.Sc. part III (Microbiology) of this college for the session 2020-2021. They have completed their dissertation under the guidance of **Prof. Ms. Harshala Shende** on the project entitled **"Isolation and Identification of Pathogenic Bacteria From College Premises."**

This dissertation is being submitted to the Gondwana University Gadchiroli, for the partial fulfillment of the requirement for the award of Degree of Bachelor of Science in Microbiology.

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INDEX

Introduction

Most of the people live indoor: houses, schools, colleges, hospitals, and offices etc, where they are exposed to many environmental conditions that affect their health. Microorganisms are normally present in both indoor and outdoor environments. The quantity of microorganisms in a particular area depends upon the presence of water and other nutrient sources in that particular environment where they can develop extensively. Usually microorganisms enter into buildings through the doors, windows, air conditioners and also by people entering from outside. The type of species and amount of organisms present depends on the viscosity, temperature, lighting and food available in that particular environment. Among the microorganisms present in the indoor environment, some species of microorganisms if present beyond the limit can cause serious health problems. So the isolation, identification and measurement of different types of microorganisms especially in indoor environment has become a very hot topic at present and it has attracted everyone's attention in this field. Among the indoor microorganisms; some may be pathogenic and could secrete toxic metabolites which can cause allergy and even serious diseases. Since a number of students are studying in our college attending both theory and practical sessions they are exposed to a number of pathogenic bacteria which can affect their health if proper care is not taken. Environmental pathogens are defined as microorganisms that normally spend a substantial part of their lifecycle outside human hosts, but when introduced to humans cause disease with measurable frequency. They are borne in the water, soil, air, food, and other elements of our surroundings, and they affect almost every individual on the planet. Their adverse effects on human health and productivity cannot be controlled without first obtaining a thorough understanding of their environmental niches, their incidence, and the epidemiology of the diseases they cause. To achieve this understanding, surveillance of the environment to determine the numbers and distribution of environmental pathogens is needed. The key difference between environmental pathogens and other human pathogens is their ability to survive and thrive outside the host. Their widespread occurrence in the environment makes them difficult to monitor

and control so, proper care and sanitation should be maintained in college premises.

The environment significantly influences multiple factors in the chain of infection. Although microbiologically contaminated surfaces can serve as reservoirs for pathogens, these surfaces generally are not directly associated with transmission of infections. The transmission of microorganisms from environmental surfaces to students is largely via hand contact with the surface. Although hand hygiene is important to minimize the impact of this transfer, cleaning and disinfecting environmental surfaces appropriately is fundamental in reducing their potential contribution to the incidence of healthcare-associated infections.

In this study we adopt the method of settle plate and swabs since settle plates are sterile, economical and readily available .The results obtained by settle plates are reproducible and reliable. Many places in the environment can be checked at the same time. Data collected on settle plates set in different places, by different operators, can be compared and understood .The natural trend of microbial population in the air is not disturbed during the sampling time.

E.coli (Escherichia Coli)

E. coli is a Gram – negative, facultative anaerobic, rod – shaped, coliform bacterium of the Genus Escherichia that is commonly found in the lower intestine of warm – blooded organisms. E. coli is expelled into the environment within fecal matter. The bacterium grows massively in fresh fecal matter under aerobic condition for 3 days, but its number decline slowly afterwards. E- coli can live on a wide variety of substrates and uses mixed - acid fermentation in anaerobic conditions, producing lactate, succinate, ethanol, acetate and carbon dioxide. Since, many pathway in mixed – acid fermentation produced hydrogen gas, these pathways require the levels of hydrogen to be low, as is the case when E. coli lives together with hydrogen – consuming organisms, such as methanogens or sulphate – reducing bacteria.

Scientific classification

Domain: Bacteria

Phylum: Proteobacteria

Class: Gammaproteobacteria

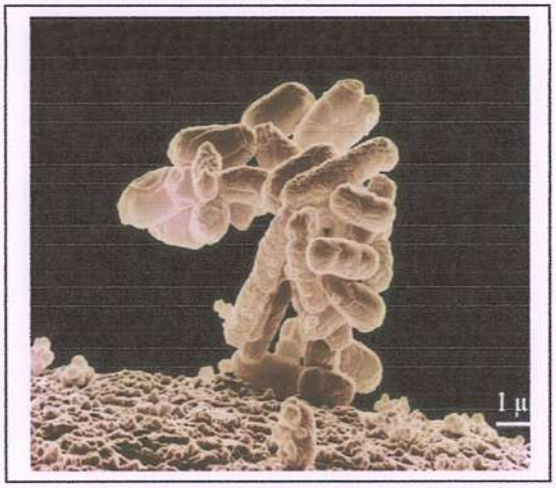
Order: Enterobacterales

Family: Enterobacteriaceae

Genus: Escherichia

Species: E. coli

Binomial name: Escherichia coli



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Conclusion

On the basis of some research papers we concluded that Microbial monitoring of our college premises was carried out in order to prevent from health hazards. Since, the organisms can cause serious disease, proper care should be taken by avoiding overcrowding .Good ventilation facilities should be provided in college laboratories, toilets along with other places of college should be cleaned and disinfected daily. On plate exposure at different sites of colleges and swabs taken Bacillus species and Staphylococcus aureus were found most commonly. Bacillus normal air microflora and they do not cause serious health problem commonly whereas Staphylococcus aureus is an opportunistic bacteria that can cause serious health problem to the student in the college premises. This project will be helpful to keep the college environment free of pathogenic microorganisms. Hence, regular monitoring of air quality evaluation should be done in order to make environment free of microorganisms.

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B.Sc. Microbiology Project Work

"ANTIMICROBIAL ACTIVITY OF MEDICINAL SOAP ON MICROORGANISMS"

PROJECT SUBMITTED TO

GONDWANA UNIVERSITY, GADCHIROLI

IN PARTIAL FULFILLMENT OF THREE YEARS FULL-TIME GRADUATION DEGREE PROGRAM

B.Sc. - III (MICROBIOLOGY)

SUBMITTED BY

Ms. RASHMI. N. GODSE

(GROUP LEADER)

UNDER THE GUIDANCE OF

PROF. Ms. HARSHALA SHENDE

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SESSION 2020-2021

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MAHATMA GANDHI COLLEGE, ARMORI

UNDER GRADUATE DEPARTMENT OF MICROBIOLOGY

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This is to certify that they are the bonafide students of B.Sc.-III (microbiology) of this college for the session 2020-2021. They have completed their dissertation under the guidance of **Prof. Ms. Harshala Shende** on the project, "**Antimicrobial activity of medicinal soaps on microorganisms".**

This dissertation is being submitted to Gondwana University Gadchiroli for the partial fulfillment of the requirement for the award of degree of Bachelor of Science in microbiology.

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CONTENTS

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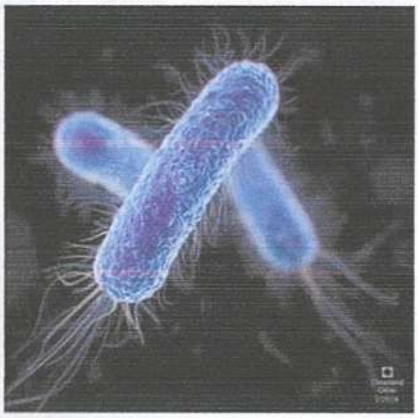
INTRODUCTION

Antimicrobial activity of any substance is defined as its ability to either kill bacteria or inhibit the growth of bacteria. Antimicrobial activity is significant with respect to the human body in preventing diseases and skin infections. Detergents and soaps are the disinfectants required in daily practices for hygienic point. Soaps are cleaning agents, which may be liquid, solid, semisolid or powders. Soaps are used to remove dirt, including dust, microorganisms, stains and bad smells in order to maintain health, beauty and remove bad odor from the body or inanimate objects, including clothes. Chemically soaps are the combination of fats, oils (of animal or vegetable origin) and Salt. Soaps are generally salts of free fatty acid made via saponification, where alkaline substances react with fatty acids in fats or oils. Other substances are then added to this salt of free fatty acid or soap base, to produce the different types of soaps we have. They are mainly used as surfactants for washing, bathing and cleaning. Soaps are either non antimicrobial soaps or an antimicrobial soap, also known as an antiseptic or medicated soap. An antibacterial soap can remove 65% to 85% of bacteria from human skin. The soap should have good ingredients which have the ability to kill bacteria but not to damage body tissues. Number of bacteria including Gram Positive and Gram negative are deposited from the environment on the surface of skin and causes skin infection. Examples of these bacteria include Staphylococcus aureus, Bacillus subtilis and Pseudomonas aeruginosa. Soaps play an important role in removing and killing bacteria. Although fats and oils are general ingredient of soaps but some detergents are added to enhance the antibacterial activities of soaps. The attribute of the soap includes gentleness on the skin, rich lather, protection against skin disorders (including rashes, eczema, scabies) treatment of skin infection (such as ringworm), protection of even skin toning and smoothness of the skin. Soaps are generally used for removal of germs and for cleansing purposes.

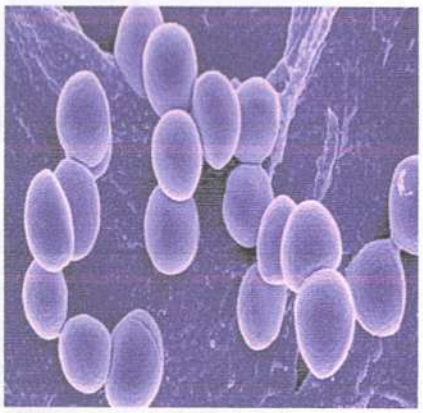
- **Microbes considered:**

Escherichia coli: *Escherichia coli* also known as *E. coli* is a Gram-negative, facultative anaerobic, rod-shaped, coliform bacterium of the genus *Escherichia*. It can cause skin infections such as cellulitis, and on rare occasions in type 1 necrotizing soft tissue infections (NSTIs), where layers within the dermis, subcutaneous tissue, superficial fascia or muscle become infected.

Staphylococcus aureus: *Staphylococcus aureus* is a Gram-positive, round-shaped bacterium, a member of the Firmicutes, and is a usual member of the microbiota of the body, frequently found in the upper respiratory tract and on the skin. It is the leading cause of skin and soft tissue infections such as abscesses (boils), furuncles, and cellulitis.



E. coli



S. aureus

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CONCLUSION

Instead of soaps, the alternative techniques which were used in the olden days are considered to be the golden techniques and now a days modern soaps have been taking care of both problems like killing the bacteria present on our body and maintain the skin beauty as well. So, from this study, we identified that all the soaps had antimicrobial activity. In this, Dettol soap is considered to be best of all and showed greater antimicrobial activity than any other selected soaps. Hamam soap is considered as the second best followed by Cinthol and Lifebuoy having least antimicrobial activity.

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B.Sc. Microbiology Project Work

Isloation of bacteria from food samples available at market

A Project Submitted To

Gondwana University, Gadchiroli

In Partial Fulfilment of Three Years Full-Time Graduation Degree Program

B.Sc-III (Microbiology)

Submitted By

Ku. Shilpa K. Gurnule

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"Isloation of bacteria from food samples available at market".

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• CONTENTS •

Introduction :-

Bacterial are group of microorganisms all of which lack a distinct nuclear membrane (and hence are considered more primitive than animal and plant cells) and most of which have a cell wall of unique composition. Most bacteria are unicellular; the cells may be spherical (cocci) rod – shaped (bacillus), spiral (spirillum), comma – shaped (vibrio) or corkscrew-shaped (spierocheate). Generally, they range in size between 0.5 and 5um.

Food is any substance that people or animal eat or drink or that plants absorb to maintain life and growth. Food is any substance consumed for nutritional support for the body; it is usually of plant or animal origin. Food consists of chemical compounds which heterophilic living thing consumes in order to carry out metabolic processed. They are also substances which when introduced to the digestive system under normal circumstances contribute to growth, repair and production of energy.

Foods are classified into six essential nutrients known as protein, carbohydrate, vitamin mineral, fat and oil, water.

PROTEIN:– Proteins are essential constituents of the body; they form the structural material of muscles, tissues, organs, etc. and are equally important as regulators of function, as enzymes and hormones, proteins are synthesized in the body.

CARBOHYDRATE:– One of a large group of compounds, including the sugar and starch, that contain carbon, hydrogen and oxygen. Carbohydrates are important as a source of energy and they are manufactured by plants. All carbohydrates are eventually broken down in the body to the simple sugar glucose which can then take part in energy producing metabolic processes.

VITAMIN:- Any of a group of substances that are required in very small amounts, for healthy growth and development: they cannot be synthesized by the body and are therefore essential constituents of the diet. Vitamins are divided into two groups, according to whether they are soluble in water or fat.

FAT:- A substance that contains one or more fatty acids (in the form of

2. REVIEW OF LITERATURE :-

- presence of e.coli our study might attribute to the heat processing failure or postprocessing contamination, faecal contamination and poor hygienic practice of food handler (Eley AR, 1992)Escherichia coli were detected in 44.6% of the food samples. This detection rate was consistent with the previous study carried out in Amravati city, which have reported finding of E.coli in 41% of all food samples (Tambekar DH 2011). This result is in agreement with previous study done by Tambekar DH . In which defective personal hygiene can facilitate the transmission of pathogenic bacteria found in environment and on peoples hand via food to humans (Tambekar DH 2011, Ashenafi M 1995).

- E. Coli 0157:H7 is leading cause of food-borne illness worldwide. Outbreaks have been linked to contaminated drinking water, fresh produce and fruit juices; however food of bovine origin particularly, raw or undercooked ground beef, has been implicated in a large number of the documented outbreaks (Smith and fratamico 2005).

- Andrews and baumler 2005; centers for disease control and prevention 2009. E.coli 0157:H7 is a food-borne pathogen of concern in immunocompromised individual, especially the elderly and young children (Smith and fratamico 2005). The bacterium can caused kidney failure along with gastrointestinal symptoms such as diarrhea, nausea, vomiting and abdominal pain. E.coli 0157:H7 transmitted through a variety of food products. Including Hamburger, apple cider, leafy greens and poultry products, has caused humerus MS 20090199 Submitted 03/06/2009, accepted 20/07/2009. Authors Ravishankar and Zhu of the department veterinary science and microbiology, Univ. Of arizona, 1117 food-borne illness outbreaks (Smith and fratamico 2005).

- The number of colonies was multiplied by the dilution factor and divided by weight of sample and reported as the number of organism per gram of food. Since not all cells grow with any one particular set of conditions, the count was referred to as colony forming units(CFU) per (Vanderzant and splittstoesser).

- This agrees with the report of oranusi et al. That noted that preparation, exposure and handling of RTE food at temperature conductive for microbial proliferation, coupled with rich coleslaw, could be factors that increase microbial load in food. This supports the report of moyo and Baudi that attributed the presence of

Conclusion :-

On the basis of Some research papers we concluded that the Street food business has remained largely unregulated in Nigeria, notwithstanding the sector contribution to the nation's food security. Wholesome and nutritious street foods have a positive impact on foodsecurity, while consumption of street foods of low and below minimumsafety standard is injurious to health on an acute or chronic basis. Thefindings of this study illustrates that bacterial contamination is present infood material.

And that the CFU/ML of Salmonella spp is high, since it is more significant (2.9 X 107Cfu/ml) and can cause food poisoning. Other organisms isolatedsuch as coli, Shigella, staphylococcus. aureus, Bacillus cereus and Vibriospp which were also isolated in insignificant number could still cause food borne illness depending on the consumer's health status.

Staphylococcus aureus was less significant in food material Therefore, it is very important and necessary for food vendors to always clean and sanitize food contact surfaces, cook and store food properly, so as to reduce the level of food contamination and also to reduce bacterial load to the lowest level, therebypreventing cases of food borne infections.

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