GOVT. HOLKAR (MODEL AUTONOMOUS) SCIENCE COLLEGE, INDORE

(An ISO 9001:2015 & ISO 14001:2015 Certified Instituion)

SSR DOCUMENT

2017-18 TO 2021-22

CRITERION –1

Curricular Aspects

Metric No. :1.3.3

Document Title:

Sample Internship Certificates & Reports submitted by the students

SURESH T SILAWAT

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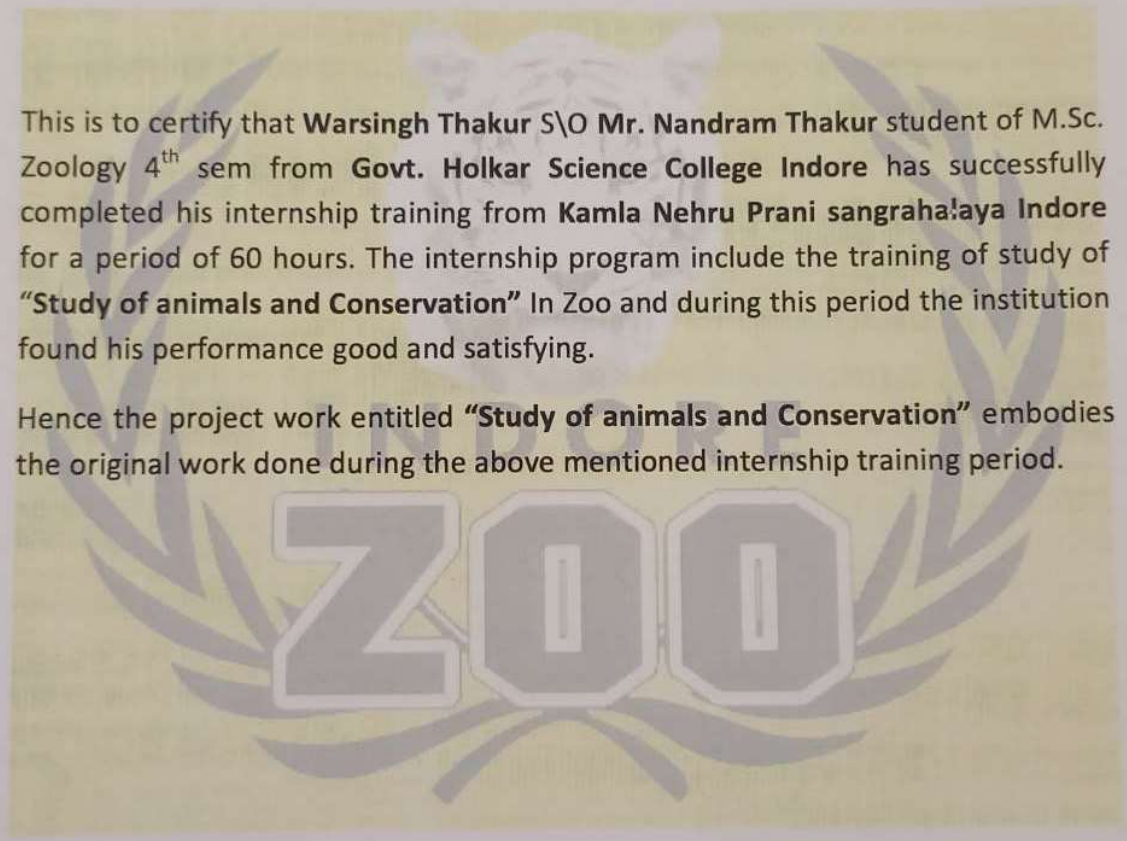
Date: 2023.08.20 17:10:34 +05'30'

तमसो मा ज्योतिर्गमय

CERTIFICATE

This is to certify that **Warsingh Thakur** S\O **Mr. Nandram Thakur** student of M.Sc. Zoology 4th sem from **Govt. Holkar Science College Indore** has successfully completed his internship training from **Kamla Nehru Prani sangrahalaya Indore** for a period of 60 hours. The internship program include the training of study of **"Study of animals and Conservation"** In Zoo and during this period the institution found his performance good and satisfying.

Hence the project work entitled **"Study of animals and Conservation"** embodies the original work done during the above mentioned internship training period.



Date.....10/05/22

Place.....Indore

Er. Nihar Pandilekar
Curator & Scientific Officer
Municipal Corporation, Indore (M.P.)

Authorised Signature

Kamla Nehru Prani Sangrahalaya

॥ श्री गणेशाय नमः ॥

CODEMANTRA
Landmark of Practical Programming

ISO 9001:2015 **Date 22-05-22**

To Whom So Ever It may Concern

This Is to Certify that **Mr. RAJENDRA S/O Mr. BALRAM**, Student of **GOVERNMENT HOLKAR SCIENCE COLLEGE, INDORE** Is an Intern at our Firm **CODEMANTRA Web-learn**. He has worked here from **10-APR-2022 To 20-MAY-22**. He Had been a co-authority on a Project Based on **PHP**. We have been impressed by the Dedication displayed & Quick Grasp of concept of new technologies.

We Wish him for his all future endeavors.

Authorized Signature
Director

For CODEMANTRA
Proprietor

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CERTIFICATE

CODEBETTER/IND/2022/04/0037

Certificate

This is to certify that

Monalisha Sahoo

has successfully completed

Internship In Full Stack Development

Duration 2 Months From 09/04/2022 To 09/06/2022

{c}odeBetter

Director

403, Shekhar Central, Palasia Square, A.B. Road, Indore (M.P.) | http://codebetter.in | contact@codebetter.in

CODEBETTER/IND/2022/04/0031

Certificate

This is to certify that

Mahima

has successfully completed

Internship In Full Stack Development

Duration 2 Months From 09/04/2022 To 09/06/2022

{c}odeBetter

Director

403, Shekhar Central, Palasia Square, A.B. Road, Indore (M.P.) | http://codebetter.in | contact@codebetter.in

GOVT. HOLKAR SCIENCE COLLEGE INDORE

SESSION:– 2021-22

INTERNSHIP PROJECT

TOPIC : STUDY OF ANIMALS IN ZOO & CONSERVATION

KAMLA NEHRU PRANI SANGRAHALAYA INDORE

UNDER GUIDANCE OF: Er. Nihar Parulekar sir

SUBMITTED TO: -

SHANTI PATIDAR MAM

DEPARTMENT OF ZOOLOGY

SUBMITTED BY:-

WARSINGH THAKUR

ENROLLMENT NO. DS1714022

M.Sc. IVth sem.

Department of Zoology, Govt. Holkar Science College, Indore (M.P.)

Date: .....

S.No. .....

To,

The Officer/Manager
Kamla Nehru Prani
Sangrahalaya Indore.

Subject :- To Provide Internship.

Sir,

Shri/Kum. Kharsingh Thakur ---------- S/OD/O/

Shri/Smt. Nandram Thakur ---------- a regular student

of B.Sc. I/II/III/ IV/V/VI or M.Sc. IV Semester Govt. Holkar Science College, Indore (M.P.)

As per government directives the student has to submit a project report on an Organization /Industry/Institute.

The above student is desire to submit a project report on your organization/industry/institute. So please provide him guidance/assistant institute along with the certificate of his/her visit.

Thanking You!

Guide

Shanti Patidar
Department of Zoology

HOD
Deptt. of Zoology
Govt. Holkar Sc. College, Indore

Dr. Rekha Sharma.
Department of Zoology

CERTIFICATE

This is to certify that **Warsingh Thakur** S\O **Mr. Nandram Thakur** student of M.Sc. Zoology 4th sem from **Govt. Holkar Science College Indore** has successfully completed his internship training from **Kamla Nehru Prani sangrahalaya Indore** for a period of 60 hours. The internship program include the training of study of **"Study of animals and Conservation"** In Zoo and during this period the institution found his performance good and satisfying.

Hence the project work entitled **"Study of animals and Conservation"** embodies the original work done during the above mentioned internship training period.

Date 10/05/22

Place Indore

Er. Nihar Pandekar
Curator
Municipal Corporation, Indore (M.P.)

Authorised Signature

Kamla Nehru Prani Sangrahalaya

DECLARATION

I **Warsingh thakur** student of **Govt. Holkar Science College College, Indore** hereby declare that the project report of internship program titled "Wildlife Conservation In Zoo" is uniquely prepared by me under the guidance of **Prof. Shanti Patidar Mam** and **Dr. Rekha Sharma Mam (H.O.D. of Zoology Department)**, with the support of Er. **Nihar Parulekar Sir (curator and zoo education officer)** and **Dr. Uttam Yadav Sir (Director Of Indore Zoological Park)** . After the completion of 60 hour of internship work at **Kamla Nehru Prani Sangrahalaya, Indore** and is completed by own work and effort towards the partial fulfillment of requirement for the pursued M.Sc. program from this institution.

Date...10/05/22.....

Place...Indore.....

Warsingh thakur

M.Sc. Zoology

4th Semester

Govt. Holkar Science College Indore

ACKNOWLEDGEMENT

I would like to express to my deepest appreciation to all those who provided me the opportunity to complete this internship training and report project. It is with deepest sense of gratitude and reverence that I express my indebtedness to **Dr. Uttam Yadav sir { Director Indore Zoological Park }** and **Er. Nihar Parulekar Sir { Curator and Education Officer }** who granted me to work under their guidance in **Kamla Nehru Prani Sangrahalaya, Indore** . I take privilege to express sincere thanks and gratitude to my guide **Prof. SHANTI PATIDAR MAM** and to **Dr. REKHA SHARMA MAM {HOD Department of Zoology }** who gave me guidance, constructive criticism, and valuable suggestions. I feel honored to have such mentor throughout. Also my deep and sincere gratefulness to all the staff members of Indore zoo who readily and cheerfully extended every help required from the beginning till the end of this project work.

Warsingh thakur

M.Sc. Zoology

4th Semester

Govt. Holkar Science College, Indore

बी.एस.सी. अंतिम वर्ष एवं बी.सी.ए. षष्ठम सेमेस्टर इंटर्नशिप कार्यक्रम

महाविद्यालय का नाम : शासकीय तोलसिंह विज्ञान महाविद्यालय, इन्दौर (म.प्र.)

छात्र/छात्रा का नाम : Warsingh Thakur

कक्षा एवं विषय : M.Sc. Zoology

कार्यानुभव की विधा : 60 Hours.

प्रशिक्षण संस्था का नाम : kamla nehru prani sangrahalaya.

निर्देशक प्रशिक्षक का नाम : Er. Nihar Parulekar sir.

निर्देशक प्राध्यापक का नाम : Prof. Shanti patidar mam.

कार्यानुभव प्रशिक्षण दैनिक उपस्थिति

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5	23/04/22	Thakur		25			
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PROPOSED MASTER LAYOUT PLAN FOR KAMLA NEHRU PRANI SANGRAHALAYA (ZOO) AT INDORE

GRID SIZE 20.0 M. X20.0 M

NOTE:
IN CONJUNCTION WITH EARLIER PLAN 2002-2007

SIGN. OF CZA AUTHORITY

SIGN. OF ZOO INDORE AUTHORITY

CLIENT: INDORE MUNICIPAL CORPORATION

DRAWING: LAYOUT PLAN OF KAMLA NEHRU PRANI SANGRAHALAYA AT INDORE

MEHTA & ASSOCIATES

Introduction of Indore zoo

kamla Nehru Prani Sangrahalaya

kamla Nehru prani sangrahalaya is one of the recognised zoo under central zoo authority. it is under the control of monicipal corporation, Indore, which looks after its maintanance and administration.

Indore zoo was established in 1974 at navlakha area in ~~city~~ only 17 acres of land. later on in the year 1999 adjoining 32 acres land of Quadibag was acquired by the zoo. Present area of Indore zoo is 51.975 acres.

Indore zoo is also known as :-

"Land of many wild life wonders."

Indore zoo is an institution which is committed to the conservation and welfare of wild-life. it is not only a place to learn and ~~contribute~~ see but also a place to learn and contribute. from our specialized conservation breeding program to dedicated research and internship.

Dr. Nihar Patilekar
Curator & Education officer
Indira Gandhi Zoological Park
Municipal Corporation, Indore (M.P.)

Objectives of zoo

Animal care :- Provide excellent quality of animal care and welbeing as a world class zoo.

Visitor Experience and Education :- Provide unforgetable visitor experience. inspire them to support and constricted contribute to the couse of conservation of wild-life, habitat and water. Provided opportunities for passive recreation.

wild life preservation :- Wild life preservation by conservation breeding and release of capative bread animal.

Sustainability :- Plan, practice and demonstrate sustainability in all spheres.

Research :- Provide platform of research in wild-life behaviour, nutrition, reproduction and preservation visitor experience and education.

* Wherever there are wild animals in the world, there is always an opportunity for caring, compassion and kindness. *

Aim of zoo :-

A.) To Develop intrest and awaness about wild animal in the public.

B.) The zoo are involved in the conservation of many endangered species of wild life. To conserve wild life special attention is being given to the protection of natural habitat and ecosystem and the captive breeding of wild life.

C.) Indore zoo is an ex-sita conservation and breeding centre which thrives to emerge as ad dedicated conservation, research and education facility for all wild life enthusiant zoo has a tagline as follow which is relision followed by all our staff members.

XOX

List of Animals in zoo.

carnivores.

- Lion
- Tiger
- Bear
- crocodile
- Leopard
- Ghariyal
- fox
- Hyena.

~~Herbivo~~ OMnivores

- White peacock
- Marmoset
- Squirrel monkey
- ostrich
- cossowary
- Emu

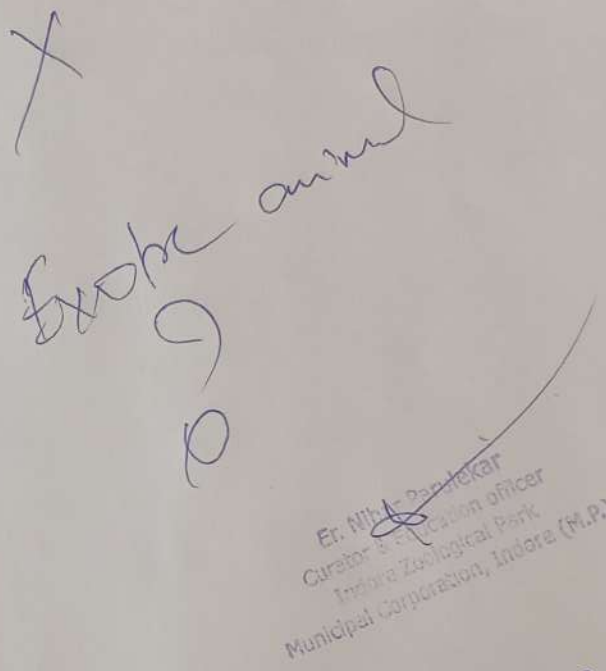
Herbivores

- Hippopotamus
- Swan
- Deer
- Iguana.

IGUANA LIZARD (Green iguana)

Classification

kingdom :- Animalia.
Phylum :- chordata.
class :- Reptilia
Order :- Squamata
Suborder :- Iguania
family :- Iguanidae
Genus :- Iguana.



Distribution :- The green iguana's extensive range comprises the rain forest of northern Mexico, central america, the carribbean islands and southern Brazil. this is the world wide distribution of green iguana.

Asian distribution of common green iguana.

common green iguana has been found in the wild in Singapore and Thailand. commonly in the southeast asia.

In India. :-

⇒ Characterstics of green iguana.

iguanas are large, ancient, herbivorous lizard with a stocky trunk, long, slender tail, scaly skin, and a single row of spines from the nape of the neck to the tip of the tail. On either side of the head is an eye with a round pupil and with movable lids.

- They can detached their tails it caught and grow another.
- Green or common iguanas are among the largest lizard in the Americas, averaging around 6.5 feet long and weighing about 11 pounds.

⇒ 30 sp over wold wide :-

- the 30 species of iguanas belong to the subfamily Iguanidae of the family Iguanidae.
- Iguanas are asigned to seven-genera, there common names being. Banded iguana, land iguanas, spiny-tailed iguana, ground iguana, desert iguana, green iguana, and marine iguana and chuckwallas iguana.

In zoo :- There is three iguanas present in the zoo.

Diet and Nutrition :- Iguanas are herbivores, meaning they eat plants ; specially, they are folivores, meaning they eat leaves. In the wild iguanas feed almost entirely on the leaves of trees and vines, plus some fruits and flower.

Life span :- The life span of an iguana is on average 12-15 years. When well-cared for, a healthy iguana can easily supercede that live more than 20 years.

Breeding :- In the wild, iguanas mate towards the end of "summer". They females carry the eggs and lay them so they incubate through the "winter" (When food) is more available. green iguanas reach sexual maturity between three and four years of age. Green iguana are oviparous, with females laying clutches of 20 to 71 eggs once per year. male iguana gives parental protection. incubation time period is of 10-15 weeks. once hatched the young iguana look similar to the adult in colour and shape, resembling adult female more.

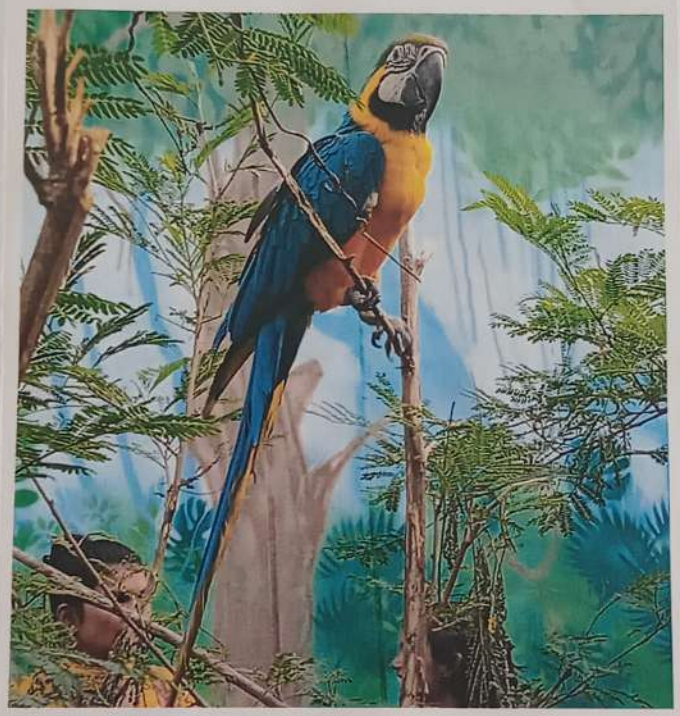
BLUE AND GOLD MACAW

SCIENTIFIC CLASSIFICATION.

kingdom :- Animalia
Phylum :- chordata
Class :- Aves
Order :- Psittaciformes
Family :- ~~Ara~~ Psittacidae
Genus :- Ara.
Species :- A. ararauna.

Distribution And Habitat :- This species occurs in colombia, Venezuela, Peru, Brazil, Bolivia, Ecuador, and Paraguay. The range extends slightly into central America, where it is restricted to Panama.

Although they were nearly wiped out in Trinidad due to human activity during the 1970s. Between 1999 and 2003, wild caught blue and yellow macaws were translocated from Guyana to trinidad, in an attempt to re-stablish the species in protected area Nariva swamp.



Does macaw found in india.?

Blue and gold macaw are native to central america and north america (only maxico), south America, and formaly the caribean. they are not found in india.

Diet and Nutrition :-

In the wild, most macaws, including blue and gold macaws, eat a variety of seeds, plant material, fruits and nuts.

captive blue and gold macaws should get a varied diet consisting of as many different types of ~~fresh~~ ~~fruits~~ and vegetables as possible. The bird should also get a high quality pellet diet. with some healthy seeds, such as flax, hemp, and chia.

Fruits that are good to feed to macaws include apples, pears, plums, cherries, grapes, oranges, bananas, mangos, papayas, and berries. Healthy vegetables includes carrots, sweet potatoes, cucumbers, zucchini, and leafy greens.

Breeding :-

Blue and ~~yellow~~ gold macaws breed every 1 to 2 years. Blue and gold macaws breed from january through july.

They lays eggs 3-4 in number. and incubate them for 24 to 28 days, after which the young hatch blind and featherless. After 10 days the young begin to develop feathers.

Life period :-

Blue and gold macaws can live from 30 to 35 years in the wild and reach sexually maturity between the ages of 3 and 6 years.

In zoo :- In Indore zoo. Kamla Nehru Prani sangrahalaya, indore, there are two male and two male. total four. Present in Bird - Aviary.

- characterstics
  - The Blue and yellow Macaw has blue wings and tail, black chin, golden underparts and a green forehead.
  - There beaks are black and very strong for crushing nuts.
  - The naked face is white, turning pink in excited birds and lined with small black feathers.

LION

• The Asiatic Lion is a Panthera leo leo.

⇒ Classification :-

kingdom	:.	Animalia
Phylum	:-	chordata
class	:.	mammalia
Order	:.	carnivora
Family	:.	Felidae
Genus	:.	Panthera.

⇒ Total species of lion :. There is only one species of lion which is known as Panthera leo. There are two recognised subspecies, the African lion P. leo leo and the Asiatic lion Panthera.

⇒ Distribution

• Nearly all wild lions live in abrica, below the Sahara Desert, but one small population exist around Gir forest National Park in western india.

• The asiatic lion is a Panthera leo leo Population surviving today only in india. in Gir National Park and surrounding areas in the indian state of Gujrat.

⇒ Characterstics.

- Lions are the symbol of strength.
- Lions are the only cats that live in groups.
- Lions have strong, compact bodies and Powerful forelegs, teeth and jaws for Pulling down and killing prey.
- their coats are yellow - gold, adult males have shaggy manes that range in colour from blond to reddish - brown to black.
- Lions are the kings of jungle because of their row power and strength.

⇒ Life span :-

- 15- 16 years of female adult in the wild.
- 8-10 years male adult in the wild.

⇒ Average weight of lion is 190 kg in male adult and 130 kg in female adult.

⇒ Lion Breeding time :-

lion begin to breed at two years but reach their prime at five years. mating take place at most times of the years and a male may mate with several females.

Lioness has cubs about every two years and their gastation time is 105- 112 days. and the litter size varies from one to six cubs, two to four being usual.

⇒ Nutritional requirements of lion.

lions are carnivores, which means they are animals that only eat meat. some of the prey they catch include birds, hares, turtles, mice, lizards, wild dogs, cheetahs, buffaloes, crocodiles baby elephants, giraffs etc.

lions are believed to feed every three or four days and need on average between 5kg and 7 kg of meat a day.

they can go without food for more than a week.

⇒ The Gir Forest Reserve created in 1913 to protect the largest of the surviving groups of asiatic lions.

There are only around 600 Asiatic lions left in the wild, living in the indian state of Gujrat.

⇒ In Indore 200 total Number of lion in four. 3 Three of which are females and one is male.

ELEPHANT

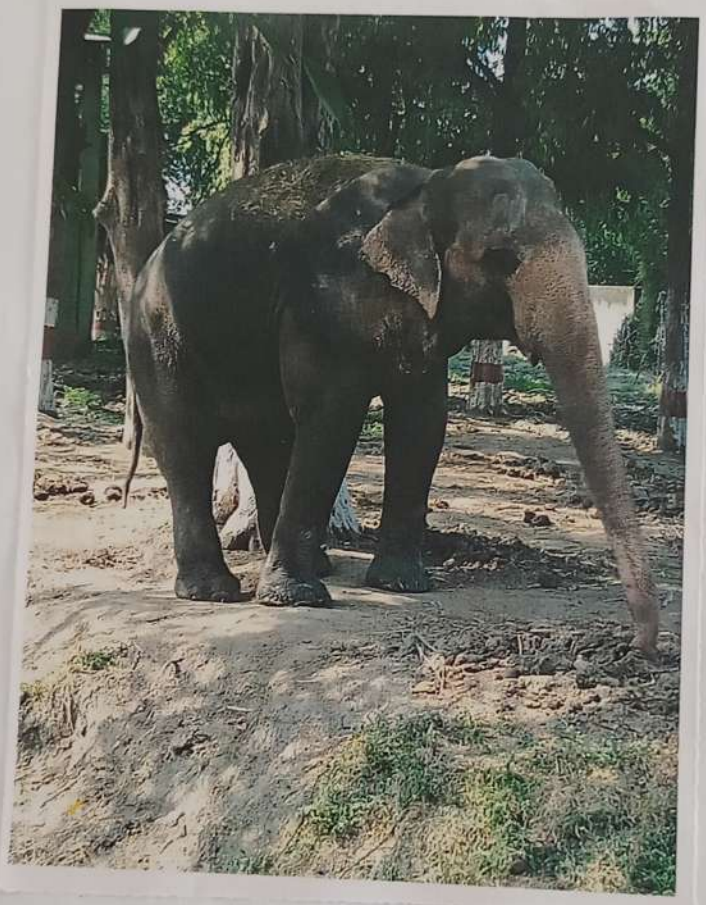
Classification

Kingdom :- Animalia
Phylum :- Chordata
Class :- Mammalia
Order :- Proboscidea
Family :- Elephantidae
Genus :- Elephas
Species :- E. maximus.

Distribution :- Elephants are scattered throughout sub Saharan Africa, south asia, and southest asia, and are found in different habitat. including savannahs forest, desert and marshes. They are herbivores and stay near water when it is accessible.

Asia :- Where does they found in Asia?
They live in forest regions of india and throughout southest Asia, including, Myanmar, thailand, combodia and Laos. Also they are found in Srilanka, Bangladesh and china.

In zoo :- Only one Elephat is present in the Indore zoo.



⇒ In india :- However current distribution of wild elephant in india is confined to south india ; North east including North West Bengal central indian states of Odisa, South West Bengal and Jharkhand ; and North West india in Uttara khand and UP.

⇒ In MP. Madhya pradesh had only seven elephants by 2017, according to official estimates, in 2018, the state become home to a herd of elephants. that sattled in tiger reserve - the herd's count today is 42.

⇒ Total species :- There are three different species of elephants: The African savanna elephant, the African forest elephant and the asian elephant. African forest elephant, recognized as a separate species in 2000, is smaller than the savanna elephant.

⇒ Life span :- Asian elephant : 48 years.
African bush (savanna) :- 60 - 70 years.

⇒ characterstics of elephant.

- Elephants are the largest existing land animal.
- The distinctive features of all the elephants include a long proboscis called a trunk, tusks, large ear flaps, massive legs, and tough but sensitive skin.

- The trunk is used for breathing, bringing food and grasping objects.
- Tusks are incisor teeth, serves both as weapons and as tools.
- The large ear flaps assist in maintaining body temprature as well as in commonication.
- communicate through vibrations.
- their body weight is about 4000 kg.

⇒ Elephant Breeding time:-

most females domesticated elephants begin to come into heat starting at about 9 years old or later and enters their "heat cycle" which has a length of about 4 months. thus in a period of one year, the average female elephant will be able to breed and become Pregnant only about three times in a year.

⇒ Elephant nutritional requirements.

Elephant consume grasses, small plants, bushes fruits, twigs, tree bark and roots. Tree bark is a favorite food source for elephants. it contain calcium and roughage, which aids digetion. Tusks are used to carve into the trunk and tear off strips of bark.

Hippopotamus

⇒ Classification :-

kingdom :· Animalia
Phylum :· chordata
class :· mammalia
order :· Artiodactyla.
Family :· Hippopotamidae.

Exotic

• Distribution :· Hippos are still found in the rivers and lakes of the northern Democratic republic of Congo, Uganda, Tanzania and Kenya, north through to Ethiopia, somalia and Sudan, west to the Gambia and south to south africa.

Characteristics of Hippopotamus

- Hippos are well adapted to aquatic life.
- The ears, eyes, and nostrils are located high on the head so that the rest of the body may remain submerged.
- Hippopotamous have pink colour sweat.
- Has bulky body on stumpy legs, an enormous head, a short tail, four toes on each foot. Each toe has a nail like hoof.
- Hippos are usually 3.5 m (11.5 feet) long, and 1.5 m (5 feet) tall.
- Their weight is about 3200 kg (3.5 tones).
- colour is grayish brown, with pinkish underparts.
- The mouth is half a metre wide and can gape 150° to show the teeth.

⇒ Diet and nutrition :- The Hippopotamus consumes a mostly herbivores diet in the wild.

- Grasses supplemented with nutrient rich fruits, seem to make up the great majority of their food consumption,
- They also enjoy small shoots and reeds emerging from the ground.
- Also in small percentage they eat aquatic plants.

⇒ Breeding :-

- Hippopotamus usually mate between may and june when the female called cows, reach peak fertility for a three day span.
- Females reach sexual maturity between 7-15 years of age, whereas males between 6 and 13 years of age.
- Give birth to single once. also female is combirtable to giving birth in water or on land.

⇒ Life period :-

- Hippos live an average lifespan of 40-50 years.

⇒ Total species :

- There are only two species of hippos - the large/common hippo and the smaller relative, the Pygmy hippo.
- Hippos are the third-largest living land mammals, after elephants and white rhinos.

⇒ Hippopotamous in Indore zoo.

Three hippopotamous are present in Indore zoo.

BLACK SWAN

kingdom :· Animalia.
Phylum :· chordata
class :· Aves
Order :· Anseriforms
Family :· Anatidae
Genus :· cygus.

⇒ The black swan (cygus atratus) is a large water bird, a species of swan which breeds mainly in the southeast and southwest regions of australia. Within

⇒ it is a large bird with mostly black plumage and a red bill.

Distribution :-

- The black swan is common in the wetlands of southwestern and eastern Australia and adjacent wastal islands. In the south west its range encompasses an area between North, West cape, cape Leeuwin and Eucla. while in the east it covers Atherton Tableland, The Eyre Peninsula and Tasmania, with the Murry Darling Basin.
- They are absent from tropical asia, central America, northern south America and the entirety of ~~earth~~. Africa.

⇒ There are seven species of swan in the genus cygus.

⇒ Breeding :- It is a monogamous breeder, with both Partners sharing incubation and cygnet-rearing duties.

- their clutch size is 4-8 eggs. oviparous in nature.
- Breeding may occur throughout the year but is often limited to **February - may** in the North and **may - September** in the south.
- Black swans are ready to breed at 18 months of age and most breed before their third year.

⇒ Life span :- Life span of black swan is about 20 - 30 years.

⇒ Weight :- weight of black swan is about 10-15kg

⇒ Incubation time :- 35 to 40 days.

⇒ Diet And Nutrition :-

- Black swans are herbivores (folivores), feeding on vegetation both in water or in pastures or when on farmland.
- common aquatic plants they feed on include algae, leaf of reedmace, and stoneworts,
- Occasionally they will eat insects.

⇒ In zoo :- There are on male and one female black swans are present in zoo.

⇒ characters :-

- Black swans are mostly black-feathered birds, with flight feathers.
- The bill is bright red, with a pale bar and tip.
- Legs and feet are greyish-black.
- cygnets (immature birds) are a greyish-brown with pale-edged feathers.

Mugger (Crocodylus palustris)

Classification

Kingdom :- Animalia
Phylum :- chordata
class :- Reptilia
Order :- Crocodilia
family :- crocodylidae
Genus :- crocodylus.

⇒ The mugger likes relatively shallow water, no deeper than 5m, and avoid fast-flowing rivers.

⇒ mugger is also known to bury itself into mud to escape the searing heat of india during the dry season.

⇒ All crocodiles, includding the mugger, are highly social. This social behaviour includes communications, gregarious behaviour, dominance interactions and territorial activity.

⇒ Life span :- their life span is about 20-40 years.

⇒ Body weight of crocodile is about 60-500 kg.

Distribution :-

- The mugger crocodile occurs in southern Iran, Pakistan, Nepal, India and Sri Lanka.
- In india it occurs in Rajasthan, Gujrat, madhayapradesh, uttarakhand, Uttar pradesh, odisha telangana, maharastra, Goa, karnataka, kerala, and tamil Nadu.
- In madhya pradesh (M.P.) it is commonly found in Nation chambal sanctuary.

⇒ There are 24 recognised species of extant crocodilians, divided into three families - Alligatoridae, crocodylidae and gavialidae.

Breeding :

- They are oviparous or egg laying.
- Females dig holes in the sand as nesting sites and lay egg upto 46 eggs during the dry season.
- The sex of hatchings depends on the temp. during incubation
- Incu incubation time period is about 55-75 days.
- Both paents protect the young for up to one year.
- They feed on insects and adult prey on fish, reptiles, birds and mammals.

⇒ Nutrition and diet.

- Mugger crocodiles are carnivores.
- Their diet changes with age. Juvenile will feed on fish, frogs and crustaceans.
- Adults are able to take down reptiles and large mammals such as buffalo or deer.

⇒ Characters

- The mugger crocodile is a medium-sized broad-snouted crocodile, also known as mugger and marsh crocodile.
- He had a tail with unimaginable and irresistable Power.
- His mouth running almost the whole length of his head.

Indian Peafowl (Peacock)

- it is the national bird of india.

⇒ Classification :-

kingdom :- Animalia
Phylum :- chordata
class :- Aves
Order :- Galliformes
family :- Phasianidae.
species :- P. cristatus.

⇒ Total species :- There are three species of peafowl and they all have different colours.

- Pavo cristatus. is the scientific name for the indian peacock. most populated and most commonly known species today.
- The scientific name for green peafowl is Pavo muticus.

⇒ Distribution

- The two most recognizable species of peafowl are the blue or indian, peacock (Pavo cristatus) of india and sri Lanka, and the green or Javanese peacock (P. muticus), found from Myanmar (Burma) to Java.

- Dandeli Wildlife sanctuary, karnataka is famous place for peacock population.
- The peacock is widely found in indian sub-continent from the south and east of the indus river, Jammu and kashmir, east assam, south Mizoram, and the whole of the indian Peninsula.
- Morachi chincholi village is famous for peacock.
- Residents of Basaniya village in manasa block of MPs Neemuch district started a movement in 2012 to save the national bird.

⇒ it is fully protected under Kanha National Park.

⇒ Indian peafowl lives upto 10-25 years.

⇒ Average weight :.

indian peafowl : 4-6 kg.

Green peafowl : 3.8 - 5 kg.

⇒ Breeding season :- starting in late fabruary and running until early August.
- male attracts female by stunning tail feathers and dance.

⇒ Breeding ages :- Two years old resemble adult males but their tails do not have characteristics ocelli. They become sexually active at about 3years.

Cassowary

⇒ Classification :-

kingdom :- Animalia
Phylum :- chordata
class :- Aves
order :- casuariiformes
family :- casuariidae kaup
Genus :- Casuarius

⇒ it is the "worlds most dangerous Bird"

⇒ Life span :- Avelage life span of these bird is about 55-60 years.

⇒ they are 5-6 feet long.

⇒ their weight is about 40-50 kg.

Distribution :-

- Cassowaries are native to the humid rainforests of new Guinea, nearby smaller islands, East Nusa Tenggara, the Maluku Island, and northeastern Australia.
- They are native to the tropical forest of south east Asia and Australia.
- They are distributed in Indonesia, Papua, New Guinea. Also found in nearby savannah forest or mangroves stands.

⇒ Diet and Nutrition

- They are omnivores in nature.
- They eat a diverse diet, but perhaps 90% of their diet comes from fruits. They prefer larger fruits with nutritious coverings.
- The species is incredibly important to the rain-forest of new Guinea and northern Australia because they spread the seeds of so many fruits and plants.

⇒ Breeding.

- They are oviparous in nature and lay eggs.
- Incubation period is about 60 days.
- They lays there eggs or clutch size is 4-6 eggs
- They dont form permanent bonds or mate for life, and the females may mate with several male cassowaries in a breeding season.
- laying clutches of 4-6 eggs by different fathers.
- only coming together to mate during the breeding season which runs from around may or June to October.

⇒ Characters of cassowary.

- Flightless bird, wings and tail feathers very short.
- their tallness is 3.2 to 5.6 ft.
- Small "reptilian-like" claw on second digit of each wing.

⇒ Cassowary are the only member of the family Casuariidae. belong to the order casuariiformes, which also includes the emu.

⇒ There are three species (counted by some expert as six) each with several races.

Black Tiger

⇒ classification

kingdom :- Animalia
Phylum :- chordata
class :- mammalia
order :- carnivora
Family :- felidae
Genus :- Panthera
species :- P. tigris.

⇒ characters.

- A black tiger is a rare colour variant of the Bengal tiger, and is not the distinct species or geographic subspecies.
- Pseudo - melanastic tigers have thick stripes so close together that the tawny background is barely visible between strips.
- They are also said to be smaller than normal tigers, perhaps also due to inbreeding or because large black leopards are misidentified as black tiger.

⇒ Height :- Female :- 2.4 – 2.6 m.
male :- 2.7 – 3.1 m.

⇒ Their body weight is from 150 to 200 kg.

⇒ Life span :- They survive about 14 – 18 years.

⇒ Tigers are endangered species and therefore they are reserves under the government of countries.

there are some Tiger Reserves in india.

Bandipur tiger reserve: karnataka.
corbett : Uttarakhand.
kanha national park : madhya Pradesh.

⇒ Tigers have the species name Panthera tigris. There are nine subspecies of tigers. three of which are extinct.

⇒ An estimated 3900 tigers remain in the wild. tigers populations remain stable or increasing in india, Nepal, Bhutan, Russia and china.

⇒ Breeding of Black tiger

- They are viviparous and their litre size is 3-4.
- Gestation period is about 93-112 days.
- mating seems to be more frequent during the coolest months (November to April).
- In tempeate regions, females enters estrus and mate only during the winter months.
- females reach sexual maturity around 3-4 years of age and males mature about 4-5 years of age.
- A female tiger may enter estrus every three to nine weeks.

Distribution

- Its natural distribution in the Indo-pacific, ranging from the eastern coast of Africa and the Arabian Peninsula, as far as southeast Asia, the pacific ocean and northern Australia.
- In asia, they are limited to only 13 countries. These are India, Nepal, Bhutan, Bangladesh, Myanmar, Russia, china, Thailand, Malaysia, indonesia, combodia, Laos, and Vietnam.

⇒ Diet and Nutrition.

tigers are carnivores. they are noctornal hunters that feed on large prey such as deer cattle wild pigs, rhinoceroses and elephants. They also supplement their diet with smaller prey such as birds, monkeys, fish, and reptiles. Tigers also feed on carrion.

⇒ In zoo, there is only two Bangal tiger one of which is white tiger and other one is black tiger.

⇒ Tiger is the national animal of India.

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INDORE

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On

E-marketing SYSTEM

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Master in Computer Science

Head of the Department
Dr. Pradeep Sharma
Department of Computer Science,

Submitted To:

Guide: Dr. Pradeep Sharma Sir
Co-Guide:Prof. Bhagyashree Pathak ma'am

Submitted By:

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Ms. Mahima Bopche
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GOVT.HOLKARSCIENCECOLLEGE
INDORE

CERTIFICATE

This is to certify that work entitle **"E- marketing"** is an original research work done by **Ms. Monalisha Surydhar, Ms. Mahima Bopche, Mr.Rajendra Randa**under my guidance and supervision for the award of Master of Computer Science degree from Govt. Holkar Science College, affiliated to Devi Ahilya Vishwa vidyalaya, Indore [M.P.] India. It is certified that candidate has put in more than 75%attendance with me.

8/8/22

Signature of
Internal Examiner:

Signature of
External Examiner:

Department of Computer Science,
Holkar Science College Indore

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Holkar Science College Indore

CERTIFICATE

CODEBETTER/IND/2022/04/0037

Certificate

This is to certify that

Monalisha Sardar

has successfully completed

Internship In Full Stack Development

Duration 2 Months From 09/04/2022 To 09/06/2022

{c}odeBetter

Director

403, Shekhar Central, Palasia Square, A.B. Road, Indore (M.P.) | http://codebetter.in | contact@codebetter.in

CODEBETTER/IND/2022/04/0031

Certificate

This is to certify that

Mahima

has successfully completed

Internship In Full Stack Development

Duration 2 Months From 09/04/2022 To 09/06/2022

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Certificate

This is to certify that

Rahul Ora

has successfully completed

Internship In Full Stack Development

Duration 2 Months From 01/05/2022 To 03/06/2022

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Rise above the rest

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GOVT.HOLKARSCIENCECOLLEGE INDORE

DECLARATION BY THE CANDIDATE

I declare that the project entitle **"E-MARKETING SYSTEM"** is my own project work conducted under the guidance of **Prof. Bhagyashree Pathak** at Govt. Holkar Science College, affiliated to Devi Ahilya Vishwa vidyalaya, Indore [M.P.] , India approved by Master of science Degree Committee. I have put in more than 75percent attendance with the supervisor at the center.

I further declare that to the best of my knowledge the report does not contain any matter partially or wholly which has already been submitted for the award of any degree either to this University/ any other University/ Deemed University and if it does it is done with proper citation.

Signature of the Guide
Dr. Pradeep Kumar Sharma

Signature of the Co-guide
Prof. Bhagyashree Pathak

Signature of the Candidate
Ms. Monalisha Surydhar
Ms. Mahima Bopche
Mr. Rajendra Randa

Signature of Head of the Department
Dr. Pradeep Kumar Sharma

Department of Computer Science
Holkar Science College,
Indore

HEAD
Department of Computer Science
Govt. Holkar Science College
INDORE (M.P.)

ACKNOWLEDGEMENT

From the start of the Application, the journey to finish this Application without the help of the many individuals we will mention below this work would have never been accomplished.

First and fore most we would like to thank **Dr. Pradeep Sharma**, Head, Department of Computer Science, Govt. Holkar Science College, Indore for taking us on as a students and supporting us the whole time we have been under him. Their support enabled us to finish our dissertation.

Furthermore, we would like to thank my family and staff members of Department of Computer Science, Govt. Holkar Science College, without their support we would not be able to accomplish this task.

Student Name

Ms. Monalisha Surydhar
Ms. Mahima Bopche
Mr. Rajendra Randa

ABSTRACT

AIM:

The purpose of designing the online e-market Management System is to computerized the tradition way of shopping anywhere any time.

SCOPE:

The scope of the e-market Management System includes:

The e-Market System is developed as web application, and it will work for particular Organization/company, and the project can be modified to operate it online.

OBJECTIVE:

The objective of our project is to providing shopping facilities at any time everywhere. So that the customers can buy products by online medium and product holder can manage own business online with easiest way.

FORMALDESCRIPTION:

This project developed in JSP, HTML and Js's frameworks is basically an "E-MARKET System" which provides the people to buy their needy products at online platform and can get it at any time anywhere or own places.

TECHNICALDETAILS:

This project has been developed on the MERN (JavaScript) Platform technology. By using it to sell own products online and can see details. We have Mongo dB 4.4 for our data base requirement.

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INTRODUCTION

E-Marketing is an area of marketing that is based on achieving targets by using electronic communication technology on the Internet.

It is true that technology has become an essential tool for online marketing nowadays. However, there are numerous small shops and grocery stores with mostly offline business model in Vietnam recently. With this commerce model, it will bring a lot of bad experiences for both buyers and sellers. For instance, the seller has the product want to offer but the buyer may not know it, or the buyer may urgently need to purchase something, but the store is out of stock. Moreover, online shopping helps customers to choose a wide range of products, prices and they can compare them to each other easily.

Currently, there are many forms of e-commerce, including the following basic forms:

B2B (Business to Business): is a trade between companies, businesses and organizations. About 80% of e-commerce today falls into this category.

B2C (Business to Consumer): is an Internet-based business to directly exchange the goods and services it creates or distributes to consumers.

C2B (Consumer to Business): is a consumer who sells their products or services to a business or organization.

C2C (Consumer to Consumer): is when a consumer sells his goods or services to another consumer.

There are also G2C, G2B, etc., but used less often than these four basic forms.

HARDWAREANDSOFTWAREREQUIREMENT

SOFTWARE REQUIREMENT:

- Operating System
  - - Windows 10
- Web Server
  - - Express Js
- Browser
  - -Google Chrome/Microsoft Edge
  -
- □Development Environment
  - - JS
- □IDE
  - - VS code 2019
- Backend Database
  - - Mongo DB 4.4

HARDWARE REQUIREMENT:

- Processor
  - - .9 gigahertz (GHz)x64-bit Dual core processor (Minimum)
- Display
  - - Super VGA with a resolution of 1024 x 768
- RAM Capacity
  - - 4GB(Minimum)
- Hard Disk
  - - 1 TB
- Keyboard
  - - Standard Keyboard
- Mouse
  - - Optical
- Screen
  - - Tab, Laptop, Desktop

DEVELOPMENT TOOLKIT

"MERN FULL STACK DEVELOPMENT"

MERN Stack: MERN Stack is a JavaScript Stack that is used for easier and faster deployment of full-stack web applications. MERN Stack comprises of 4 technologies namely: **MongoDB, Express, React and Node.js.** It is designed to make the development process smoother and easier.

Each of these 4 powerful technologies provides an end-to-end framework for the developers to work in and each of these technologies play a big part in the development of web applications.

"OUR WEB TECHNOLOGIES"

Frontend technology:

React: Front-End Library

React is a JavaScript library that is used for building user interfaces. React is used for the development of single-page applications and mobile applications because of its ability to handle rapidly changing data. React allows users to code in JavaScript and create UI components.

Backend technology:

1. Express: Back-End Framework:

Express is a Node.js framework. Rather than writing the code using Node.js and creating loads of Node modules, Express makes it simpler and easier to write the back-end code. Express helps in designing great web applications and APIs. Express supports many middle-wares which makes the code shorter and easier to write.

2.Node.js: (JS Runtime Environment)

Node.js provides a JavaScript Environment which allows the user to run their code on the server (outside the browser). Node pack manager i.e. 'npm' allows the user to choose from thousands of free packages (node modules) to download.

3. MongoDB: (Cross-platform Document-Oriented Database)

MongoDB is a NoSQL database where each record is a document comprising of key-

value pairs that are similar to JSON (JavaScript Object Notation) objects. MongoDB is flexible and allows its users to create schema, databases, tables, etc. Documents that are identifiable by a primary key make up the basic unit of MongoDB. Once MongoDB is installed, users can make use of Mongo shell as well. Mongo shell provides a JavaScript interface through which the users can interact and carry out operations (eg: querying, updating records, deleting records).

WEB APPLICATION

A web application is a computer program that uses a web browser to perform a particular function. It is also called a web app. Web apps are present on many websites. A simple example is a contact form on a website.

A web application is a client-server program. It means that it has a client-side and a server-side. The term "client" here refers to the program the individual uses to run the application. It is part of the client-server environment, where many computers share information. For example, in the case of a database, the client is the program through which the user enters data. The server is the application that stores the information.

Businesses need to exchange information and conclude transactions with their target customers. The Internet can be an excellent and inexpensive channel for that purpose, providing that there is a way to capture and store all the necessary data and show results to users. Thanks to web applications, users can interact with the business using shopping carts or content management systems.

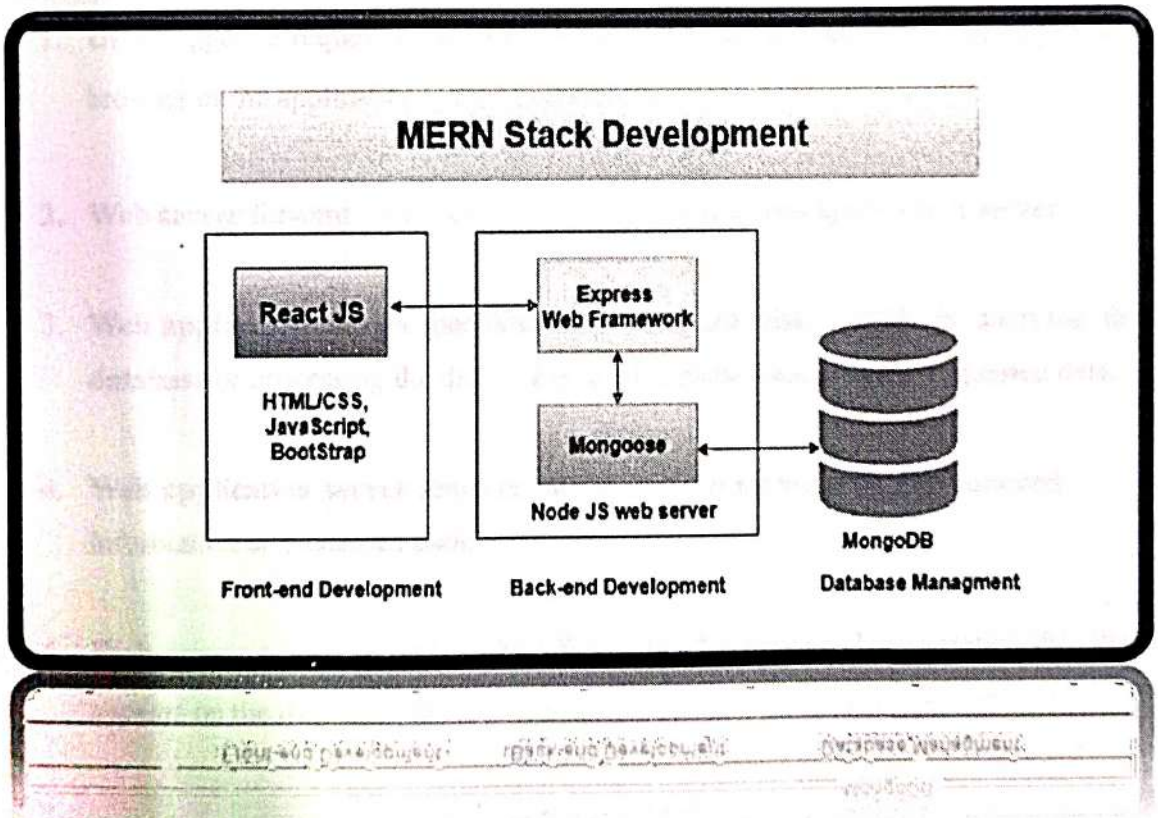
Web apps can be developed for many different reasons and used by companies or individuals. Individuals need it to facilitate their communication or purchase things online. Also, employees can collaborate on projects and work on shared documents with web applications. They can create reports, files, and share information from anywhere and with any device.

Web apps have evolved since their invention. One of the first applications, Perl, a popular server-side scripting language, was developed in 1987.

WEB APPLICATION ARCHITECTURE

A Web application is a complex piece of software. It consists of many components like the user interface, a login-screen, an in-app store, the database, etc. To manage these components, software engineers devised web application architecture to logically define the relationships and manner of interactions between all of these components for a Web app.

It's actually easier to define web application architecture by showing how everything fits together:



WORKING OF WEB APPLICATION:-

Web applications are usually coded in browser-supported language such as JavaScript and HTML as these languages rely on the browser to render the program executable. Some of the applications are dynamic, requiring server-side processing. Others are completely static with no processing required at the server.

The web application requires a web server to manage requests from the client, an application server to perform the tasks requested, and, sometimes, a database to store the information. Application server technology ranges from ASP.NET, ASP and ColdFusion, to PHP and JSP.

- **WEB APPLICATION FLOW**

1. **User** triggers a request to the **web server** over the **Internet**, either through a web browser or the application's user interface.

2. **Web server** forwards this request to the appropriate **web application server.**

3. **Web application server** performs the requested task – such as querying the **database** or processing the data – then generates the results of the requested data.

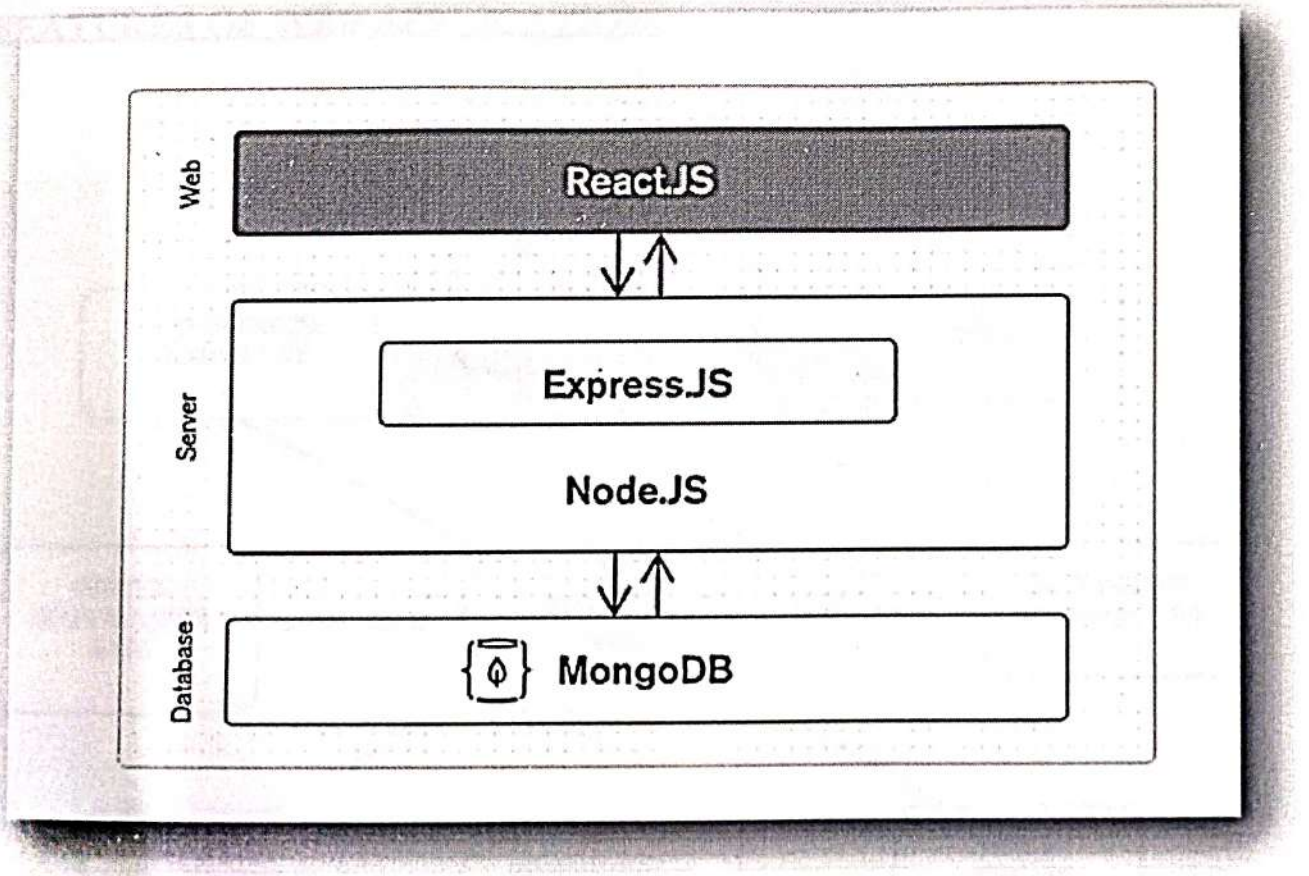
4. **Web application server** sends results to the **web server** with the requested information or processed data.

5. **Web server** responds back to the client with the requested information that then appears on the user's display.

AN EXAMPLE OF HOW IT WORKS

You find this cool new website and you want to create an account, so you decide to click the "sign up" button. You are then redirected to a page where you find a form asking you to enter your information. After you are done filling the form you are redirected to the profile section and you can now use the app.

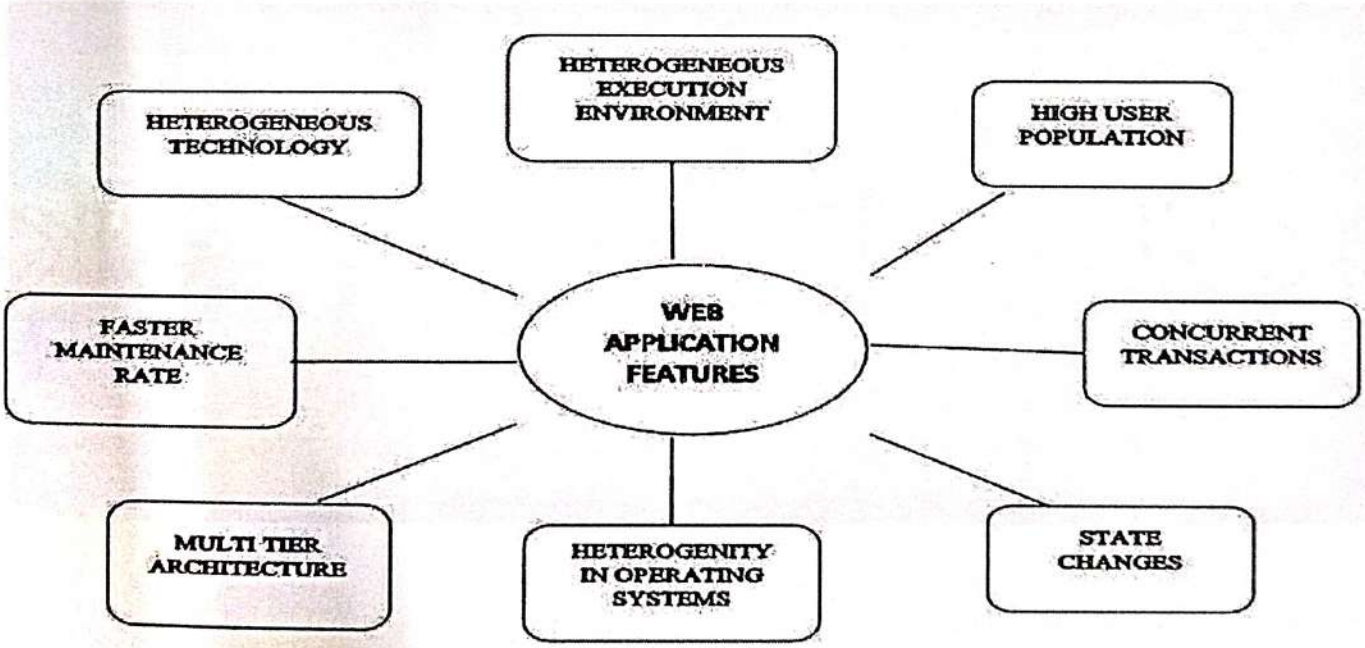
In this example, the sign-up form is on the client-side, where data is collected from the user. On the other hand, all the actions that are happening behind the scenes like adding the user to the database, checking if the email is unique and valid, redirecting the user to different pages, etc., are the backend of our Web app.



BENEFITS OF A WEB APPLICATION

- **Zero install** - all PCs have a browser
- **Reduce business costs** - less time spent talking to customers over the phone; eliminate printed materials; allow users to update their own details.
- **Centralized data** is secure and easy to backup.
- **Reach** anybody, anywhere in the world.
- **Available** 24 hours a day, 7 days a week.
- **Low spec PCs or smart phones** can be used.
- **Online training** can be completed at user's own time and pace.
- **Direct access** to latest information**always up-to-date.**

FEATURES OF WEB APPLICATION:-



THE EVOLUTION OF WEB DEVELOPMENT

Web Development was previously only known for the development of web pages and websites for both intranet and internet. However, nowadays it is more like creating **web applications** that surpass the complexity as well as the size of typical mobile and desktop applications. It can be said, web application development is the artsy method to develop complex business applications to both business and customers.

The web that we see today is the outcome of regular ongoing efforts of an open community of web that assists in designing the latest technologies. Some of the technologies that are being used today for web development are CSS3, WebGL, HTML 5, Java, React JS, Angular JS, PHP, etc. These technologies also ensure that the website or web app is supported in all web browsers.

STAGES OF WEB DEVELOPMENT EVOLUTION

During the start of web development evolution from the 90s to the current date, several things have changed and some of the features that were incorporated in its features:

- The sites were text-based
- Rise of Flash
- Sites were table-based with online page builders
- CSS Hits Web
- The Rise of JavaScript
- Semantic Web has come into view
- Web 2.0 was out
- Web Designs started embedding background images.
- Web Pages were divided into columns to aid numerous other customizations of the sites.
- Different graphic elements began incorporating in the web applications □Real-time visitor counters have become common on websites or web apps.
- Scrolling Marquee came into the picture
- GIF appearance started on the website

FRONT-END DETAILS

- **HTML**

HTML stands for **Hyper Text Markup Language**, which is the most widely used language on Web to develop web pages. **HTML** was created by Berners-Lee in late 1991 but "HTML 2.0" was the first standard HTML specification which was published in 1995. HTML 4.01 was a major version of HTML and it was published in late 1999. Though HTML 4.01 version is widely used but currently we are having HTML-5 version which is an extension to HTML

, and this version was published in 2012.

HTML is a MUST for students and working professionals to become a great Software Engineer especially when they are working in Web Development Domain. I will list down some of the key advantages of learning HTML:

- **Create Web site** - You can create a website or customize an existing web template if you know HTML well.

- **Become a web designer** - If you want to start a career as a professional web designer, HTML and CSS designing is a must skill.

- **Understand web** - If you want to optimize your website, to boost its speed and performance, it is good to know HTML to yield best results.

- **Learn other languages** - Once you understand the basic of HTML then other related technologies like JavaScript, php, or angular are become easier to understand.

- **BASIC HTML**

tag	Description
<!DOCTYPE>	Defines the document type
<html>	Defines an HTML document
<head>	Contains metadata/information for the document
<title>	Defines a title for the document
<body>	Defines the document's body
.....	Defines HTML headings
<p>	Defines a paragraph
 	Inserts a single line break
<hr>	Defines a thematic change in the content
<!--...-->	Defines a comment

- **FORMS AND INPUT**

Tag	Description
<form>	Defines an HTML form for user input
<input>	Defines an input control
<textarea>	Defines a multiline input control (text area)
<button>	Defines a clickable button
<select>	Defines a drop-down list
<optgroup>	Defines a group of related options in a drop-down list
<option>	Defines an option in a drop-down list
<label>	Defines a label for an <input> element

<fieldset>	Groups related elements in a form
<legend>	Defines a caption for a <fieldset> element
<datalist>	Specifies a list of pre-defined options for input controls
<output>	Defines the result of a calculation

- **IMAGES**

Tag	Description
<img>	Defines an image

- **LINKS**

Tag	Description
<a>	Defines a hyperlink
<link>	Defines the relationship between a documentresource and an external (most used to link to style sheets)
<nav>	Defines navigation links

- **LISTS**

Tag	Description
	Defines an unordered list
	Defines an ordered list
	Defines a list item
<dir>	Not supported in HTML5. Use instead. Defines a directory list
<dl>	Defines a description list
<dt>	Defines a term/name in a description list

<dd>	Defines a description of a term/name in a description list

- **TABLES**

Tag	Description
<table>	Defines a table
<th>	Defines a header cell in a table
<tr>	Defines a row in a table
<td>	Defines a cell in a table
<tbody>	Groups the body content in a table

- **STYLES AND SEMANTICS**

Tag	Description
<style>	Defines style information for a document
	Defines a section in a document
	Defines a section in a document
<header>	Defines a header for a document or section
<footer>	Defines a footer for a document or section
<main>	Specifies the main content of a document
<section>	Defines a section in a document

- **PROGRAMMING**

Tag	Description
<script>	Defines a client-side script

• CSS (Cascading Style Sheets)

Cascading Style Sheet (CSS) is used to set the style in web pages that contain HTML elements. It sets the background color, font-size, font-family, color etc. property of elements on a web page. The major points of CSS are given below:

- CSS stands for Cascading Style Sheet.
- CSS is used to design HTML tags.
- CSS is a widely used language on the web.
- HTML, CSS and JavaScript are used for web designing. It helps the web designers to apply style on HTML tags.

➢ there are three types of CSS which are given below:

- Inline CSS
- Internal or Embedded CSS
- External CSS

background	**A shorthand property for all the *background-** properties**
background-color	Specifies the background color of an element
background-image	Specifies one or more background images for an element
background-position	Specifies the position of a background image
background-size	Specifies the size of the background images
border	A shorthand property for *border-width, border-style* and *border-color*
border-bottom	A shorthand property for *border-bottom-width, border-bottom-style* and *border-bottom-color*
border-bottom-color	Sets the color of the bottom border

border-collapse	Sets whether table borders should collapse into a single border or be separated
border-color	Sets the color of the four borders
border-image	A shorthand property for all the *border-image-** properties
border-radius	A shorthand property for the four *border-*-radius* properties
border-style	Sets the style of the four borders
border-top	A shorthand property for *border-top-width, border-top-style* and *bordertop-color*
bottom	Sets the elements position, from the bottom of its parent element

color	Sets the color of text
columns	A shorthand property for *column-width* and *column-count*
display	Specifies how a certain HTML element should be displayed
flex	A shorthand property for the flex-grow, flex-shrink, and the flex-basis properties
float	Specifies whether or not a box should float
font	A shorthand property for the font-style, font-variant, font-weight, fontsize/line-height, and the font-family properties
font-family	Specifies the font family for text
font-size	Specifies the font size of text
font-style	Specifies the font style for text
font-weight	Specifies the weight of a font

justify-content	Specifies the alignment between the items inside a flexible container when the items do not use all available space
margin	Sets all the margin properties in one declaration
margin-bottom	Sets the bottom margin of an element
margin-left	Sets the left margin of an element
margin-right	Sets the right margin of an element
margin-top	Sets the top margin of an element
min-height	Sets the minimum height of an element
min-width	Sets the minimum width of an element
padding	A shorthand property for all the padding-* properties
padding-bottom	Sets the bottom padding of an element
padding-left	Sets the left padding of an element
padding-right	Sets the right padding of an element
padding-top	Sets the top padding of an element
table-layout	Defines the algorithm used to lay out table cells, rows, and columns
text-align	Specifies the horizontal alignment of text
text-decoration	Specifies the decoration added to text
text-decorationcolor	Specifies the color of the text-decoration
text-shadow	Adds shadow to text

JAVASCRIPT

JavaScript (js) is a light-weight object-oriented programming language which is used by several websites for scripting the webpages. It is an interpreter, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document. It was introduced in the year 1995 for adding programs to the webpages in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers. With JavaScript, users can build modern web applications to interact directly without reloading the page every time. The traditional website uses js to provide several forms of interactivity and simplicity.

JavaScript can be added to your HTML file in two ways:

:

- **Internal JS:** We can add JavaScript directly to our HTML file by writing the code inside the <script> tag. The <script> tag can either be placed inside the <head> or the <body> tag according to the requirement.
-
- **External JS:** We can write JavaScript code in other file having an extension.js and then link this file inside the <head> tag of the HTML file in which we want to add this code.

Syntax:

,

```
<script>
    // JavaScript Code
</script
```

DATABASE

A database is a separate application that stores a collection of data. Each database has one or more distinct API's for creating, accessing, managing, searching and replicating the data it holds. The name indicates what the database is. A database is one of the important components for many applications and is used for storing a series of data in a single set. In other words, it is a group/package of information that is put in order so that it can be easily accessed, manage and update.

There are different types of database. They are:

- Bibliographic
- Full- text
- Numeric
- Images

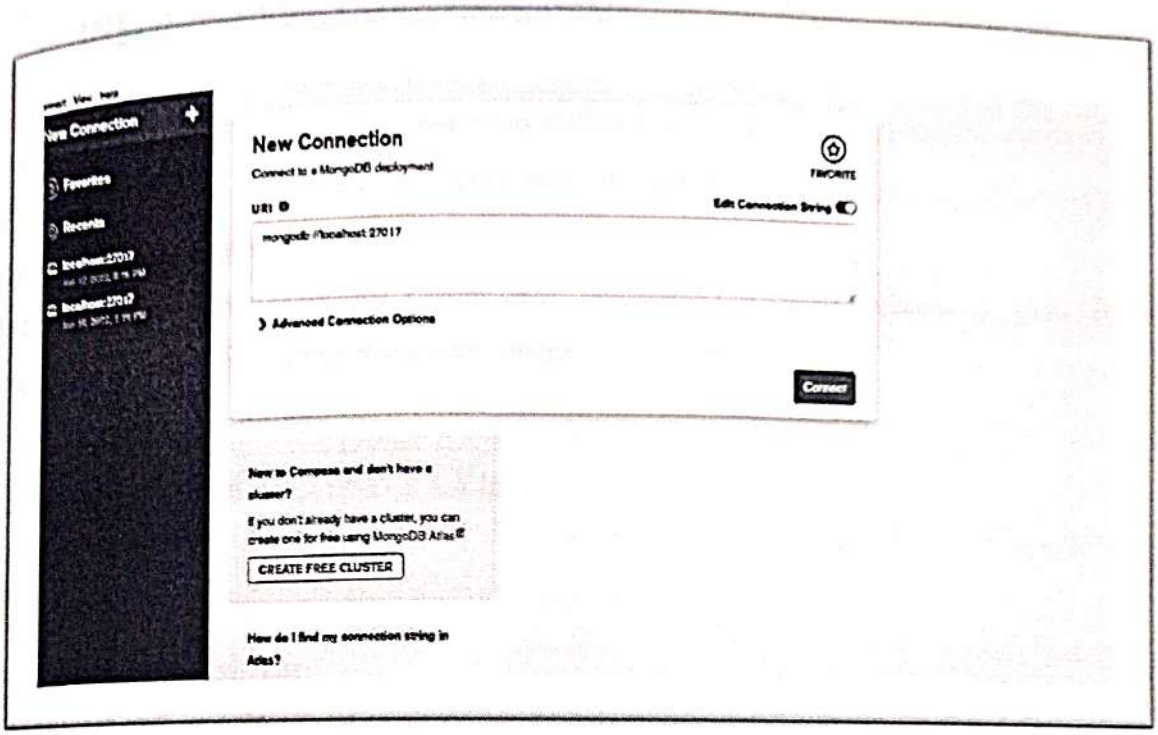
In a database, even the smallest portion of information becomes the data. Example, Student is a data, roll number is a data, and the address is a data, height, weight, marks everything is data. In brief, all the living and non- living objects in this world is a data. In this chapter of the database, you will learn about the basic terminologies that are used in DBMS.

Any relational database has a typical schema design that shows number of tables and the relationship between these tables. While in MongoDB, there is no concept of relationship.

Advantages of MongoDB

- **Schema less** – MongoDB is a document database in which one collection holds different documents. Number of fields, content and size of the document can differ from one document to another.
- Structure of a single object is clear.
- No complex joins.
- Deep query-ability. MongoDB supports dynamic queries on documents using a document-based query language that's nearly as powerful as SQL.
- Tuning.

- **Ease of scale-out** – MongoDB is easy to scale.
- Conversion/mapping of application objects to database objects not needed.
- Uses internal memory for storing the (windowed) working set, enabling faster access of data.



MongoDB Features

- Ad-hoc queries for optimized, real-time analytics. ...
- Indexing appropriately for better query executions. ...
- Replication for better data availability and stability. ...
- Shading. ...
- Load balancing.

SYSTEM REQUIREMET ANALYSIS

. INFORMATION GATHERING:-

It is a depth study of end user information requirement that is needed before the design of new information system can be completed. System analyst traditionally involved in the following activities.

Meeting: For this we meet our Guide prof. Bhagyashree Pathak whenever need. They suggested us about including some new features to our project.

. SYSTEM FEASIBILITY:-

Economic feasibility:

There must be sufficient benefit in creating the system to make the cost acceptable. A system can be developed technically and that will be used if installed must still be a good investment for the organization. Financial benefit must equal or exceed the cost. The financial and economical question raised by analyst during the preliminary investigation is for the purpose of estimating the following:

(a) The cost to conduct the full system investigation.

(b) The cost of hardware and software.

Technical Feasibility:

Technical feasibility canter on the existing computer hardware and software, it deals with the feasibility of the required technology for implementing the proposed system. The system is developed in windows environment using JAVA EE technology, with JDK version 1.8

MongoDB 4.4, the project is technically feasible because there is no need to have very high configured system.

Behavioral Feasibility:

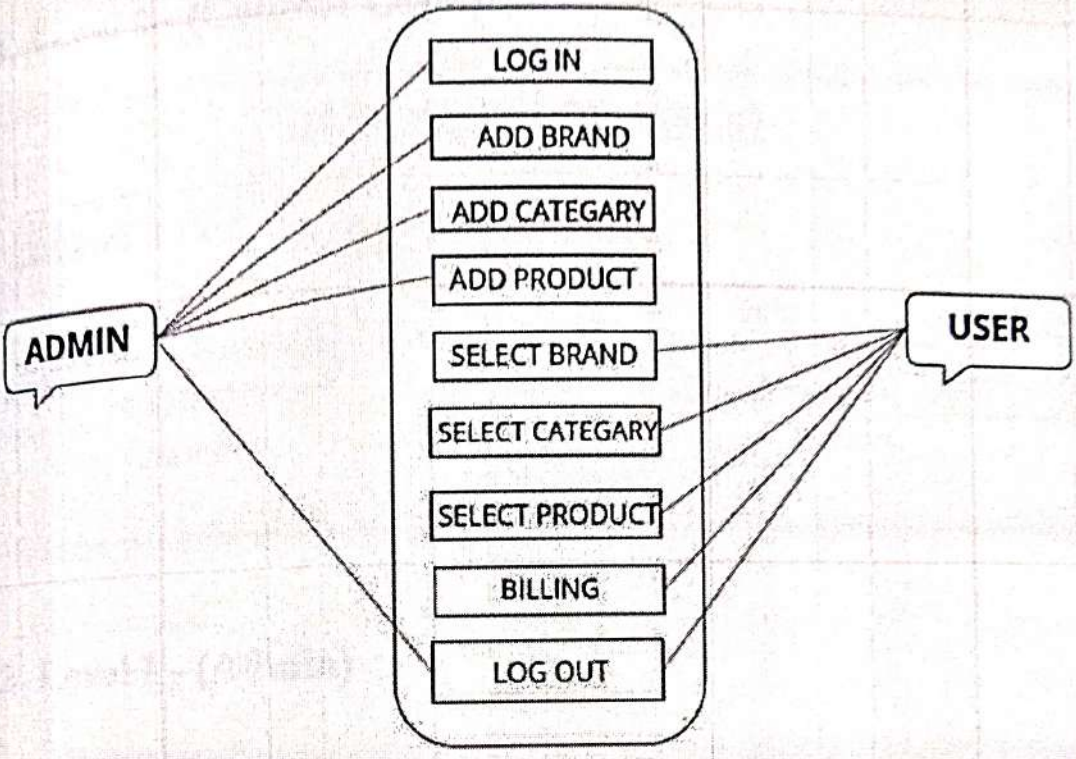
Our system follows Behavioral feasibility because of its friendliness in nature. Anyone can operate easily for this we have developed user interface and user friendly web app.

TECHNOLOGY USED:

The system should be developed such that deployment of the system easy and effortless. Also the technology should very easy and user friendly.
Wed had plenty of option select the technology and tools .The selection criteria we set are decided below:

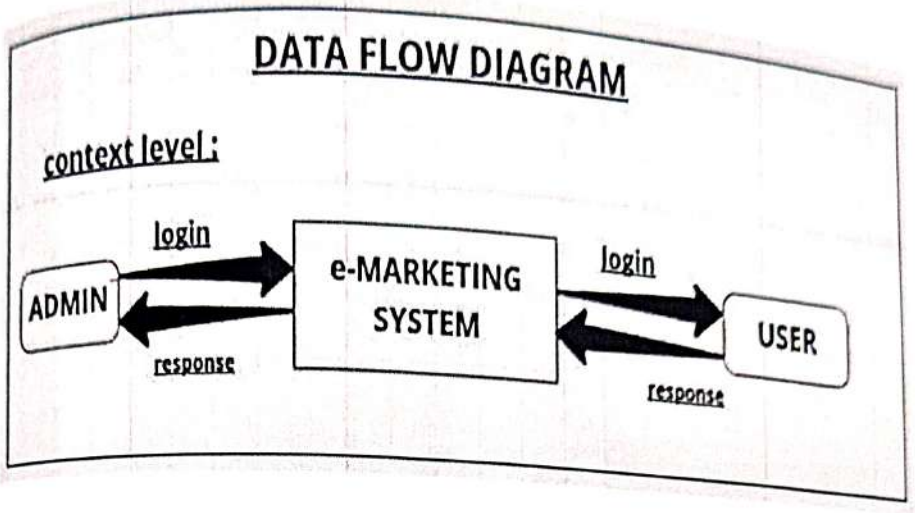
- The technology should be widely accepted in industry.
- The platform should be easy to develop and allow rapid development.
- The technology selected should be performs independent.

USE CASE DIAGRAM

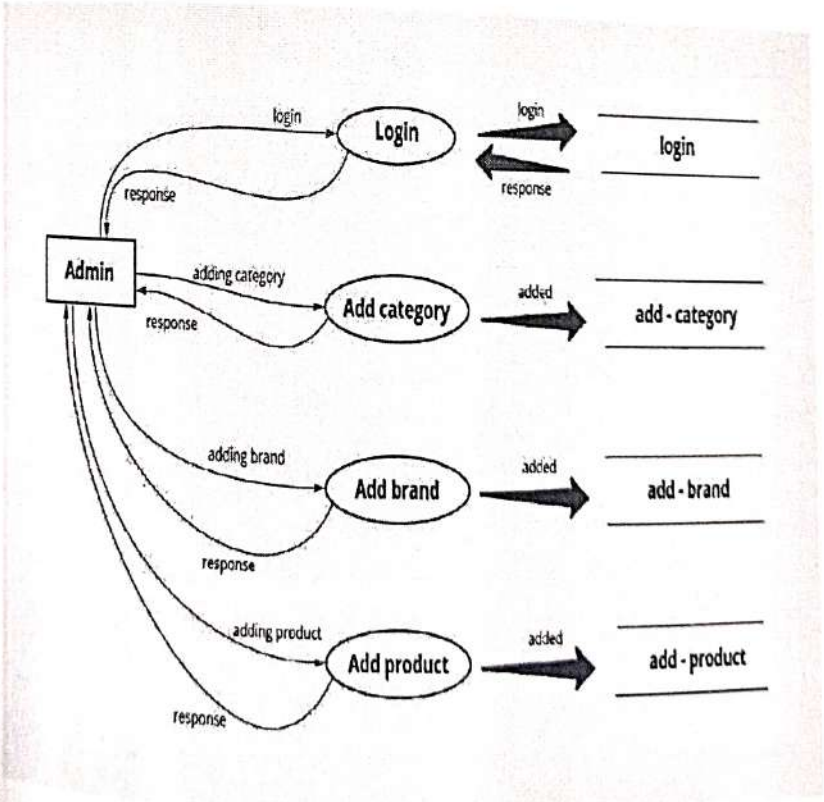


DATA FLOW DIAGRAM

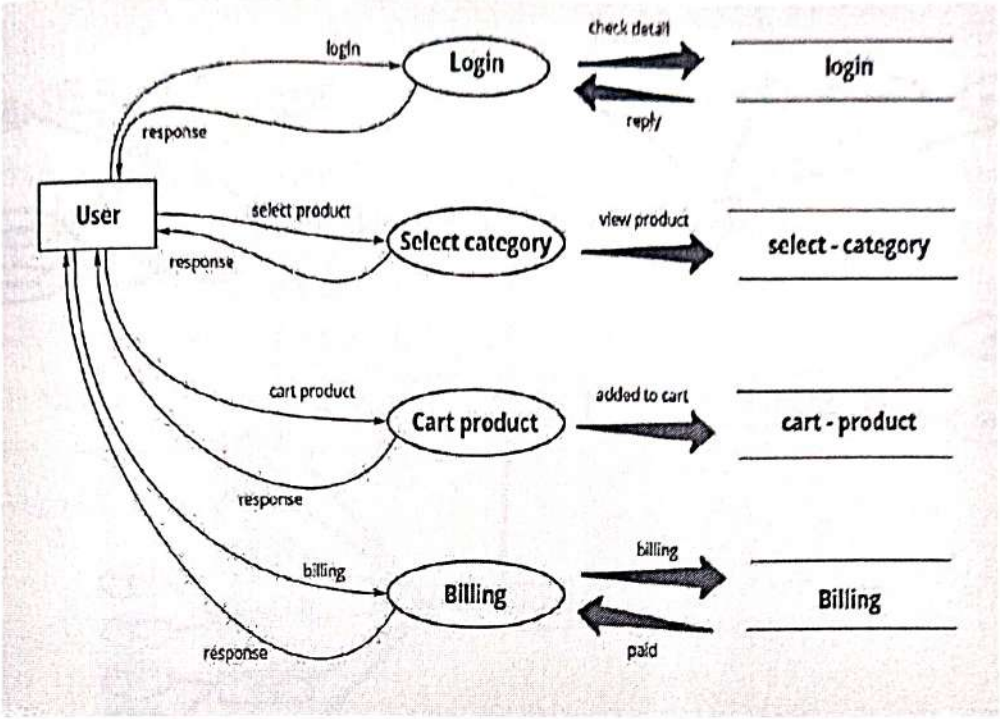
1. Level 0 - (Context Level)



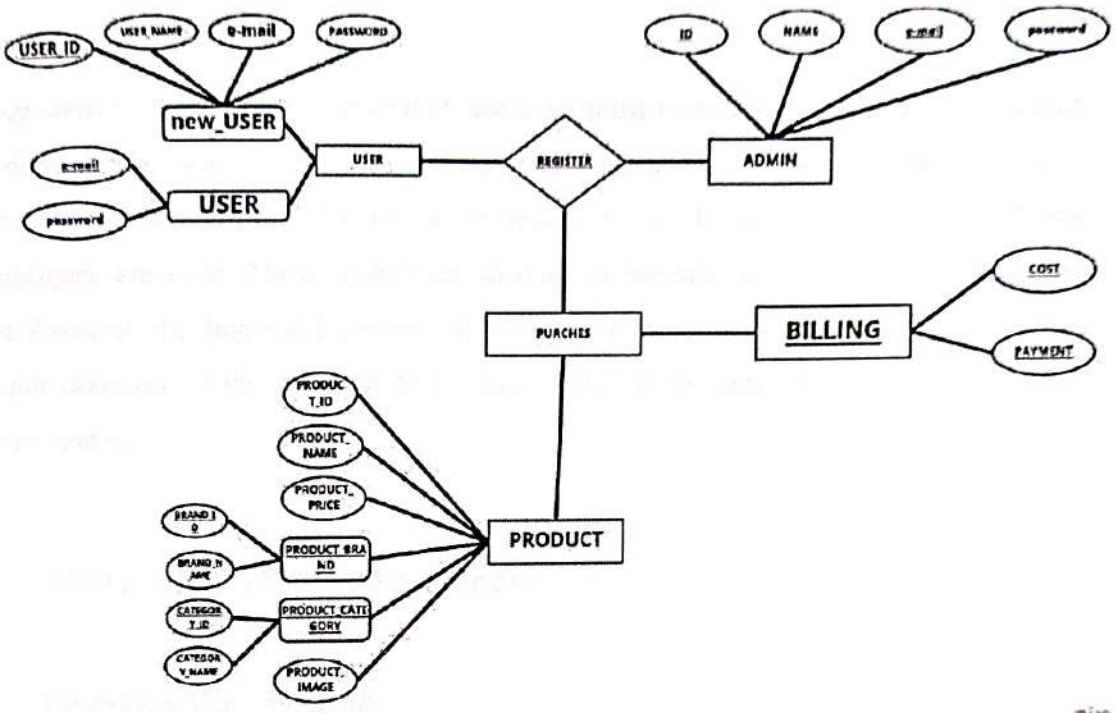
2. Level 1 - (Admin)



3. Level 1 - (User)



ER- DIAGRAM


USER_ID
USER NAME
E-mail
PASSWORD
new_USER
USER
e-mail
password
USER
REGISTER
ID
NAME
e-mail
password
ADMIN
PURCHES
BILLING
COST
PAYMENT
PRODUC T_ID
PRODUCT_ NAME
PRODUCT_ PRICE
BRAND I D
BRAND_N AME
PRODUCT_BRA ND
CATEGOR Y_ID
CATEGOR Y_NAME
PRODUCT_CATE GORY
PRODUCT_ IMAGE
PRODUCT
miro

TESTING

TESTING PLAN

Once source code has been generated, software must be tested to uncover (and correct) as many errors as possible before delivery to customer. Our goal is to design a series of test cases that have a high likelihood of finding errors. To uncover the errors software techniques are used. These techniques provide systematic guidance for designing test that Exercise the internal logic of software components, and Exercise the input and output domains of the program to uncover errors in program function, behavior and performance.

TESTING – TECHNIQUES USED:

1. Functionality Testing

- We have verified there is no dead page or invalid redirects.
- We have checked all the validations on each field.
- We have taken Wrong inputs to perform negative testing.
- We have verified the workflow of the system.

2. Usability testing -

- We have tested the navigation and controls.
- We have checked Content.
- Checked for user intuition.

3.Interface testing –

Performed this technique to verify the interface and the data is flowing from one system to other.

4.Compatibility testing-

- Browser compatibility
- Operating system compatibility
- Compatible to various devices like notebook, mobile, etc.

5.Performance testing–

We have performed this testing to verify the server response time and throughput under various load conditions.

6.Security testing –

- We have performed to verify if the application is secured on web as data theft and unauthorized access are more common issues

TESTED ITEMS:

Our tested items are like:

- Check for Server and Internet Connections
- Check for valid Source and Destination points entered by user
- Orientation changes handling

- Transitions between two activities and passing data □Database connections and updates handling.

TESTING SCHEDULE:

We have tested each procedure back-to-back so that errors and omissions can be found as early as possible. Once the system has been developed fully we have tested it on different devices, and browsers which differs in configuration.

BLACK BOX TESTING

This is a software testing method in which the functionalities of software applications are tested without having knowledge of internal code structure, implementation details and internal paths. Black Box Testing mainly focuses on input and output of software applications and it is entirely based on software requirements and specifications. It is also known as Behavioral Testing.

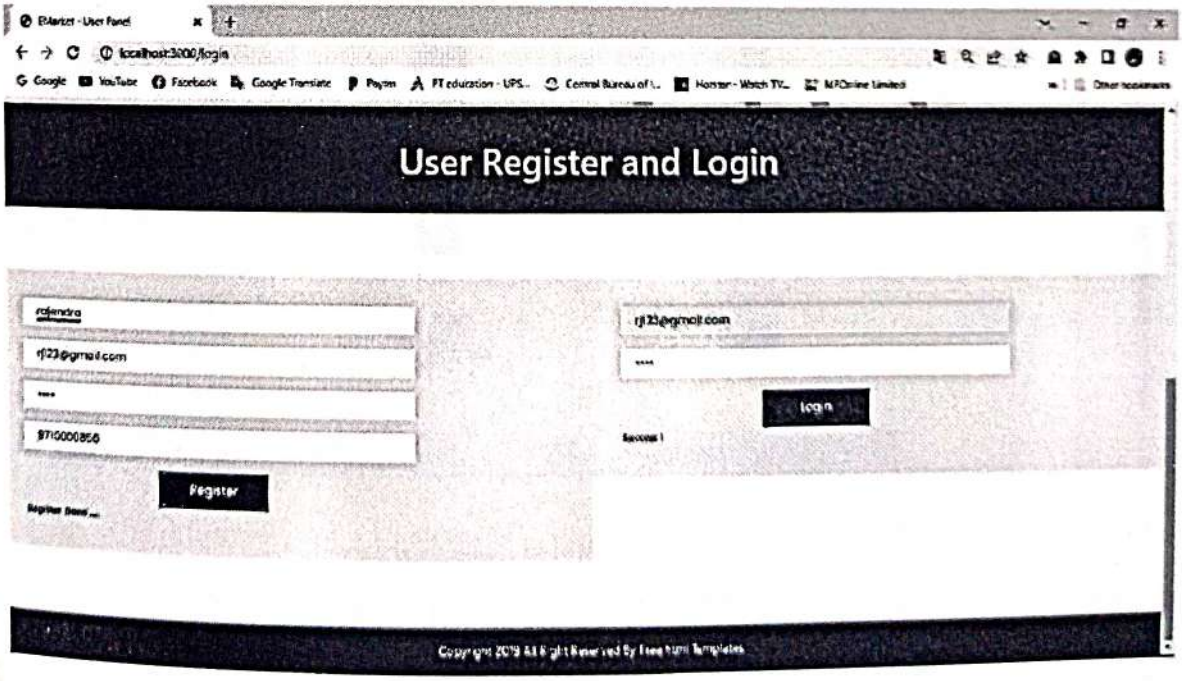
WHITE BOX TESTING

This is software testing technique in which internal structure, design and coding of software are tested to verify flow of input-output and to improve design, usability and security. In white box testing, code is visible to testers so it is also called Clear box testing, open box testing, transparent box testing, Code-based testing and Glass box testing.

INPUT/OUTPUT SCREEN

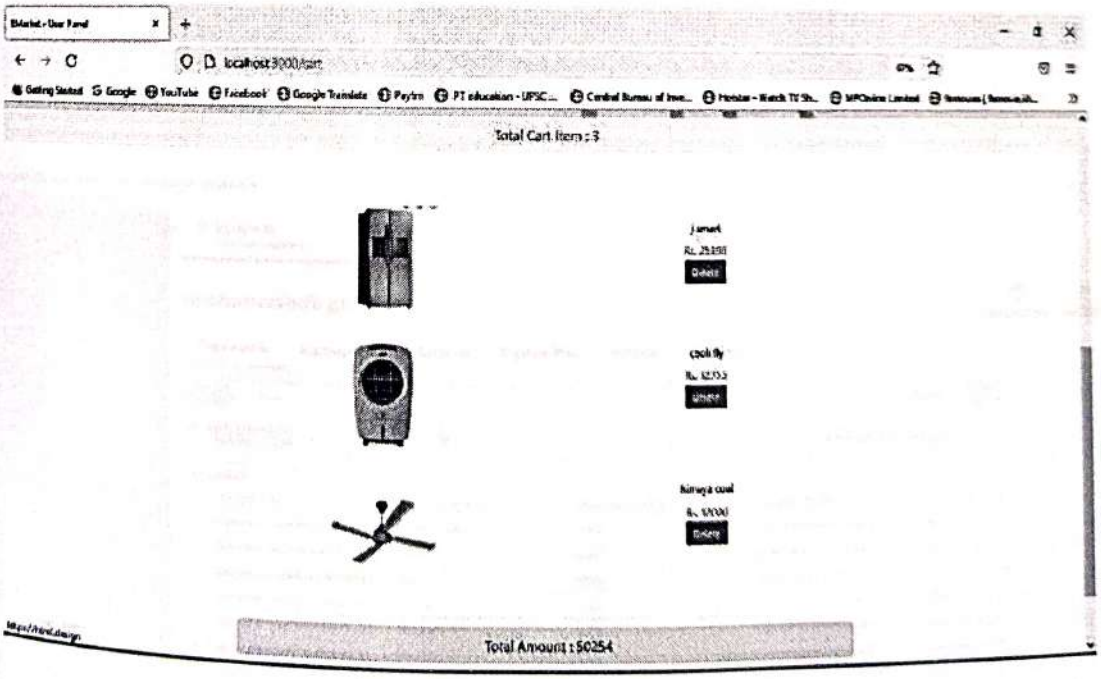
1. MAIN PAGE

2. LOGIN FROM MAIN PAGE



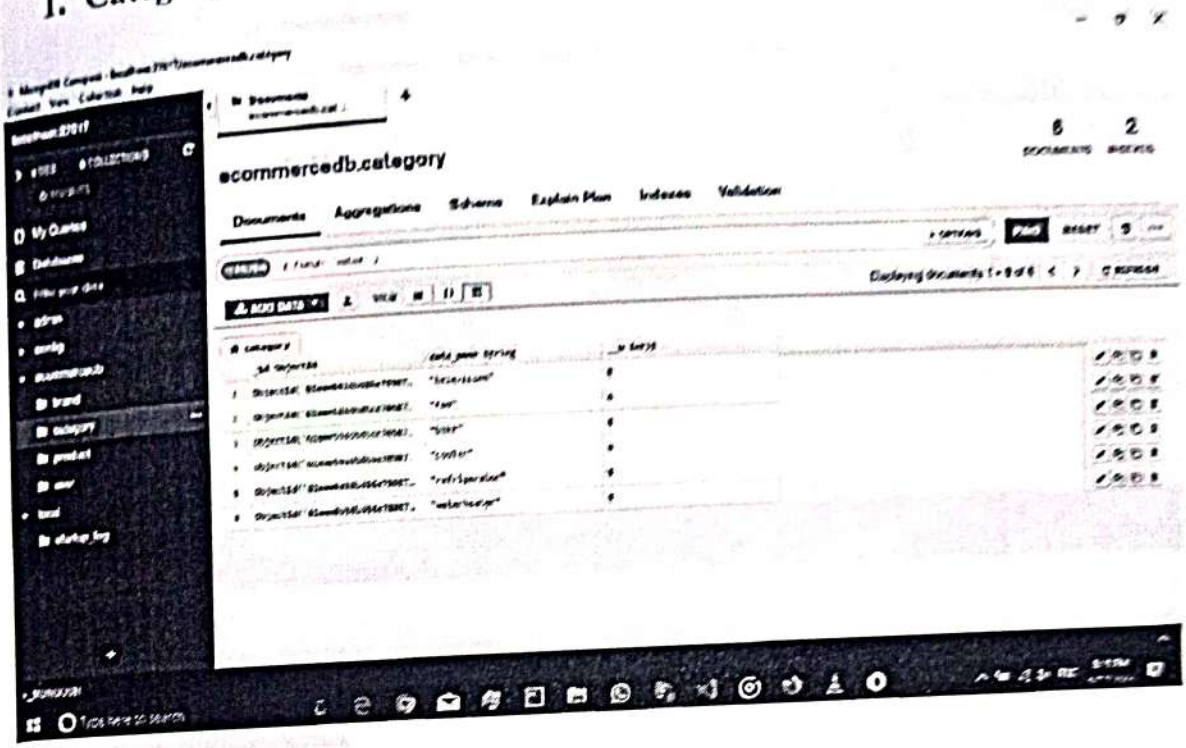
3. PRODUCT AND COST:

4. PERCHESED PRODUCTS/ BILLING:

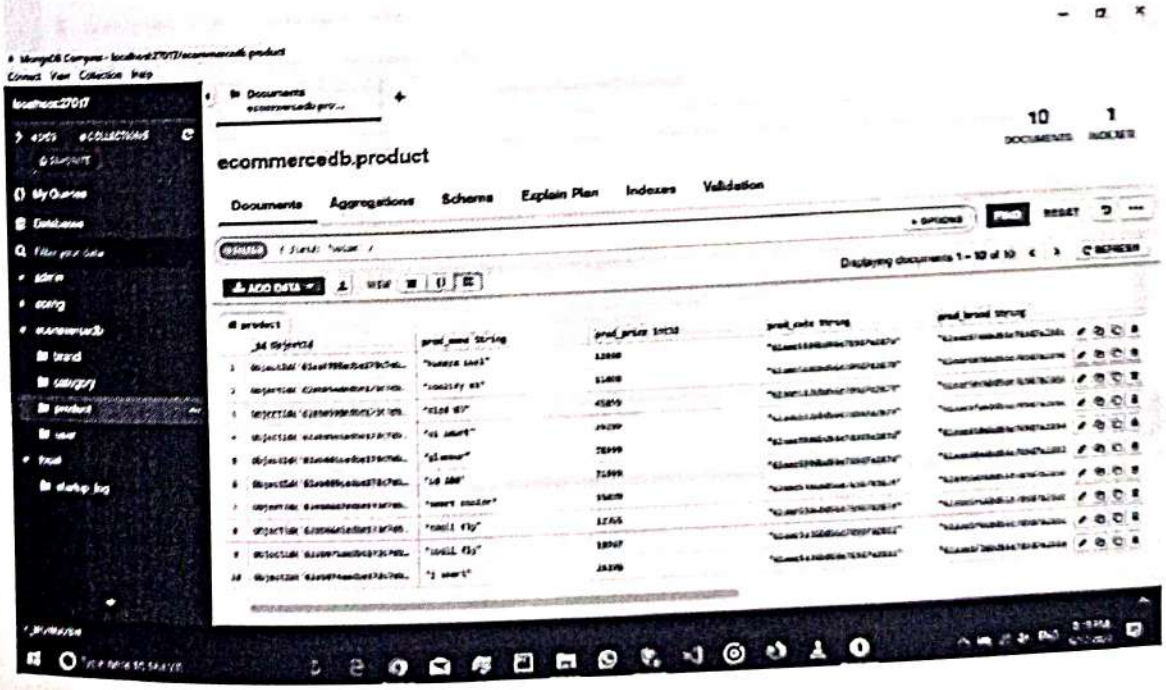


DATABASE TABLE

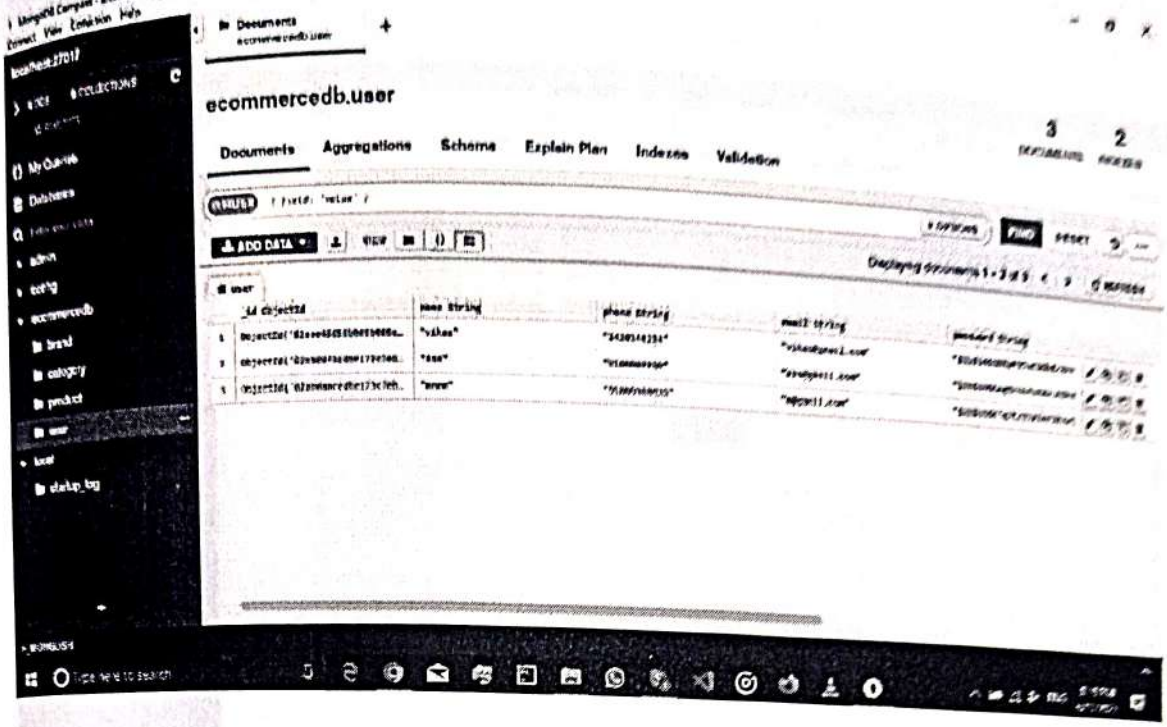
1. Category table



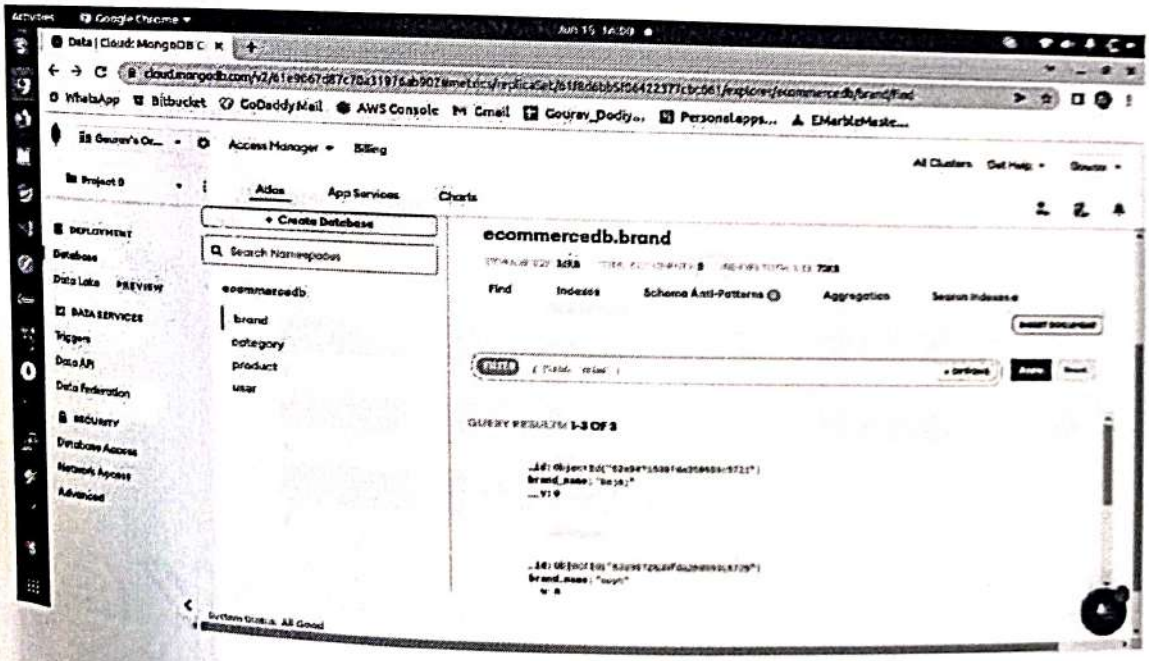
2. Product table



3. User table

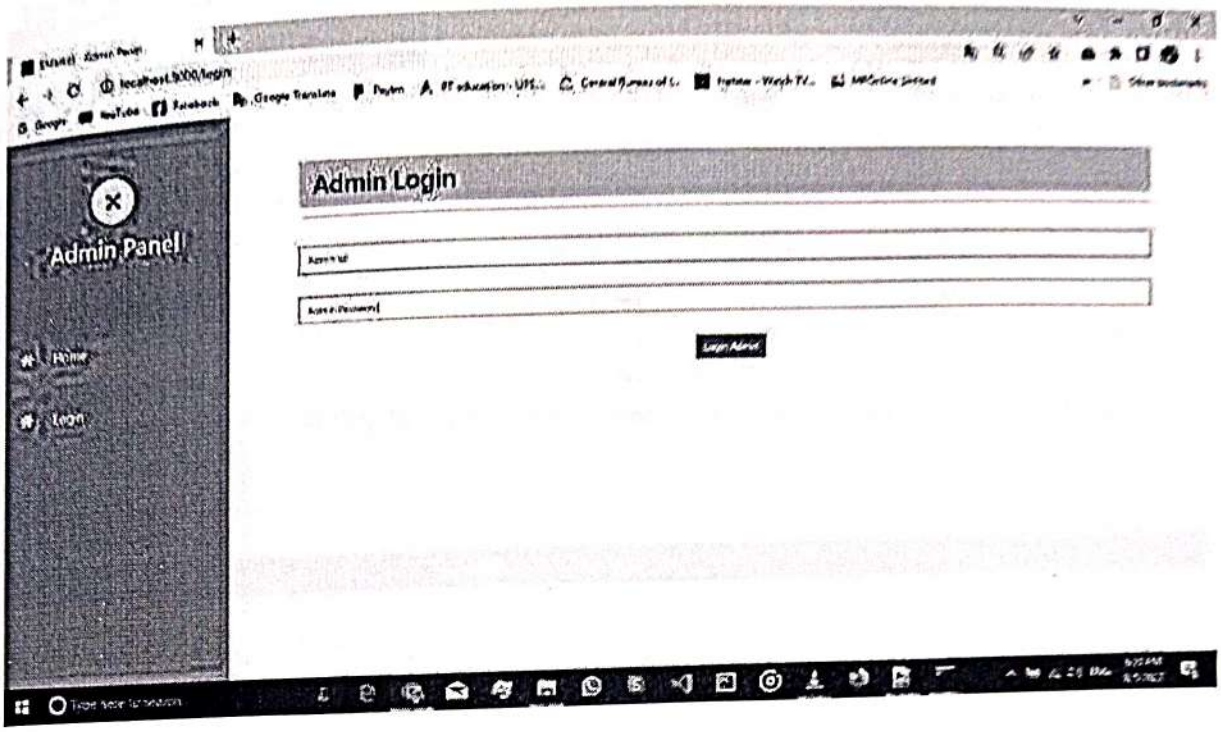


Main database coding

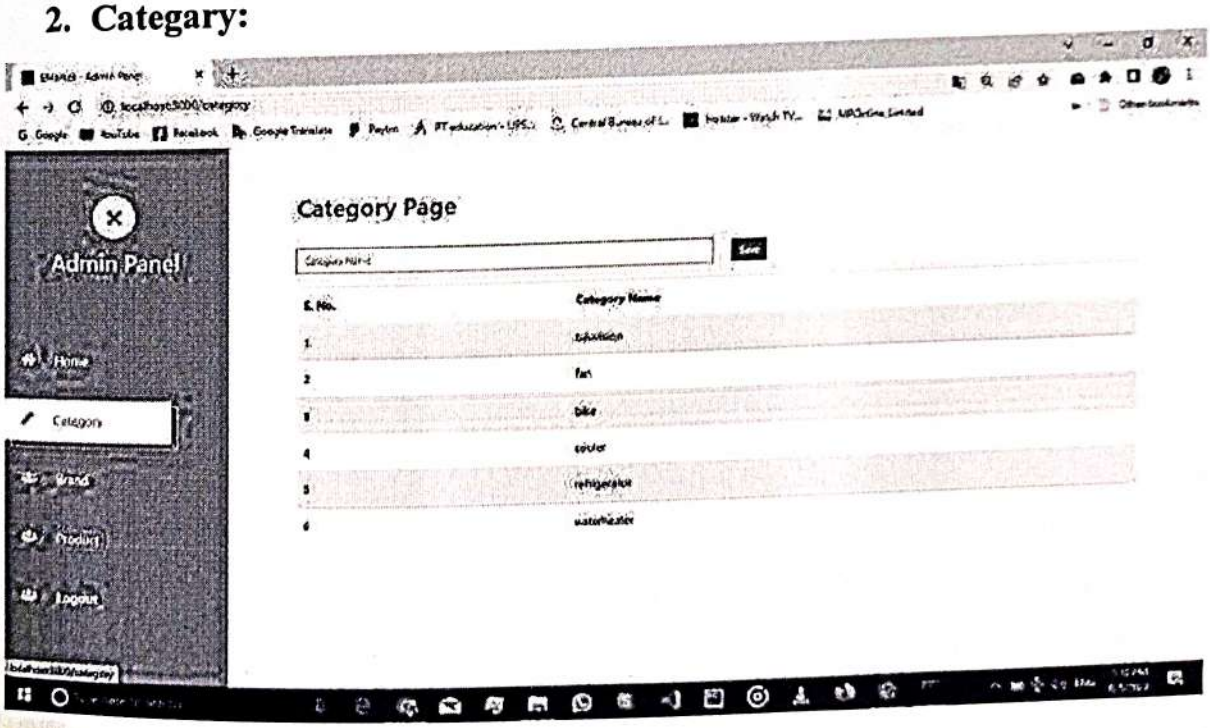


Admin panel:

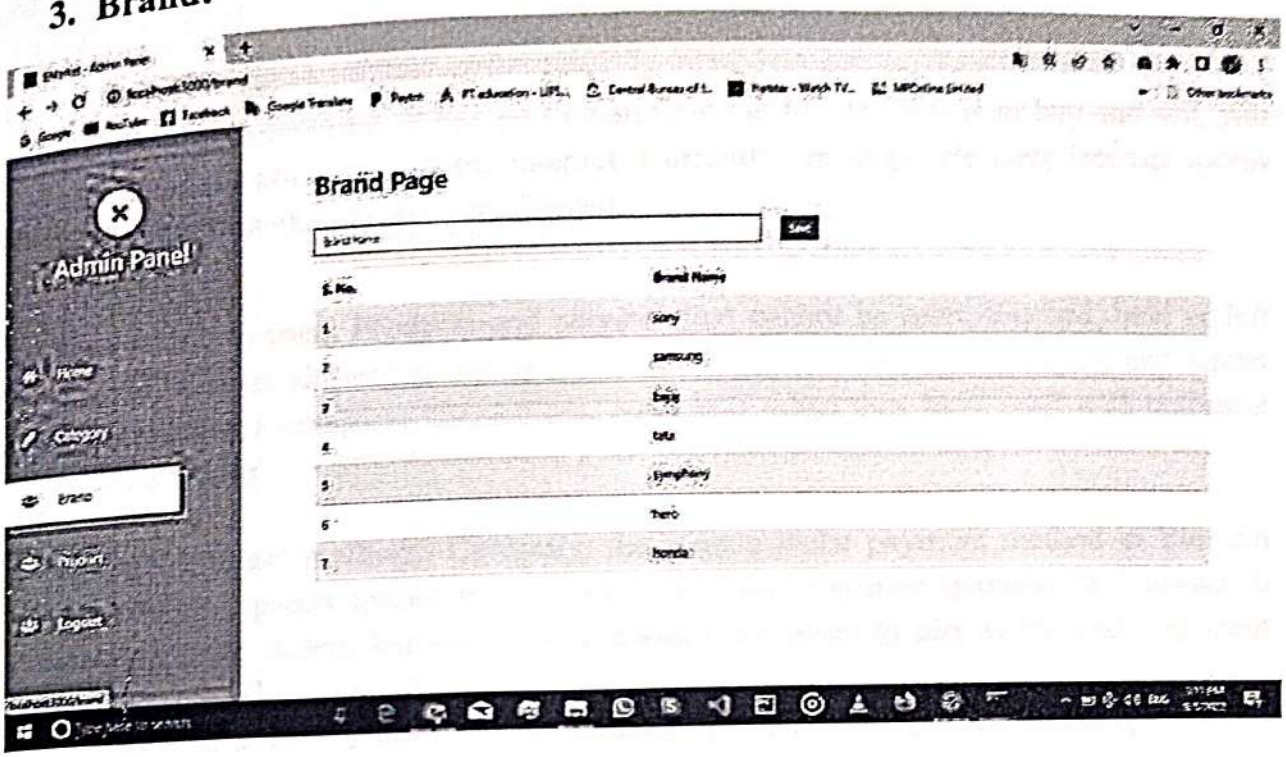
1. Admin:



2. Categary:



3. Brand:


Admin Panel
Home
Category
Brand
Product
Logout
Brand Page
Save
S.No.
Brand Name
1
sony
2
samsung
3
bajaj
4
tata
5
symphony
6
hero
7
honda

Limitation

1. Internet access required: When participating in the EC, to be able to buy and sell, you need a device connected to the internet. Currently, most people have internet access but, in many areas, it is still very limited.

2. Not enough to trust: Products and services that cannot be seen, touched, held or felt directly, are not allowed to try as a prudent buyer. Doubt in both buyers and sellers leads to many incomplete transactions, especially when they have dealt with untrusted partners before.

3. Limited payment methods: Currently, the most popular payment method in Vietnam when buying goods online is to receive and pay. Payment gateway in Vietnam is growing quite strong, but not reliable enough for users to use as the main payment method.

In addition, e-commerce business also faces many other challenges: technical, competitors, payment, etc.

FUTURE SCOPE

To state the obvious, the future isn't written in stone. But we can surely draw a fair analysis on the growth to come for MERN stack developers based on the industry data that we have today. So, what are the advantages of mastering the MERN Stack for developers?

1. Open-source:

The best part about MERN is that all the four technologies that make up the stack are free (open-source). This makes it easier for developers to find swift solutions from the available open portals, and effectively fix the issues that may arise during development.

2. Cost-Effective:

MERN Stack Developers are well in demand because this stack uses one language that is JavaScript. It is far more beneficial for companies to invest in professionals with expertise in MERN. This proves to be a more cost-effective solution, both in terms of time and money, as compared to hiring different specialists for different technologies.

3. Easy to switch between client & server:

When it comes to MERN Stack, everything is written in one language; making it much simpler for developers to master the language (within 4-6 months with dedicated learning). It is also easy to switch between client and server, opening up more growth avenues for the developers.

4. UI rendering and performance:

For UI layer abstraction, rendering and performance, React JS has proven to be the best solution so far. Why? It gives developers the liberty to build and organize the application code according to their vision.

CONCLUSION

Finally, in the E-marketing system we can proving e commerce service globally anytime anywhere.

With the MERN stack you can ideally build any web application you want by learning just one language, JavaScript. With increased popularity of NoSQL databases, MongoDB is a go to database because of its scalability and flexible document schemas.

Though, the MERN stack is ideally suited for more JSON heavy, cloud native and dynamic web applications. One can build simple applications like the todo list, task manager to more complex ones like e-commerce sites and social media sites. MERN stack has growing popularity and many advantages with backing from a community of developers. If one aspires to be a full stack developer, he/she should definitely try out the MERN stack!

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- Mastering Html, CSS & JavaScript Web Publishing: Laura Lemay

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- www.w3schools.com
- www.reactjs.org
- www.stackoverflow.com
- www.programmingz.com

GOVT.HOLKAR SCIENCE COLLEGE

INDORE

Project Report
On

SCHOOL MANAGEMENT

This is a major project for the partial fulfillment of the award of degree of

Master in Computer Science

Head of the Department
Dr. Pradeep Sharma
Department of Computer Science,

Submitted To:
Dr. Pradeep Sharma(Guide)
Prof.Harsh Paliwal(Co-Guide)

Submitted By:
Ms. Neha Prajapati
Mr. Rajendra Dhurve

Department of Computer Science,
Govt. Holkar Science College Indore
(Affiliated to D.A.V.V. Indore)
2022

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(Affiliated to D.A.V.V. Indore)
2022

GOVT.HOLKAR SCIENC ECOLLEGE
INDORE

CERTIFICATE

This is to certify that work entitle **"SCHOOL MANAGEMENT "** is an original research work done by **Ms. Neha Prajapati** and **Mr.Rajendra Dhurve** under my guidance and supervision for the award of Master of Computer Science degree from Govt. Holkar Science College, affiliated to Devi Ahilya Vishwa vidyalaya, Indore [M.P.] India. It is certified that candidate has put in more than 75%attendance with me.

8/8/22

Signature of
Internal Examiner:

Signature of
External Examiner:

Department of Computer Science,
Holkar Science College
Indore

॥ श्री गणेशाय नमः ॥

CODEMANTRA
Landmark of Practical Programming

ISO 9001:2015 **Date 22-05-22**

To Whom So Ever It may Concern

This is to Certify that **Mr. RAJENDRA S/O Mr. BALRAM**, Student of **GOVERNMENT HOLKAR SCIENCE COLLEGE, INDORE** Is an Intern at our Firm **CODEMANTRA Web-learn**. He has worked here from **10-APR-2022 To 20-MAY-22**. He Had been a co-authority on a Project Based on **PHP**. We have been impressed by the Dedication displayed & Quick Grasp of concept of new technologies.

We Wish him for his all future endeavors.

For CODEMANTRA
Proprietor

Authorized Signature
Director

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M.P 452001, Mob.: 89594 90906, 9340131405
codemantratech@gmail.com | www.codemantra.org

॥ श्री गणेशाय नमः ॥

CODEMANTRA
Landmark of Practical Programming

ISO 9001:2015

Date 22-05-22

To Whom So Ever It may Concern

This is to Certify that Mr. NEHA PRAJAPATI S/O Mr. MANOJ PRAJAPATI, Student of GOVERNMENT HOLKAR SCIENCE COLLEGE, INDORE Is an Intern at our Firm CODEMANTRA Web-learn. He has worked here from 10-APR-2022 To 20-MAY-22. He Had been a co-authority on a Project Based on PHP. .We have been impressed by the Dedication displayed & Quick Grasp of concept of new technologies.

We Wish Her for his all future endeavors.

Authorized Signature
For Director

CODEMANTRA
Proprietor

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

DECLARATION BY THE CANDIDATE

I declare that the project entitle **"WEBSITE ON SCHOOL MANAGEMENT"** is my own project work conducted under the guidance of **Dr. Pradeep Sharma** and **Prof. Harsh Paliwal,** at Govt. Holkar Science College, affiliated to Devi Ahilya Vishwavidyalaya, Indore [M.P.] , India approved by Master of science Degree Committee. I have put in more than 75 percent attendance with the supervisor at the centre.

I further declare that to the best of my knowledge the report does not contain any matter partially or wholly which has already been submitted for the award of any degree either to this University / any other University / Deemed University and if it does it is done with proper citation.

Signature of the Guide
Dr. Pradeep Sharma
Signature of the Co-Guide
Prof. Harsh Paliwal

HEAD
Department of Computer Science
Govt. Holkar Science College

Signature of the Candidates

Ms. NEHA PRAJAPATI
Mr. RAJENDRA DHURVE

Signature of Head of the Department
Dr. Pradeep Kumar Sharma
Department of Computer Science

ACKNOWLEDGEMENT

From the start of the Application, the journey to finish this Application without the help of the many individuals we will mention below this work would have never been accomplished.

First and fore most we would like to thank **Dr. Pradeep Sharma**, Head, Department of Computer Science, Govt. Holkar Science College, Indore and **Prof. Abhishek Verma(Code Mantra)** for taking us on as a students and supporting us the whole time we have been under him.
Their support enabled us to finish our dissertation.

Furthermore, we would like to thank my family and staff members of Department of Computer Science, Govt. Holkar Science College, without their support we would not be able to accomplish this task.

Student Name

Ms. Neha Prajapati
Mr. Rajendra Dhurve

ABSTRACT

AIM:

The purpose of designing the School Management is to computerized the tradition way of maintain school data.

SCOPE:

The scope of the School Management includes:

The School Management is developed as web application, and it will work for particular School, and the project can be modified to operate it online.

OBJECTIVE:

The objective of our project is to retrieve and add information at any time. So that the information of students and all school staff can be modify at any time and easily.

FORMAL DESCRIPTION: This project developed in PHP, JAVA, HTML,CSS , PHYTHON

TECHNICAL DETAILS:

This project has been developed on the PHP Platform technology. By using it head of school can easily retrieve school data. We have Oracle11g XE for our data base requirement.

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INTRODUCTION

School Management is Web Application developed for maintain data of school for principal. It facilitates to access the all information of students and staff members.

School Management System basically has three main modules for proper functioning:-

- First module is admin which hold the key for editing and updating information. The admin has absolute right to all the users which are the Teachers and Student.
- Second module is handled by the user which can be a Teacher or Instructor. This user has a right of update information.
- Third is handled by a user which is the Student, he has less privilege to the access of the system. The student can only view his own record by providing his username and password.

HARDWARE AND SOFTWARE REQUIREMENT

SOFTWARE REQUIREMENT:

- Operating System - Windows 10
- Web Server - Apache
- Browser - Google Chrome/Microsoft Edge
- Development environment - XAMPP

HARDWARE REQUIREMENT:

RAM Capacity	-	4GB(Minimum)
Hard Disk	-	500GB
Keyboard	-	Standard Keyboard
Mouse	-	Optical
Screen	-	Tab, Laptop, Desktop

DEVELOPMENT TOOL KIT

JAVA JDK

The Java Development Kit (JDK) is an implementation of either one of the Java Platform, Standard Edition, Java Platform, Enterprise Edition, or Java Platform, Micro Edition platforms released by Oracle Corporation in the form of a binary product aimed at Java developers on Solaris, Linux, MACOS or Windows. The JDK includes a private JVM and a few other resources to finish the development of a Java application. Since the introduction of the Java platform, it has been by far the most widely used Software Development Kit (SDK).

JDK is an acronym for Java Development Kit. The Java Development Kit (JDK) is a software development environment which is used to develop Java applications and applets. It physically exists. It contains **JRE + development tools.**

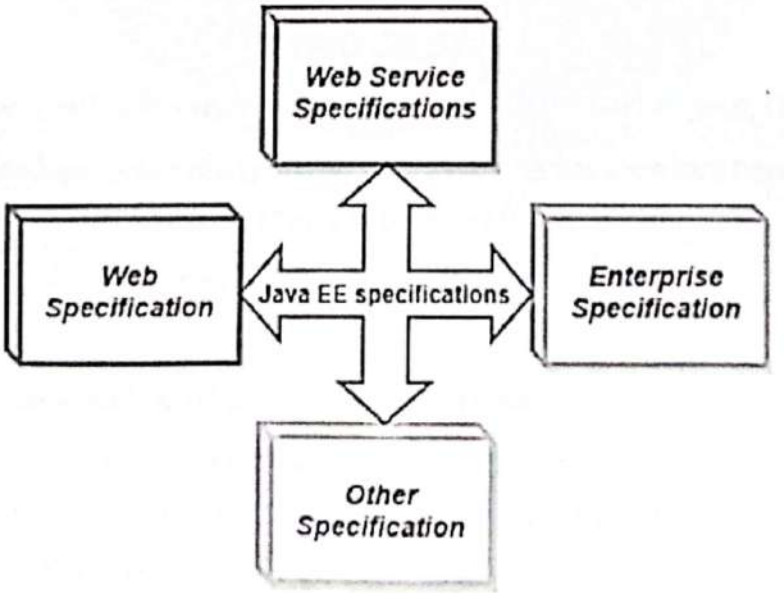
The JDK contains a private Java Virtual Machine (JVM) and a few other resources such as an interpreter/loader (java), a compiler (javac), an archiver (jar), a documentation generator (Javadoc), etc. to complete the development of a Java Application.

JAVA EE

The Java EE stands for Java Enterprise Edition, which was earlier known as J2EE and is currently known as Jakarta EE. It is a set of specifications wrapping around Java SE (Standard Edition). The Java EE provides a platform for developers with enterprise features such as distributed computing and web services. Java EE applications are usually run on reference run times such as micro servers or application servers. Examples of some contexts where Java EE is used are e-commerce, accounting, banking information systems.

- **SPECIFICATIONS OF JAVA EE**

Java EE has several specifications which are useful in making web pages, reading and writing from database in a transactional way, managing distributed queues. The Java EE contains several APIs which have the functionalities of base Java SE APIs such as Enterprise JavaBeans, connectors, Servlets, Java Server Pages and several web service technologies.



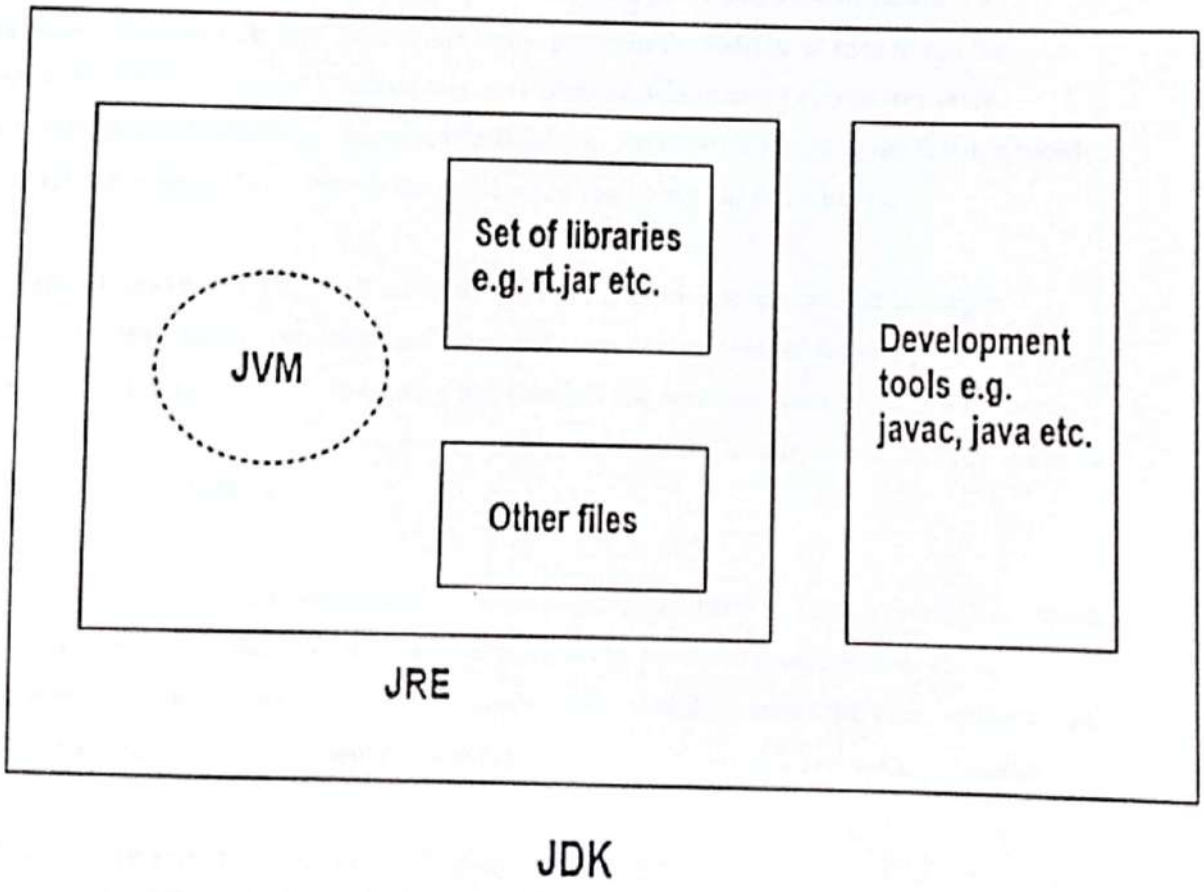
JAVA JRE

Java Run-time Environment (JRE) is the part of the Java Development Kit (JDK). It is a freely available software distribution which has Java Class Library, specific tools, and a stand-alone JVM. It is the most common environment available on devices to run java programs. The source Java code gets compiled and converted to Java byte code. If you wish to run this byte code on any platform, you require JRE. The JRE loads classes, verify access to memory, and retrieves the system resources. JRE acts as a layer on the top of the operating system.

- **JRE COMPONENTS:**
  - **Deployment technologies** such as deployment, Java plug-in, and Java Web Start.
  - **User interface toolkits**, including Abstract Window Toolkit (AWT), Swing, Java 2D, Accessibility, Image I/O, Print Service, Sound, drag, and drop (DnD) and input methods.
  - **Integration libraries** including Interface Definition Language (IDL), Java Database Connectivity (JDBC), Java Naming and Directory Interface (JNDI), Remote Method Invocation (RMI), Remote Method Invocation Over Internet Inter-Orb Protocol (RMI-IIOP) and scripting.
  - **Other base libraries**, including international support, input/output (I/O), extension mechanism, Beans, Java Management Extensions (JMX), Java Native Interface (JNI), Math, Networking, Override Mechanism, Security, Serialization and Java for XML Processing (XML JAXP).
  - **Lang and util base libraries**, including lang and util, zip, Java Archive

(JAR), instrument, reflection, Collections, Concurrency Utilities, management, versioning, Logging, Preferences API, Ref Objects and Regular Expressions.

- **Java Virtual Machine (JVM)**, which comprise of Server Virtual Machine and Java HotSpot Client.



WEB APPLICATION

A web application is a computer program that uses a web browser to perform a particular function. It is also called a web app. Web apps are present on many websites. A simple example is a contact form on a website.

A web application is a client-server program. It means that it has a client-side and a serverside. The term "client" here refers to the program the individual uses to run the application. It is part of the client-server environment, where many computers share information. For example, in the case of a database, the client is the program through which the user enters data. The server is the application that stores the information.

Businesses need to exchange information and conclude transactions with their target customers. The Internet can be an excellent and inexpensive channel for that purpose, providing that there is a way to capture and store all the necessary data and show results to users. Thanks to web applications, users can interact with the business using shopping carts or content management systems.

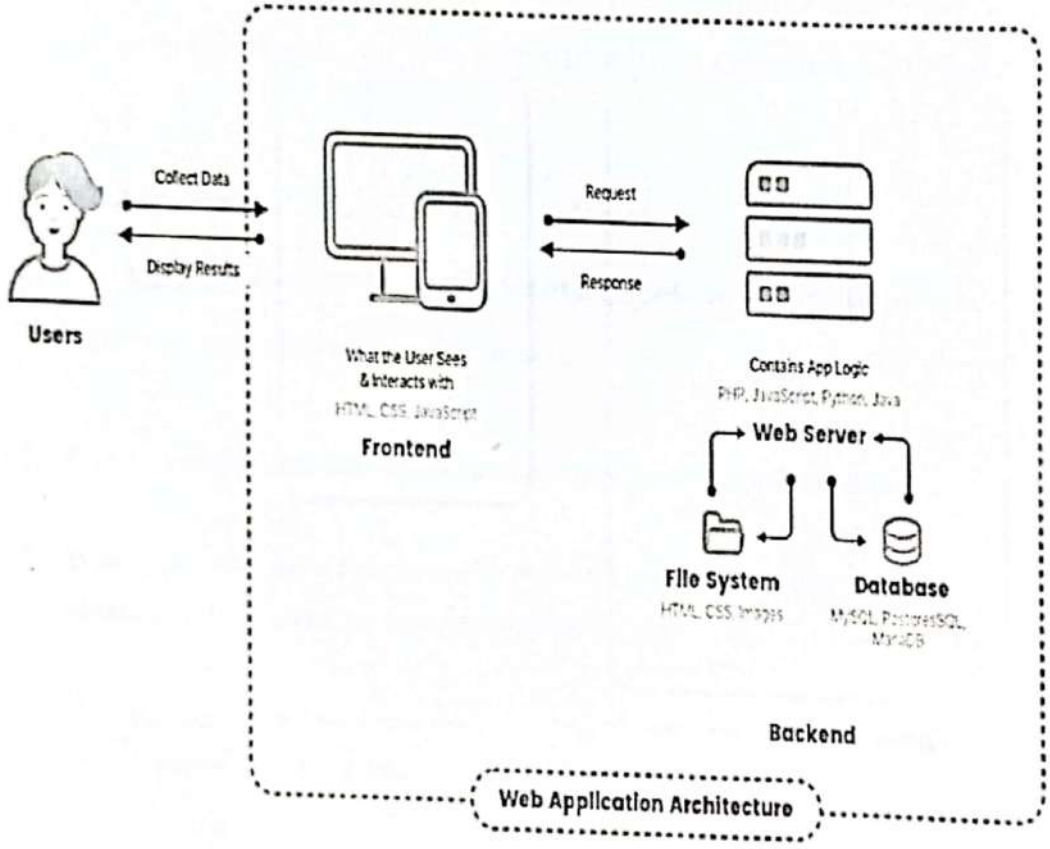
Web apps can be developed for many different reasons and used by companies or individuals. Individuals need it to facilitate their communication or purchase things online. Also, employees can collaborate on projects and work on shared documents with web applications. They can create reports, files, and share information from anywhere and with any device.

Web apps have evolved since their invention. One of the first applications, Perl, a popular server-side scripting language, was developed in 1987.

WEB APPLICATION ARCHITECTURE

A Web application is a complex piece of software. It consists of many components like the user interface, a login-screen, an in-app store, the database, etc. To manage these components, software engineers devised web application architecture to logically define the relationships and manner of interactions between all of these components for a Web app.

It's actually easier to define web application architecture by showing how everything fits together:



WORKING OF WEB APPLICATION:-

Web applications are usually coded in browser-supported language such as JavaScript and HTML as these languages rely on the browser to render the program executable. Some of the applications are dynamic, requiring server-side processing. Others are completely static with no processing required at the server.

The web application requires a web server to manage requests from the client, an application server to perform the tasks requested, and, sometimes, a database to store the information. Application server technology ranges from ASP.NET, ASP and ColdFusion, to PHP and JSP.

- ## WEB APPLICATION FLOW

1. User triggers a request to the **web server** over the **Internet**, either through a web browser or the application's user interface.

2. **Web server** forwards this request to the appropriate **web application server.**

3. **Web application server** performs the requested task – such as querying the **database** or processing the data – then generates the results of the requested data.

4. **Web application server** sends results to the **web server** with the requested information or processed data.

5. **Web server** responds back to the client with the requested information that then appears on the user's display.

AN EXAMPLE OF HOW IT WORKS

You find this cool new website and you want to create an account, so you decide to click the

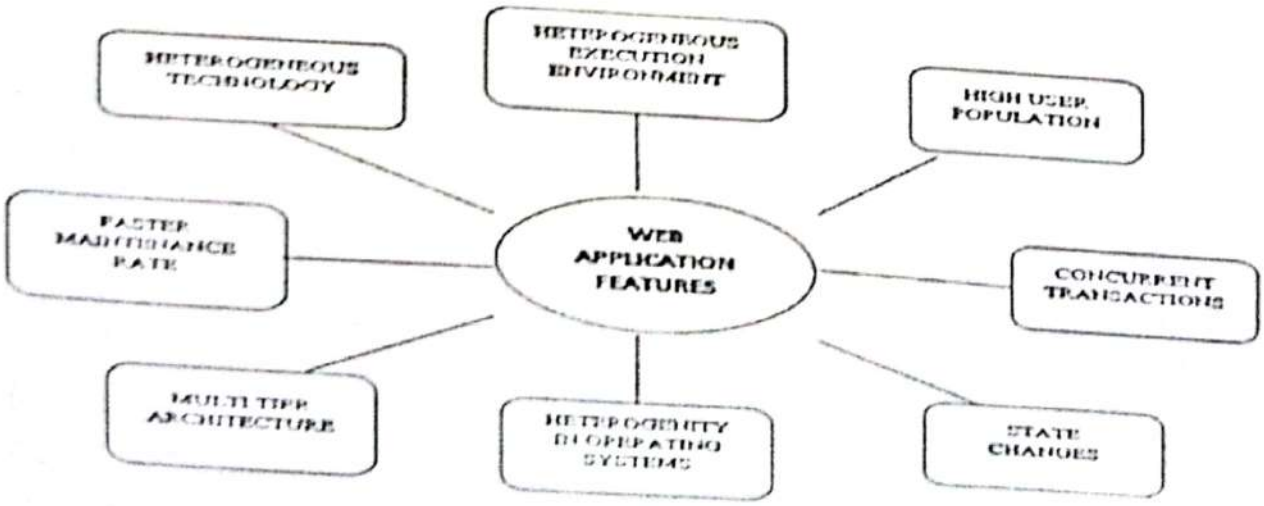
"sign up" button. You are then redirected to a page where you find a form asking you to enter your information. After you are done filling the form you are redirected to the profile section and you can now use the app.

In this example, the sign-up form is on the client-side, where data is collected from the user. On the other hand, all the actions that are happening behind the scenes like adding the user to the database, checking if the email is unique and valid, redirecting the user to different pages, etc., are the backend of our Web app.

*BENEFITS OF A WEB APPLICATION

- **Zero install** - all PCs have a browser
- **Reduce business costs** - less time spent talking to customers over the phone; eliminate printed materials; allow users to update their own details.
- **Centralized data** is secure and easy to backup.
- **Reach** anybody, anywhere in the world.
- **Available** 24 hours a day, 7 days a week.
- **Low spec PCs or smart phones** can be used.
- **Online training** can be completed at user's own time and pace.
- **Direct access** to latest information **Always up-to-date.**

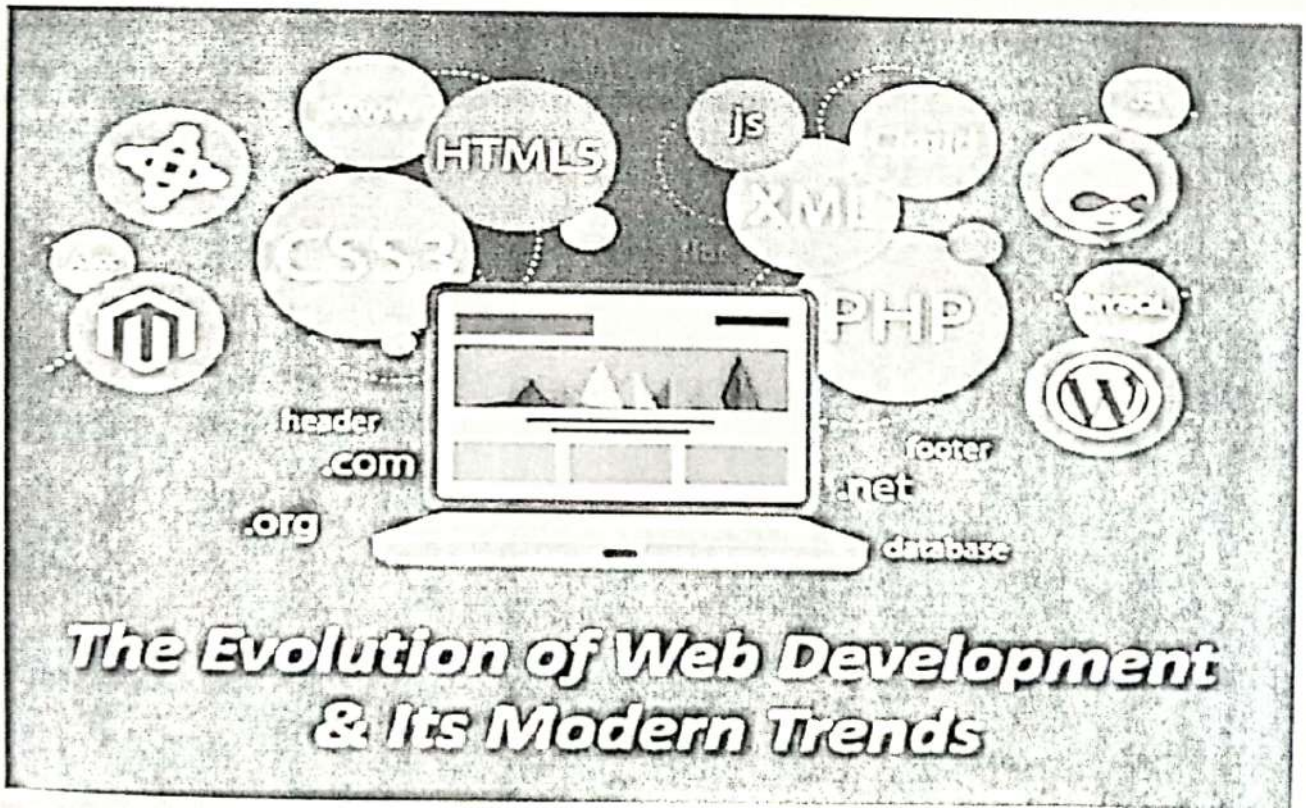
FEATURES OF WEB APPLICATION:-



THE EVOLUTION OF WEB DEVELOPMENT

Web Development was previously only known for the development of web pages and websites for both intranet and internet. However, nowadays it is more like creating **web applications** that surpass the complexity as well as the size of typical mobile and desktop applications. It can be said, web application development is the artsy method to develop complex business applications to both business and customers.

The web that we see today is the outcome of regular ongoing efforts of an open community of web that assists in designing the latest technologies. Some of the technologies that are being used today for web development are CSS3, WebGL, HTML 5, Java, React JS, Angular JS, PHP, etc. These technologies also ensure that the website or web app is supported in all web browsers.



STAGES OF WEB DEVELOPMENT EVOLUTION

During the start of web development evolution from the 90s to the current date, several things have changed and some of the features that were incorporated in its features:

- The sites were text-based
- Rise of Flash
- Sites were table-based with online page builders
- CSS Hits Web
- The Rise of JavaScript
- Semantic Web has come into view
- Web 2.0 was out
- Web Designs started embedding background images.
- Web Pages were divided into columns to aid numerous other customizations of the sites.
- Different graphic elements began incorporating in the web applications Real-time visitor counters have become common on websites or web apps.
- Scrolling Marquee came into the picture
- GIF appearance started on the website

FRONT-END DETAILS

- HTML

HTML stands for **Hyper Text Markup Language**, which is the most widely used language on Web to develop web pages. **HTML** was created by Berners-Lee in late 1991 but "HTML 2.0" was the first standard HTML specification which was published in 1995. HTML 4.01 was a major version of HTML and it was published in late 1999. Though HTML 4.01 version is widely used but currently we are having HTML-5 version which is an extension to HTML 4.01, and this version was published in 2012.

HTML is a MUST for students and working professionals to become a great Software Engineer especially when they are working in Web Development Domain. I will list down some of the key advantages of learning HTML:

- **Create Web site** - You can create a website or customize an existing web template if you know HTML well.

- **Become a web designer** - If you want to start a career as a professional web designer, HTML and CSS designing is a must skill.

- **Understand web** - If you want to optimize your website, to boost its speed and performance, it is good to know HTML to yield best results.

- **Learn other languages** - Once you understand the basic of HTML then other related technologies like JavaScript, php, or angular are become easier to understand.

- **BASIC HTML**

Tag	Description
<!DOCTYPE>	Defines the document type
<html>	Defines an HTML document
<head>	Contains metadata/information for the document
<title>	Defines a title for the document
<body>	Defines the document's body
<h1> to <h6>	Defines HTML headings

<p>	Defines a paragraph
 	Inserts a single line break
<hr>	Defines a thematic change in the content
<!--...-->	Defines a comment

- **FORMS AND INPUT**

<form>	Defines an HTML form for user input
<input>	Defines an input control
<textarea>	Defines a multiline input control (text area)
<button>	Defines a clickable button
<select>	Defines a drop-down list
<optgroup>	Defines a group of related options in a drop-down list
<option>	Defines an option in a drop-down list
<label>	Defines a label for an <input> element
<fieldset>	Groups related elements in a form
<legend>	Defines a caption for a <fieldset> element
<datalist>	Specifies a list of pre-defined options for input controls
<output>	Defines the result of a calculation

- **IMAGES**

Tag	Description
<img>	Defines an image

- **LINKS**

Tag	Description
<a>	Defines a hyperlink
<link>	Defines the relationship between a document and an external resource (most used to link to style sheets)
<nav>	Defines navigation links

- **LISTS**

Tag	Description
	Defines an unordered list
	Defines an ordered list
	Defines a list item
<dir>	Not supported in HTML5. Use instead. Defines a directory list
<dl>	Defines a description list
<dt>	Defines a term/name in a description list
<dd>	Defines a description of a term/name in a description list

- **TABLES**

Tag	Description
<table>	Defines a table

<th>	Defines a header cell in a table
<tr>	Defines a row in a table
<td>	Defines a cell in a table
<tbody>	Groups the body content in a table

- **STYLES AND SEMANTICS**

Tag	Description
<style>	Defines style information for a document
	Defines a section in a document
	Defines a section in a document
<header>	Defines a header for a document or section
<footer>	Defines a footer for a document or section
<main>	Specifies the main content of a document
<section>	Defines a section in a document

- **PROGRAMMING**

Tag	Description
<script>	Defines a client-side script

• CSS (Cascading Style Sheets)

Cascading Style Sheet (CSS) is used to set the style in web pages that contain HTML elements. It sets the background color, font-size, font-family, color etc. property of elements on a web page. The major points of CSS are given below:

- CSS stands for Cascading Style Sheet.
- CSS is used to design HTML tags.
- CSS is a widely used language on the web.
- HTML, CSS and JavaScript are used for web designing. It helps the web designers to apply style on HTML tags.

➢ There are three types of CSS which are given below:

- Inline CSS
- Internal or Embedded CSS
- External CSS

background	**A shorthand property for all the *background-** properties**
background-color	Specifies the background color of an element
background-image	Specifies one or more background images for an element
background-position	Specifies the position of a background image
background-size	Specifies the size of the background images
border	A shorthand property for *border-width*, *border-style* and *border-color*
border-bottom	A shorthand property for *border-bottom-width*, *border-bottom-style* and *border-bottom-color*
border-bottom-color	Sets the color of the bottom border

border-collapse	Sets whether table borders should collapse into a single border or be separated
border-color	Sets the color of the four borders
border-image	A shorthand property for all the *border-image-** properties
border-radius	A shorthand property for the four *border-*-radius* properties
border-style	Sets the style of the four borders
border-top	A shorthand property for *border-top-width, border-top-style* and *bordertopcolor*
bottom	Sets the elements position, from the bottom of its parent element

color	Sets the color of text
columns	A shorthand property for *column-width* and *column-count*
display	Specifies how a certain HTML element should be displayed
flex	A shorthand property for the flex-grow, flex-shrink, and the flex-basis properties
float	Specifies whether or not a box should float

font	A shorthand property for the font-style, font-variant, font-weight, fontsize/line-height, and the font-family properties
font-family	Specifies the font family for text
font-size	Specifies the font size of text
font-style	Specifies the font style for text

font-weight	Specifies the weight of a font
justify-content	Specifies the alignment between the items inside a flexible container when the items do not use all available space
margin	Sets all the margin properties in one declaration
margin-bottom	Sets the bottom margin of an element
margin-left	Sets the left margin of an element
margin-right	Sets the right margin of an element
margin-top	Sets the top margin of an element
min-height	Sets the minimum height of an element
min-width	Sets the minimum width of an element
padding	A shorthand property for all the padding-* properties
padding-bottom	Sets the bottom padding of an element
padding-left	Sets the left padding of an element
padding-right	Sets the right padding of an element
padding-top	Sets the top padding of an element
table-layout	Defines the algorithm used to lay out table cells, rows, and columns
text-align	Specifies the horizontal alignment of text
text-decoration	Specifies the decoration added to text

text-decorationcolor	Specifies the color of the text-decoration
text-shadow	Adds shadow to text

JAVASCRIPT

JavaScript (js) is a light-weight object-oriented programming language which is used by several websites for scripting the webpages. It is an interpreter, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document. It was introduced in the year 1995 for adding programs to the webpages in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers. With JavaScript, users can build modern web applications to interact directly without reloading the page every time. The traditional website uses js to provide several forms of interactivity and simplicity.

PHP-

- PHP is an acronym for "PHP: Hypertext pre-processor" - PHP is a widely-used, open source scripting language.
- PHP scripts are executed on the server.
- PHP is free to download and use.

PHP is an amazing and popular language!

DEVELOPMENT TOOL KIT-

XAMPP- XAMPP is an abbreviation for cross-platform, Apache, MySQL, PHP and it allow you to build WordPress site offline, on a local web server on your computer. This simple and lightweight solution works on Windows, Linux, and, Mac – hence the 'cross-platform' part "Why

do I need this XAMPP tutorial?" Well, dear reader,let me tell you that having a local WordPress website has benefits such as allowing you to test out different themes, plugins, and learn WordPress development without actually creating a website.

DATABASE

A database is a separate application that stores a collection of data. Each database has one or more distinct API's for creating, accessing, managing, searching and replicating the data it holds. The name indicates what the database is. A database is one of the important components for many applications and is used for storing a series of data in a single set. In other words, it is a group/package of information that is put in order so that it can be easily accessed, manage and update.

There are different types of database. They are:

- Bibliographic
- Full-.text
- Numeric
- Images

In a database, even the smallest portion of information becomes the data. Example, Student is a data, roll number is a data, and the address is a data, height, weight, marks everything is data. In brief, all the living and non- living objects in this world is a data. In this chapter of the database, you will learn about the basic terminologies that are used in DBMS.

SYSTEM RELATIONAL DATABASE MANAGEMENT (RDMS):-

A Relational database management system (RDBMS) is a database management system (DBMS) that is based on the relational model. An important feature of relational system is that a single database can be spread across several tables. This differs from flat file database in which each database is self-contained in a single table.

Rules for Relational Databases

In order for a relational database to function, a number of basic rules need to be followed:

- Each table has a unique name.
- Each table contains multiple rows.
- Each row in a table is unique.
- Every table has a key to uniquely identify the rows.
- Each column in a table has a unique attribute name.

These rules are implemented as part of the overall database design.

ORACLE

Oracle database is a relational database management system. It is known as Oracle database, Oracle DB or simply Oracle. It is produced and marketed by Oracle Corporation. Oracle database is the first database designed for enterprise grid computing. The enterprise grid computing provides the most flexible and cost effective way to manage information and applications.

- **EXPRESS EDITION (XE):**

Oracle Database Express Edition (Oracle Database XE) is a free, smaller-footprint edition of Oracle Database. Oracle Database XE is easy to install and easy to manage.

- **FEATURES OF ORACLE EXPRESS EDITION(XE)**

- Administer the database
- Create tables, views, and other database objects
- Import, export, and view table data
- Run queries and SQL scripts
- The Oracle Database XE user interface, including the system menu commands and the database administration interface

- Creating a database user
- Installing and using **SQL Developer**, including creating database connections.

SYSTEM REQUIREMET ANALYSIS

INFORMATION GATHERING:-

It is a depth study of end user information requirement that is needed before the design of new information system can be completed. System analyst traditionally involved in the following activities.

Meeting: For this we meet our Guide prof. Harsha Paliwal whenever need. They suggested us about including some new features to our project.

SYSTEM FEASIBILITY:-

Economic feasibility:

There must be sufficient benefit in creating the system to make the cost acceptable. A system can be developed technically and that will be used if installed must still be a good investment for the organization. Financial benefit must equal or exceed the cost. The financial and economical question raised by analyst during the preliminary investigation is for the purpose of estimating the following:

(a) The cost to conduct the full system investigation.

(b) The cost of hardware and software.

Technical Feasibility:

Technical feasibility canter on the existing computer hardware and software, it deals with the feasibility of the required technology for implementing the proposed system. The system is developed in windows environment using PHP technology.

Oracle 11g Express Edition (XE), the project is technically feasible because there is no need to have very high configured system.

Behavioral Feasibility:

Our system follows Behavioral feasibility because of its friendliness in nature. Anyone can operate easily for this we have developed user interface and user friendly web app.

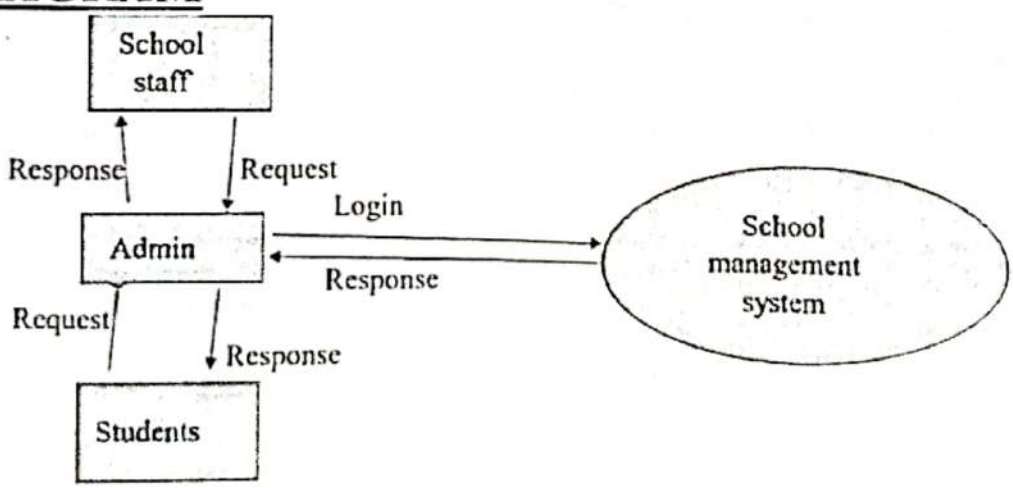
TECHNOLOGY USED:

The system should be developed such that deployment of the system easy and effortless. Also the technology should very easy and user friendly.
Wed had plenty of option select the technology and tools .The selection criteria we set are decided below:

- The technology should be widely accepted in School Management.
- The platform should be easy to develop and allow rapid development.
- The technology selected should be performs independent.

DATA FLOW DIAGRAM (DFD

ER- DIAGRAM



TESTING

TESTING PLAN

Once source code has been generated, software must be tested to uncover (and correct) as many errors as possible before delivery to customer. Our goal is to design a series of test cases that have a high likelihood of finding errors. To uncover the errors software techniques are used. These techniques provide systematic guidance for designing test that Exercise the internal logic of software components, and Exercise the input and output domains of the program to uncover errors in program function, behavior and performance.

TESTING – TECHNIQUES USED:

1. Functionality Testing

- We have verified there is no dead page or invalid redirects.
- We have checked all the validations on each field.
- We have taken Wrong inputs to perform negative testing.
- We have verified the workflow of the system.

2. Usability testing -

- We have tested the navigation and controls.
- We have checked Content.
- Checked for user intuition.

3. Interface testing –

Performed this technique to verify the interface and the data is flowing from one system to other.

4.Compatibility testing-

Browser compatibility

- Operating system compatibility
- Compatible to various devices like notebook, mobile, etc.

 Performance testing– We have performed this testing to verify the server response time and throughput under various load conditions.

5. Security testing –

- We have performed to verify if the application is secured on web as data theft and unauthorized access are more common issues

TESTED ITEMS:

Our tested items are like:

- Check for Server and Internet Connections
- Check for valid Source and Destination points entered by user
- Orientation changes handling
- Transitions between two activities and passing data Database connections and updates handling.

TESTING SCHEDULE:

We have tested each procedure back-to-back so that errors and omissions can be found as early as possible. Once the system has been developed fully we have tested it on different devices, and browsers which differs in configuration.

BLACK BOX TESTING

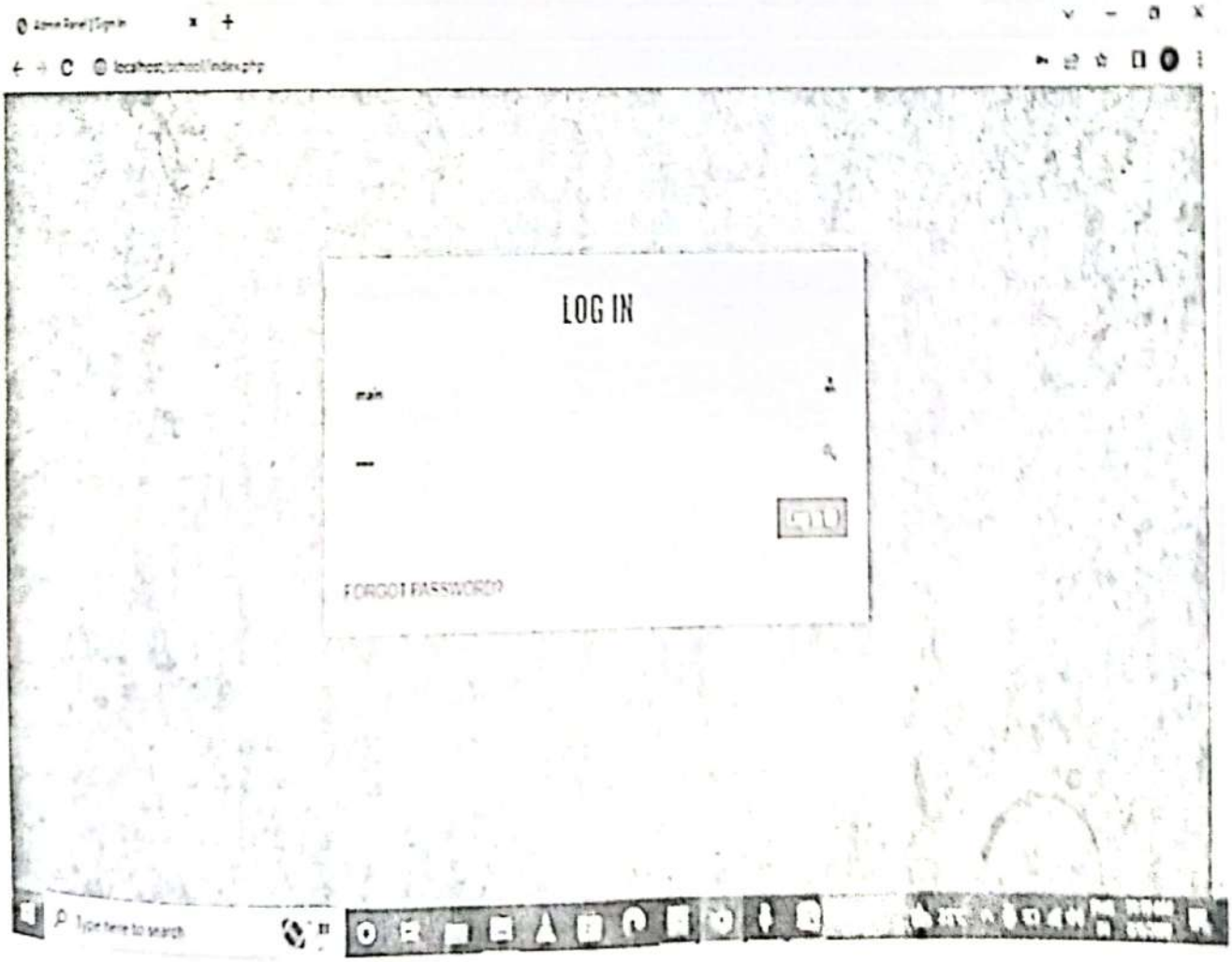
This is a software testing method in which the functionalities of software applications are tested without having knowledge of internal code structure, implementation details and internal paths. Black Box Testing mainly focuses on input and output of software applications and it is entirely based on software requirements and specifications. It is also known as Behavioral Testing.

WHITE BOX TESTING

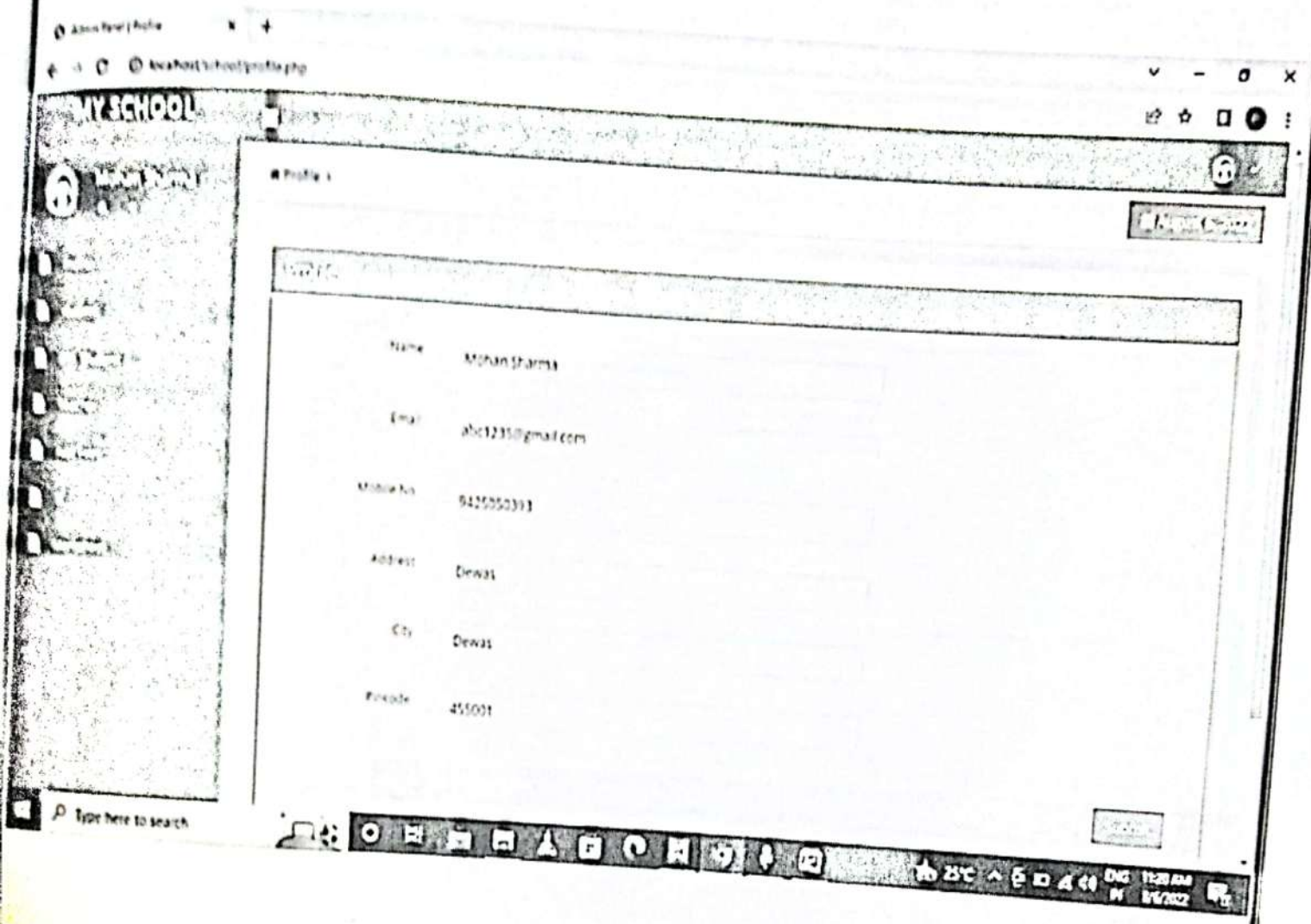
This is software testing technique in which internal structure, design and coding of software are tested to verify flow of input-output and to improve design, usability and security. In white box testing, code is visible to testers so it is also called Clear box testing, open box testing, transparent box testing, Code-based testing and Glass box testing

INPUT/OUTPUT SCREEN

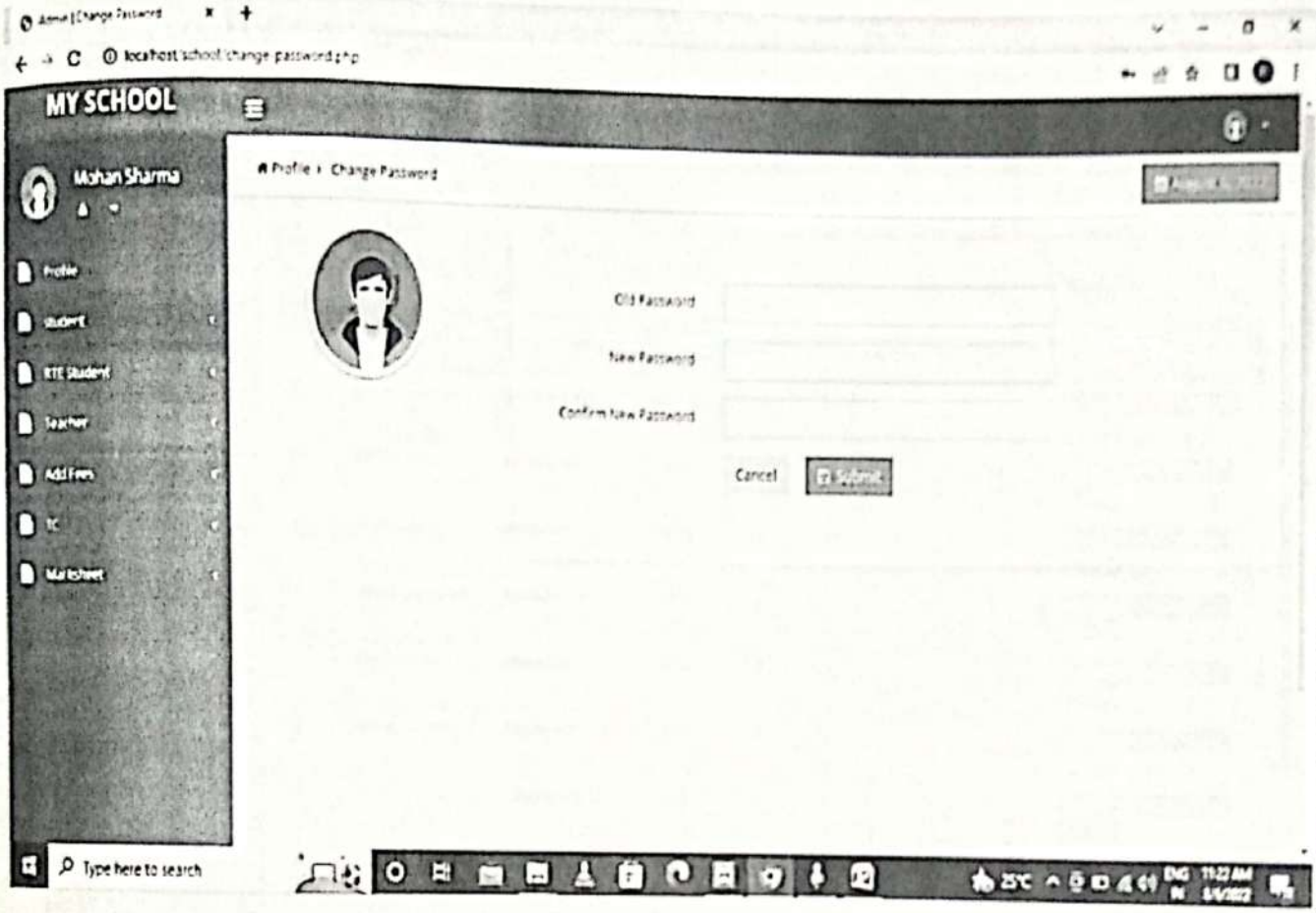
1. LOGIN PAGE



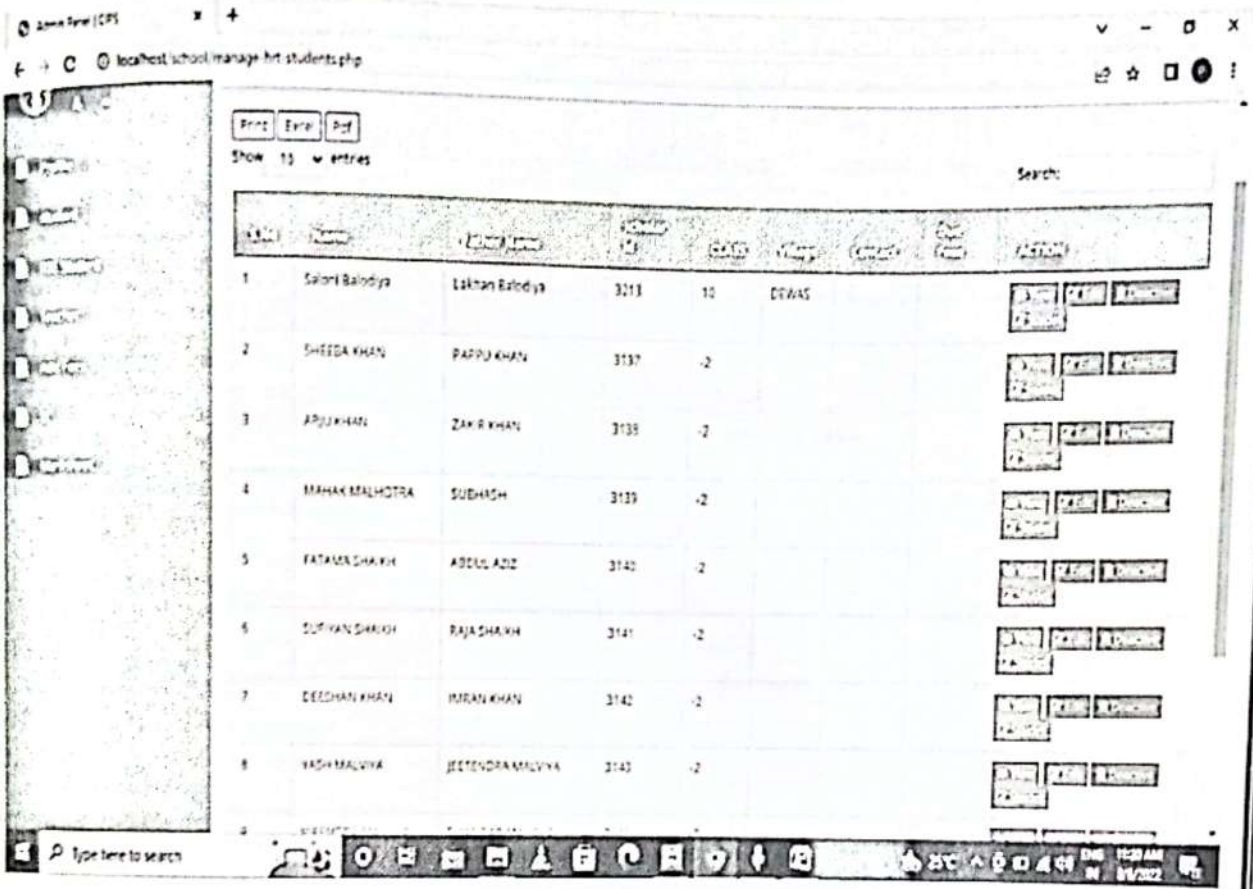
2.Admin side view



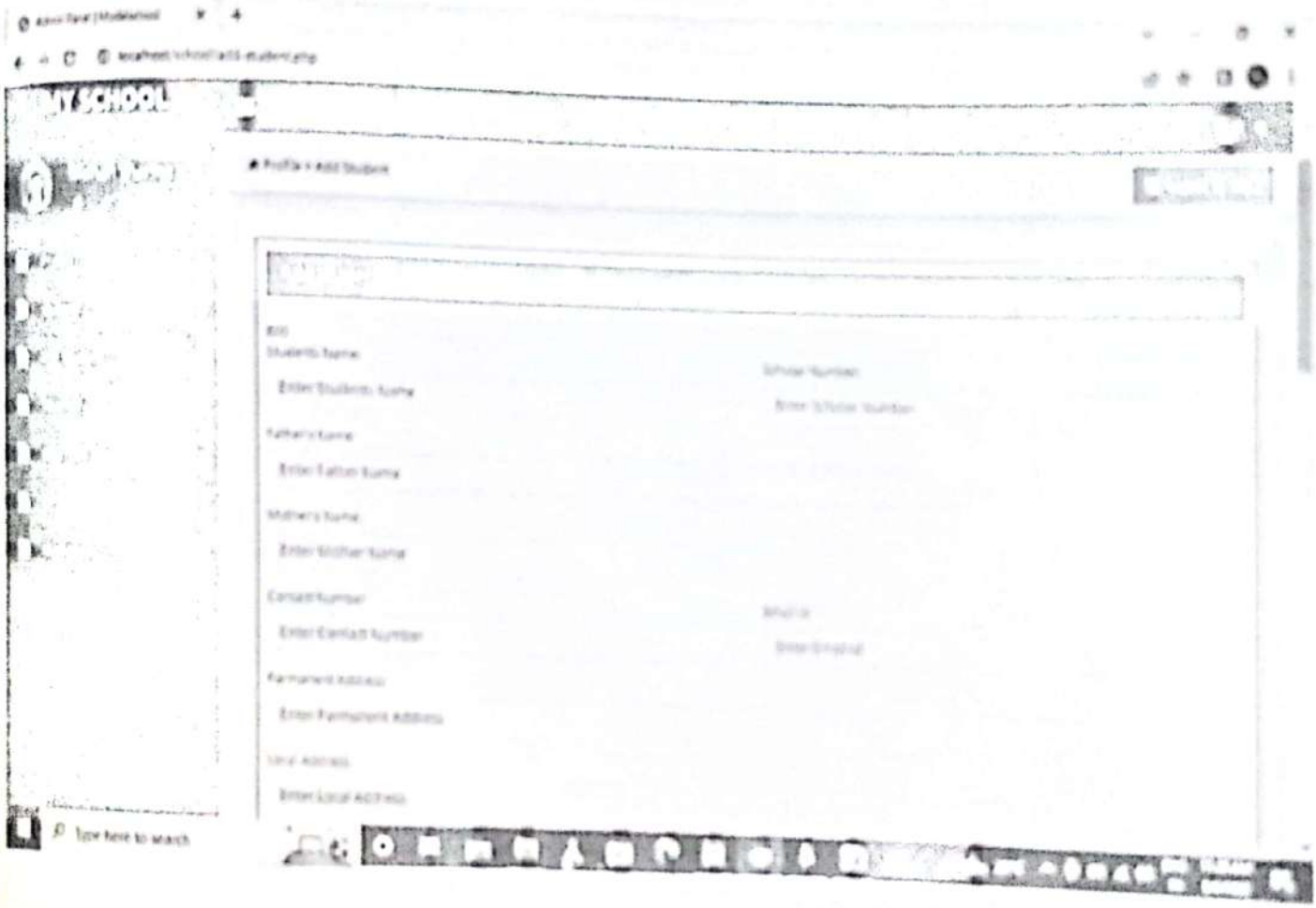
3. Profile of Head



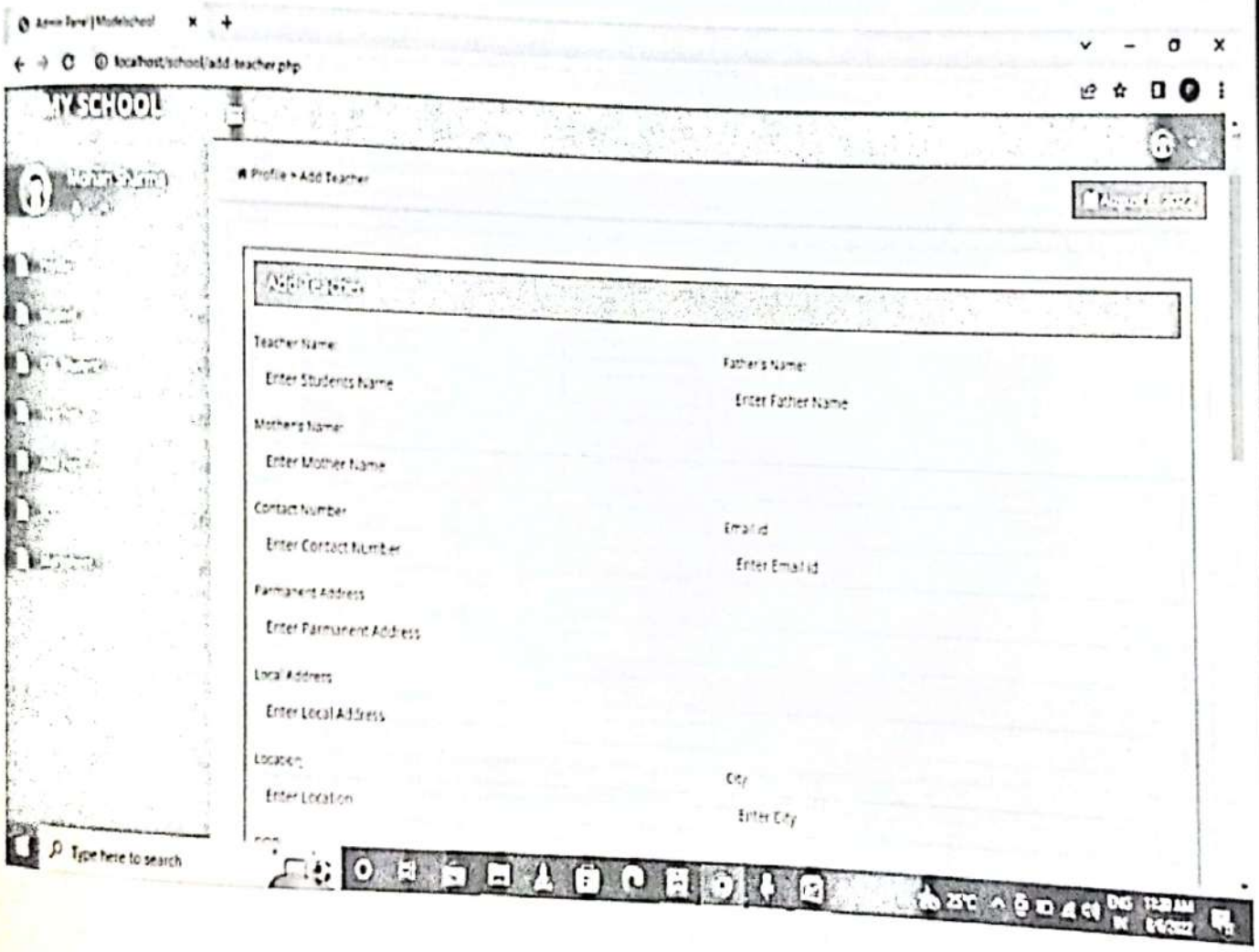
- **MANAGE STUDENT**



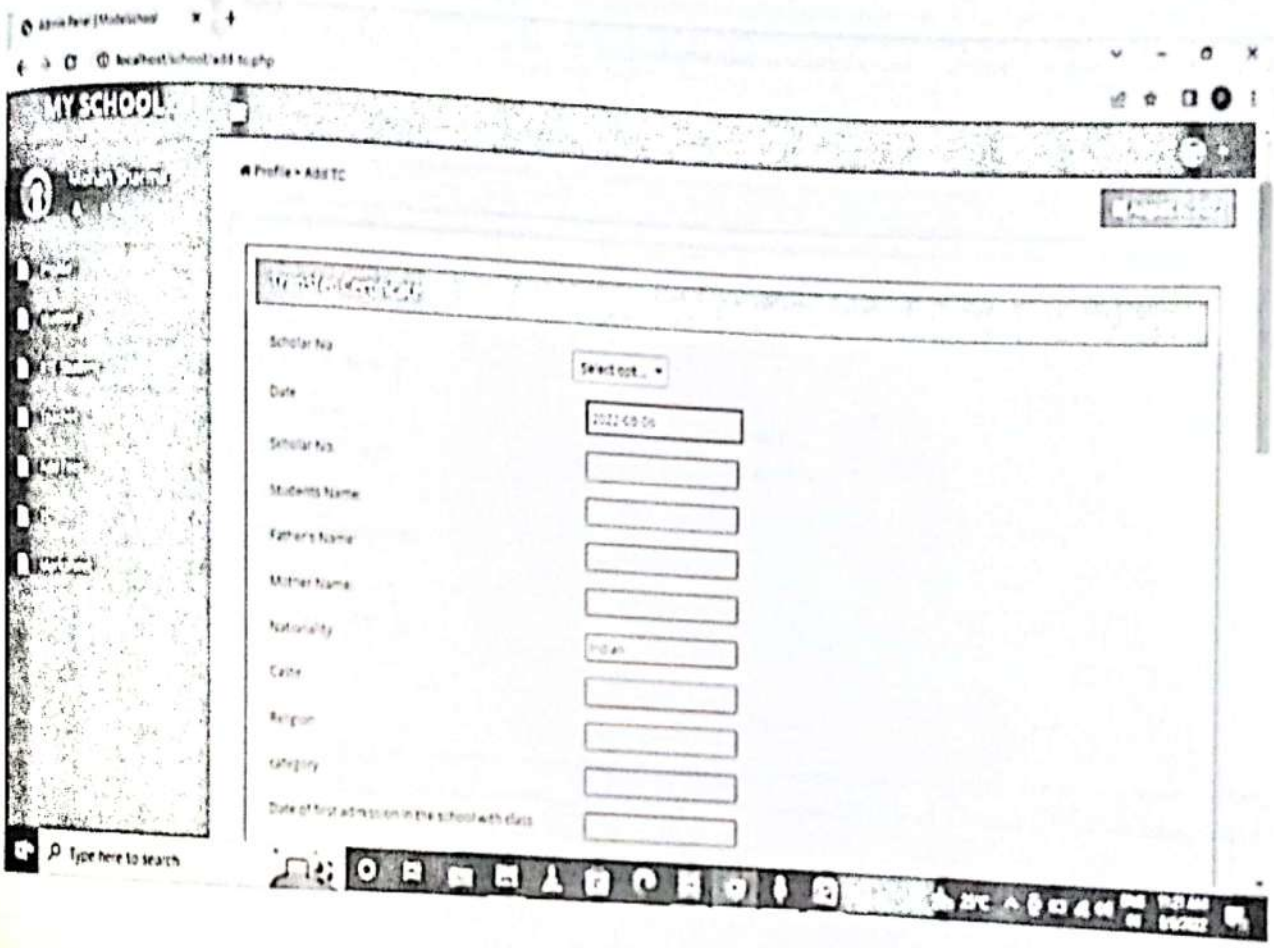
- **Add Students**



- **MANAGE TEACHER**



- **TC**



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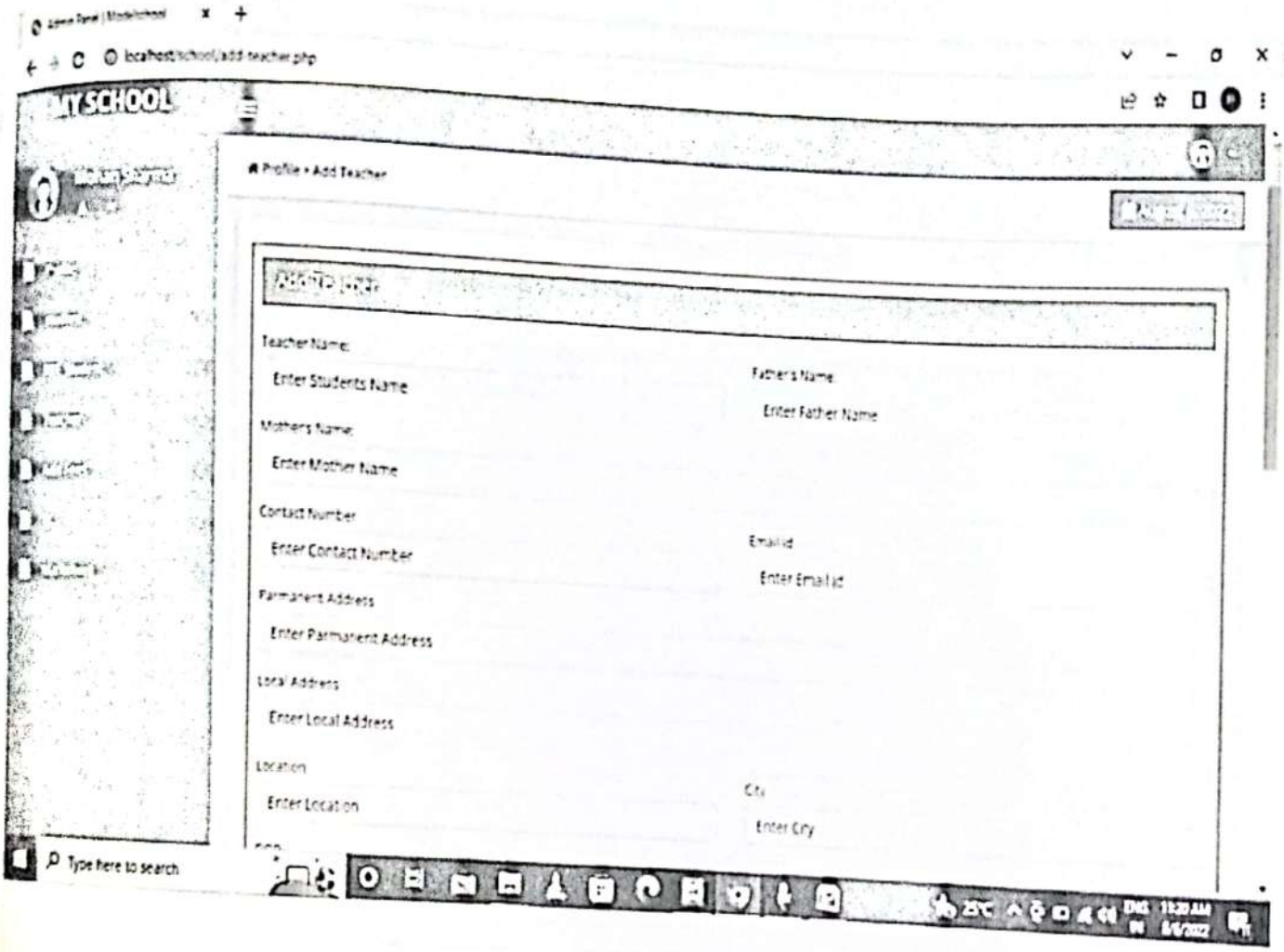

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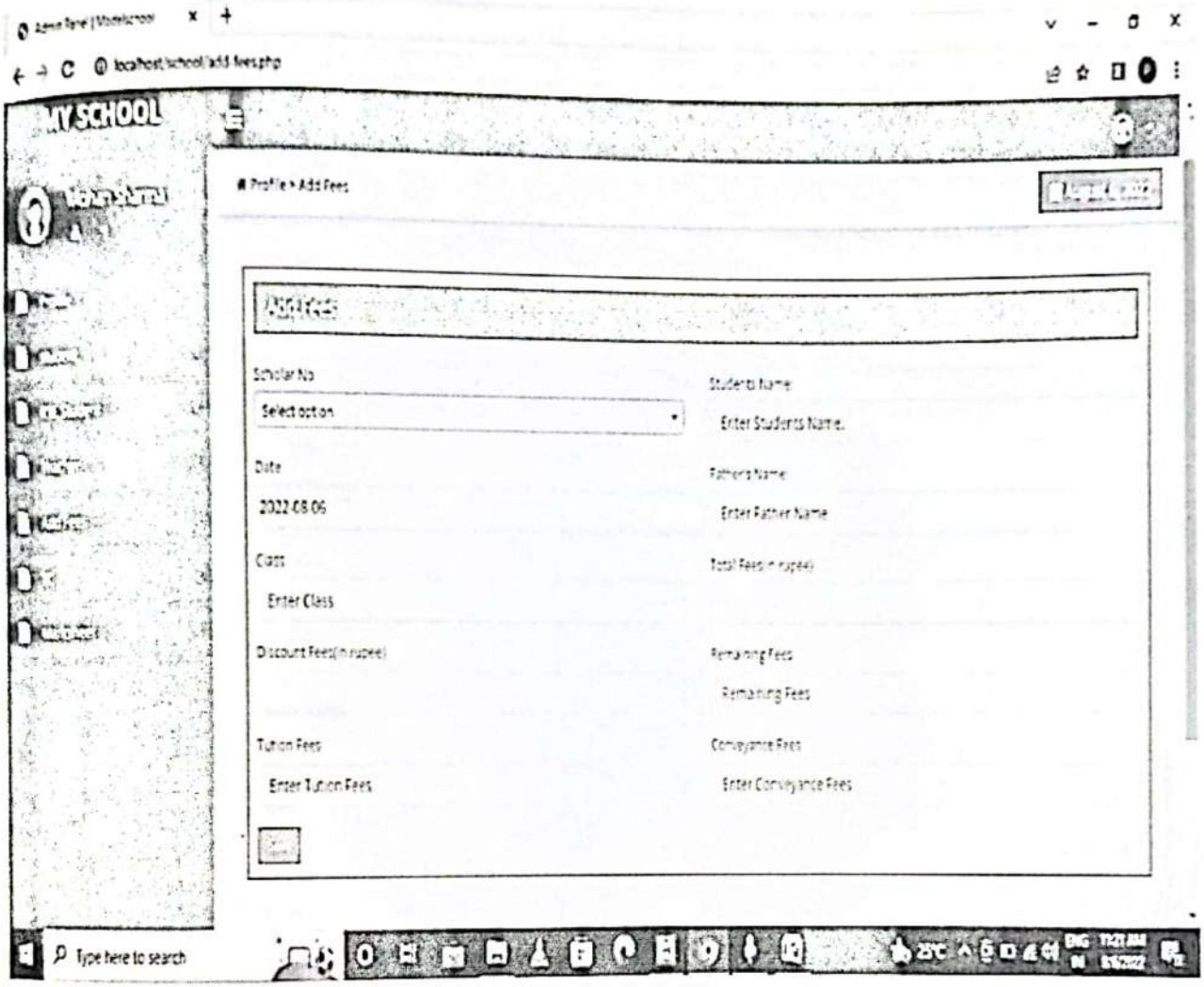

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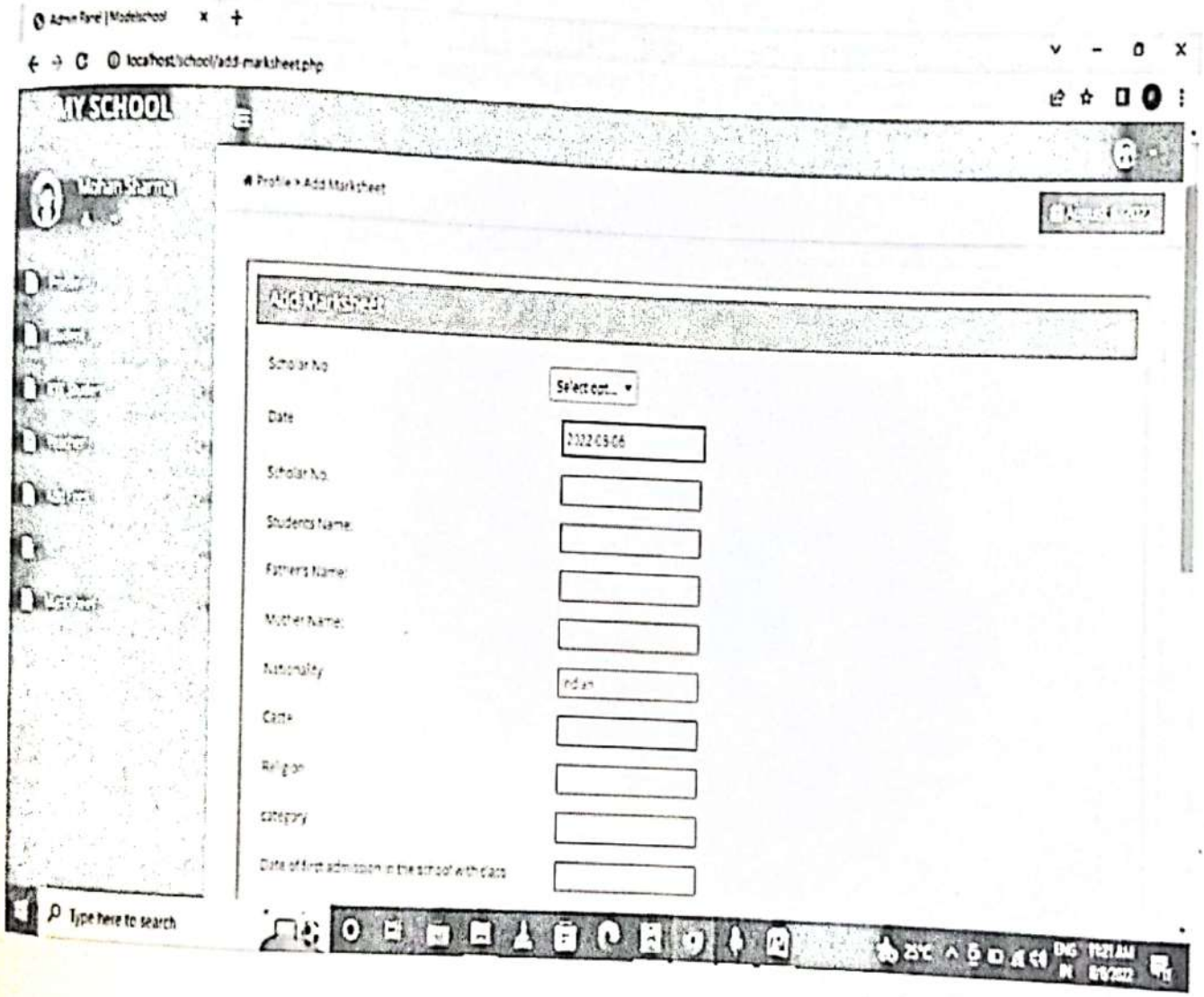

Limitation- *In this system we only add and remove information of school members and see their record.

*Only Admin can modify.

*Staff unable to create their own profile

*Entry of false information cannot be changed.

*Staff cannot search other staff profile.

*Staff and Student cannot change any description of database.

FUTURE SCOPE 1. Create more categories*Student personal information like NAME,DOB,ADDRESS *Student fee management 2. Updation on false entry.

CONCLUSION

Finally, in the student School management system, the outcome of all the hard work done for School management system is here. It is software that helps the user to work with the School Data.

This software reduces the amount of manual data entry and gives greater efficiency. The User Interface of it is very friendly and can be easily used by anyone. It also decreases the amount of time taken to write details and other modules.

All the details about students, teachers, and their other tasks can only be seen by the verified users. This School Management System is a solution to all the problems related to the Student Admission, Staff data maintain taken,Fees of teachers and the students, etc.

In the end, we can say that this software is performing all the tasks accurately and is doing the work for which it is made and this system can be implemented in N number of schools.

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GOVT. HOLKAR SCIENCE COLLEGE

DEPARTMENT OF BIOCHEMISTRY

INTERNSHIP REPORT

"Development of Research Skills"

Session: 2021 – 2022

M. Sc. Final Year

Submitted By:

Mayuri Bisen

Submitted to:

Dr. Angurbala Bafna

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I am highly indebted to ***Mr. Rohan Gupta*** (Manager of Noble Alchem Pvt. Ltd.) who gave us the golden opportunity to carry out the project work.

I would like to express my special thanks of gratitude to my Principal ***Dr. Suresh T. Silawat*** as well as the Head of the Biochemistry Department ***Dr. Angurbala Bafna*** who permitted me to complete this internship project.

I would also like to express my sincere gratitude to my mentor ***Prof. Tasneem Rangwala*** for providing valuable guidance and suggestions for the project.

DECLARATION

I hereby declare that the presented report of the internship titled ***"Development of Research Skills"*** is uniquely completed by me after the completion of 60 hours of work Under the guidance of Noble Alchem Pvt. Ltd.

I also declare that this project report is the record of authentic work carried out by me during the training program. I confirm that the report is prepared for my academic requirement.

Mayuri Bisen

M.Sc. Final Year

Biochemistry

Signature: -

Date: -

"DEVELOPMENT OF RESEARCH SKILLS"

Selection Of Research Topic:

Choosing a topic after finding your research problem is important because the topic guides your research and gives you a means to not only arrive at other interesting topics but also direct you to discover new knowledge.

What is a Good Research Topic?

The signs of a good idea to keep in mind when choosing a research topic are the following:

- narrow enough to answer one question in the paper;
- broad enough to cover several aspects of an issue;
- meaningful in the modern world;
- interesting to you.

Process of Choosing Research Topic-

Finding some decent ideas is a process containing several steps:

- **Understand Why You Do Research -**

Identify the reasons for wanting to conduct a study. It is the opportunity to learn something new that drives through the process and choose a suitable and interesting topic.

❖ **Brainstorm Multiple Research Topic Ideas-**

To get an idea of what research topics may be interesting, start with taking a piece of paper and writing down anything you find interesting to learn, or learn more, about. If you have some limitations regarding the theme from your professor, make sure that you keep those in mind when you brainstorm research ideas. Similarly, you can always google to see what other research paper writers use as themes for their papers. It can also be helpful to identify a set of keywords or areas that either you often spend time thinking of or your professor has required you to focus on.

- **Pick An Interesting Thing to Research-**

After gaining an understanding of how to choose a research paper topic, start looking for information. Take some of the keywords or a specific idea and start looking for information. The more you find, the better you can see what appeals the most in terms of a subject for study. Based on the instructions given for the paper, narrow down the list of options to choose one.

Coming up with a research question- Choose a question that will help to shape the information of your paper throughout the entire essay.

Make A Background Research on The Topic -

Start with going through some general information about the subject to get some background information. As you research ideas, take notes about the subtopics you come across. After you finish your data collection, go through the ideas you have to identify a common theme they have. Restate it in a question form and make it a research topic question for your project.

Finding Credible Resources for Research Paper:

When libraries and databases online don't provide the expected answers, things can go downhill. There's also a problem that one can't just use any source available on the internet. Since the web is an enormous pool of information, finding sources for research papers is becoming harder each year. That's because a lot of unreliable information has appeared lately, and it's wrong to use such in your research work.

Following are some ways to find credible resources in less time:

- **Focus on paper topics-**

  Start the research journey by clearly determining paper topics and focusing search and the research around them. It should give a clear idea of which particular articles and materials to look into. It will also help in saving time and ensure finding the most credible, relevant facts for the subject.

- **Identify the purpose of the research-**

  Once you have your mindset on a specific topic, use it to narrow your search and determine the purpose of your research. It will help in finding the most relevant and suitable information. Identifying a fresh angle for developing your topic is of the same importance as a good introduction for a research paper.

- **Use Academic Search Engine –**

  Academic search engines can be quite helpful in eliminating the lower-quality resources and focusing on true research papers from reputable organizations. Most people use Google, but despite being number one it doesn't always provide the most credible results.

  Instead of relying on Google, it is recommended to use these tools:

Google Scholar –provides connections with countless credible and relevant scholarly journals, including formatted citations in APA, AP, or MLA, all exportable with BibTex or RefWorks.

Refseek – a web search tool that allows you to quickly browse countless journals, newspapers, books, and documents without the annoying sponsored links or ads.

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- **Use different types of materials-**

  Use different types of materials to make the paper more convincing, factual, informative, and interesting by incorporating real-life examples, credible references, interviews, statistics, etc.

- **Get college paper help-**

  If looking for useful materials online doesn't give the results that you hoped for, you can always resort to getting professional college paper help from experts with years of experience in providing top-quality academic assistance.

Writing Project Synopsis:

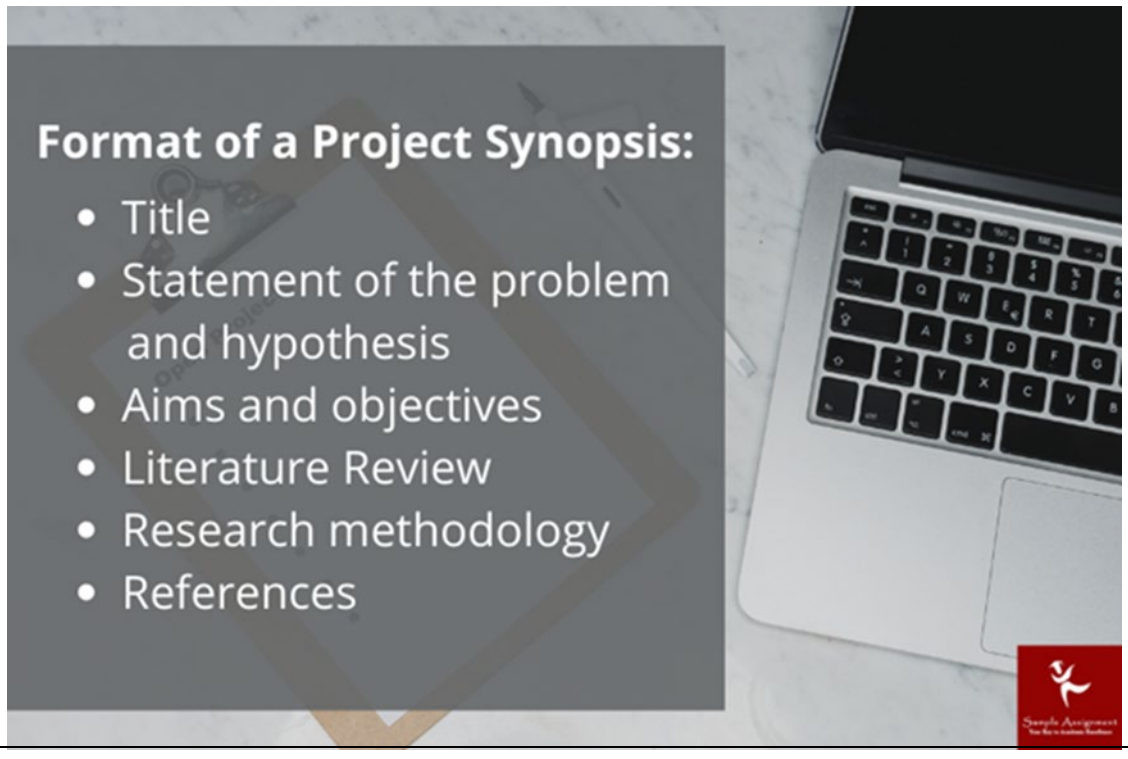
Project synopsis-

A Project Synopsis is an integral part of a thesis or research project.

A Project Synopsis is the gist of a project plan. It mentions the aims, objectives, and other important details of the project. It is submitted to the competent authority for approval, ethical clearance, peer review, formal registration to universities to get an award or degree, or financial assistance from organizations.

A project synopsis gives a panoramic view of the research work conducted for a quick analysis. A project synopsis should be conducted to facilitate the reviewer to understand the project in a go. It should be precise and brief.

Project Synopsis Format-



The project Synopsis should be written in the following format:

- **Title –**

  It is crucial to give a title that aligns with your project. Any reader or reviewer will eventually lose interest if the title does not justify the contents of a project. The title should not be too short or too long. It should adhere to the standard length of the title of a Project Synopsis. Make sure not to mention the name of your university or the number of cases, or any such irrelevant information in the title.

- **Statement of the problem and hypothesis-**

  Do not skip writing a statement of the problem in clear and concise terms. Developing an understanding of the reader's problem at the beginning of the project synopsis helps the reader understand the research proposal. It also allows the reader to devise a hypothesis. Ensure that the problem is relevant to the present and mention the present status and relevance of the problem.

  The hypothesis is not haphazard guesswork. It should display the experience, imagination, and knowledge of the researcher. The hypothesis is an explanation of the relationship between two or more variables which should be expressed in more than 200 words.

- **Aims and objectives-**A project synopsis should have the aims and objectives of the concerned topic. There is no need to write a long list of objectives.

- **Literature Review-**

  Literature Review makes the reader familiar with the research. It emphasizes the research conducted by other researchers to help the reader comprehend the difficulties and anticipate additional problems. The literature review should be written within 300 words with proper references.

- **Research methodology-**

  The research project comprises a research methodology. It should be written in 150-200 words. A research methodology should cover study settings, variables, data analysis, study design, sampling, controls, ethical clearance, references, study methods, etc.

- **Study Design-**

  Study design should incorporate community diagnosis, prospective study, animal studies, follow-up study, descriptive designs, retrospective study, etc.

- **Sampling-**

  Sampling means choosing a sample of apt size for conducting the study. The size of the sample depends on the study design. The study population can be a population of people, a population of recipients, or a population of cases. The sample size should be enough to give meaningful results. Systemic, simple, stratified, and cluster sampling are some of the methods of sampling. It should represent the population.

- **Variables-**

  It is crucial Variables affect the outcome of a research project. Variables should be quantified using a measurable unit. The use of multiple variables in a research project helps in achieving the objectives. There are four major types of variables, namely dependent variable, independent variable, background variable, and intervening variable.

- **Data Analysis-**

  Data analysis is one of the most important aspects of a research project. It leads to results using statistical methods, data sorting methods, and computer programs.

- **Data Collection-**

  Data Collection states how the data used in the research was collected. It includes logistic support, organizational setup, and training. It also mentions plans for collaboration or partnership with other organizations.

- **References-**

  Ensure to give proper referencing and follow the referencing style recommended by your university. References and citations are an important part of any project.

After the Development of research skills, we worked on the minor project to apply the knowledge gained during the internship.

.

PROJECT- WORK

❖ Title:

Effect of fruit peels, raw vegetable by-products, and residual tea leaves extract on growth of leafy vegetables.

❖ Introduction:

In traditional farming, farmers are using chemical fertilizers, insecticides, and pesticides to increase the yield of crops. These crops contain a high number of toxic materials which can greatly affect our health and environment.

With the help of kitchen gardening, we can shift towards a non-toxic and healthy lifestyle. As the plants grown in kitchen gardening do not contain any toxic materials. We can grow 100% organic and nutritious vegetables for the whole family with Kitchen Garden. One of Kitchen Garden's strengths is that the vegetables contain vitamins and minerals of all kinds. This helps to counter the food issue that now prevails in the country. Kitchen gardening will certainly improve the home and backyard air quality which ultimately provides health benefits.

The fruit peels, raw vegetable by-products, and residual tea leaves extract are examples of garbage that accumulates in large quantities daily. It is a severe issue that must be addressed in order to eliminate pollution from the environment. Fruit

peels, raw vegetable waste, and residual tea leaves extract are high in macro and micronutrients that promote plant development which makes them usable as organic fertilizers in kitchen gardening.

The women performing household chores can utilize this kitchen waste for the improvement of plants cultivated in their kitchen gardens.

Nowadays people are becoming aware of kitchen gardening and plantation in which these organic wastes can be used to promote nutrition for plants in the following ways:

- Used Tea leaves contain all the three major nutrients (NPK) as well as some trace minerals (Gupta., 2019) which makes the soil fertile thus contributing to the growth of plants.

Fruit and vegetable peels are rich in antioxidants, potassium, magnesium, and fibers which are good for plant health. (Soni., 2021).

❖ Literature Review:

Plants synthesize antioxidants that are low molecular weight such as glutathione and ascorbate within the chloroplast stroma and cytosol by using NADPH as the ultimate electron donor. These antioxidants function as redox buffers which interact with numerous cellular components and influence plant growth and development by modulating processes from mitosis and cell elongation to senescence and death (Alscher et. al., 1997).

Alkaloids, terpenoids, sulfur-containing compounds, and phenolic and polyphenolic compounds reduce oxidative damage by neutralizing the activities of free radicals. (Kaur and Kapoor, 2001). These compounds are antioxidants present in FAV (Barret et.al., 2005).

Ethyl acetate fractions of the peel contain a higher number of phenolic compounds and it is also not surprising that peel extract contains higher antioxidant activity as compared to pulp and seed. Using different solvents from *Canarium odontophyllum* peel, pulp, and seeds were investigated for the presence of antioxidant capacities in all the assays and the study showed that the peel extract of *C. odontophyllum* can be efficiently used as a source of the natural antioxidant agent (Prasad et al., 2010).

The studies generally reported that total phenolic content is a good indicator of the antioxidant capacity of a plant and is very easy and convenient to analyze plant antioxidative properties through it before further studies are carried out. However, according to results obtained by Chanda et al., 2013 there is no correlation between phenol content and antioxidant activity, suggesting that non-phenolic compounds also contribute to the antioxidant property of plants.

It was reported by Mercy et al., 2014 that the fruit peel powder and extract can increase soil fertility, soil microbes, plant growth, and yield so that, it can be used as an alternative and effective source of nutrients for enriched growth and higher yield. It was found that the growth of plants and yield increased and the leaves of the plants remain green till harvesting by the use of fruit peel powder extract. In addition, for the preparation of tissue culture media, fruit peel powder can be used. This research reveals that the media containing fruit peel powder induce the shoots from *Vinca rosea*. This research concludes that it can be possible to

replace the chemical fertilizers with fruit peel powder and extract to protect the soil from infertility.

The antioxidant activity in an extract of peels of five kinds of fruits was assessed by measuring DPPH (2,2-dimethyl-1-picryl-hydrazine-hydrate) radical scavenging activity and ferric reducing power. The maximum antioxidants in terms of total phenol, FRAP (ferric reducing antioxidant power), and total flavonoid content were found in apple peels followed by orange, banana, kiwifruit, and pineapple respectively. To replace the synthetic antioxidants the peels could be dried under appropriate conditions and used as strong antioxidants (Afsharnezhad et al., 2017).

The pulp extract and peel powder mixed had an almost significant effect in the same direction as indicated and the study factors had affected stronger because of their content of minerals, proteins, carbohydrates, and amino acids. It was recommended to use higher concentrations of the peel powder and pulp extract and to apply them at different growth stages (Fatkhan et al., 2020).

The macro and micronutrients which are beneficial for plant growth are very rich in fruit peels. The fruit peels can be used as fertilizer to reduce the load of waste and can get more benefits as compared to inorganic fertilizer. The study conducted by Dayarathna and Karunarathna., 2021, on Okra (Abelmoschus esculentus) reveal that application of fruit peel powder at basal and the top dressing had significant differences in plant height, na number of leaves per plant, leaf area, chlorophyll content, flowering, dry weights of leaves, stem, root and fruit, fruit length and girth.

By small-scale bead milling technique, the plant crystals from bulk materials of black tea waste were successfully produced. The bulk suspension of black tea waste possesses weak antioxidant activity but by the nanonization process it was significantly improved. Based on the results of the study, it can be concluded that nano milling is also applicable on plants wastes, e.g., black tea waste, and leads to higher amounts of plant active constituents released in comparison with the unprocessed corresponding bulk materials) without the use of organic solvents (Abraham et al., 2021).

In fruits and vegetables (FAV), antioxidants are present as the important ingredients. Fruits and vegetables have the oxidant constituent which generally contributes to their protective effect. Antioxidants are natural radical terminators such as vitamins A, C (ascorbic acid), E (α-tocopherol), β- and α-carotene, and glutathione. Some fruits and vegetables such as citrus (orange, grapefruit, lime, and lemon), grapes, pomegranates, strawberries, apples, dates, green and yellow vegetables (peppers), cabbage, carrots, dark leafy greens, and banana have been worldwide known to have antioxidants (Jideani et al., 2021).

❖ Aims and Objectives:

After reviewing the above studies, we aim to observe the effect on quality as well as quantity of plant content by using fruit peels, raw vegetables, and residual tea leaves extract for kitchen gardening.

The Germination Percentage would be studied.

❖ Study Design-

- Leafy vegetable selected for study: **- *Coriandrum sativum* (Dhaniya).**

- **Sample collection-**

- Fruit peels, raw vegetable waste, and used tea leaves from kitchen by-products.
- The effect of extract obtained from fruit peels, raw vegetable waste, and used tea leaves will be studied on 14 days seedling stage of ***Coriandrum sativum* (Dhaniya).**

- **Methods for extraction-**

- Extract prepared with the R.O. water / Normal water.

❖ Requirements-

1. By products-

a) Used tea leaves

b) Vegetable peels / stale raw vegetables

c) Fruit peels

d) Fruit pulp

2. Soil

3. Strainer

4. Seeds

5. Petri plates

6. Beakers

7. Funnels

8. Pipettes

9. Labelling Stickers

10. Tape

11. Markers

12. Bottles

13. Cork

14. Pots

15. Tissue paper

16. Spray bottle

17. Trays

❖ Collection of soil-

We collected the soil from our college's ground. The soil was collected from the area under the tree where the dry old shaded leaves were present on the upper layer (Humus) which adds more nutrients to soils.

Reduction in soil particle size - The collected soil was large in the form of particles sticking together. To get separate particles of reduced size, we firstly crushed and filter the soil.

❖ **Collection of materials-** We collected the kitchen by-products such as-

- Used tea leaves
- Vegetable peels / stale raw vegetables
- Fruit peels
- Fruit pulp.

❖ Processing of material-

1. **Weighing-**

Tea leaves used - 200gm

Vegetable by-product -400gm

Fruit peels -400gm

Fruit pulp -400gm

2. **Grinding** – Water used during grinding-

Tea leaves - 200gm in 700ml water

Vegetable by-products -400gm in 550ml water

Fruit peels -400gm 1250ml water

Fruit pulp -400gm in 1350ml water

3. **Dilution during grinding to prepare juice**-

Tea leaves juice - 100gm in 350 ml water

Vegetable juices -100gm in 138ml water

Fruit peels juice -100gm in 313ml water

Fruit pulp juice -100gm in 338ml water

4. **Storage**- in freezer

Treatment solutions-

Water

Tea leaves juice

Vegetable juices

Fruit peels juice

Fruit pulp juice

Mix- 1:1:1:1

❖ Liquid Holding capacity of soil-

50 gm soil (Percolation method)

Water holding capacity- 27ml

With Tea leaves juice - 28 ml

With Vegetable juices - 27ml

With Fruit peels juice - 27ml

With Fruit pulp juice - 27m

With mixed juice- 28ml

❖ Buying Seed-

Brand - Nutech seeds

Quality - American green classic

Produced and marketed by AGRO IMPEX CORPORATION

Name of chemical used- THIRUM/ CAPTAN

❖ Processing of seeds-

Technically, each coriander seed contains two true seeds which are enclosed in a hard, round, brown, or light grey husk. It is recommended to prepare the seeds by splitting them into two halves, breaking the coat, and soaking them in water before planting for 2-3 days. Splitting seeds by applying pressure is called scarification. Though scarification or soaking of the seeds is not crucial, it helps increase germination rate and speed. If you haven't prepared the seed before planting, maybe your seeds fail to break the seed coat and are not germinating due to this reason.

❖ Soaking seeds and their need-

Soaking coriander seeds are not strictly necessary, but it is recommended. Soaking the cilantro seed is beneficial for the germination process. It also helps to make the cilantro seedlings softer so they will grow faster. We soaked seeds for about 12 hours or more.

❖ Soil container-

1 trial - Petri plates

2 trials - Petri plates

3 trials- Small-sized Pots

➢ Weighing of soil/amount of soil taken-

1 trial - 50 gm

2 trials - 50gm

3 trials - 1700gm

➢ No. Of seeds sown-

1 trial - 10

2 trials - 10

3 trials - 25

❖ Sowing seeds-

1st trial and error- Poured 50 gm of soil into Petri plates a moistened the soil a day before sowing seeds with Tea leaves juice, Vegetable juices, Fruit peels juice, and Fruit pulp juice, Mixed juice according to the holding capacity of each juice by soil. The next day we dug up soil one by one for sowing each seed and then pressed the soil over the seed to cover it.

Errors:

1. Moistened the soil a day before caused the problem in sowing seeds.

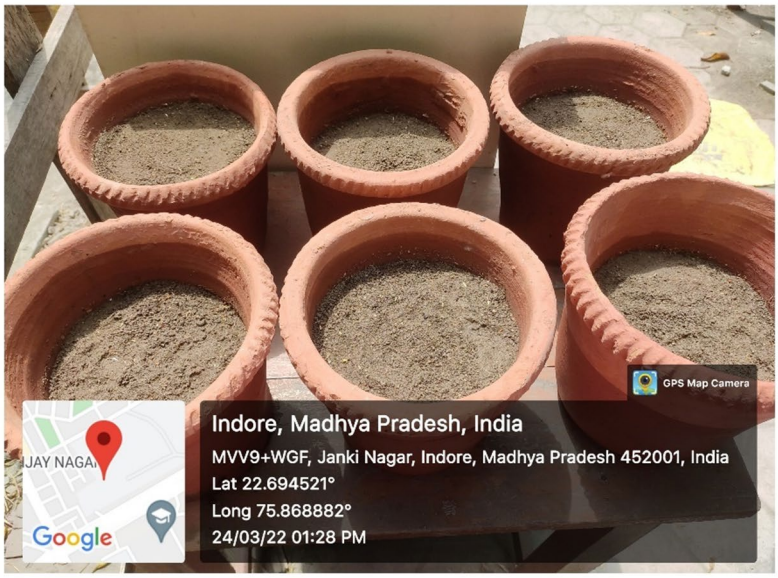
2. Pressing the soil over the seed to cover it harden the soil which is not helpful in the germination of the seed as it needs porous soil around it to develop.

3. Using juices directly without dilution caused fungus. (Thought seeds are not germinated due to fungal infections and other mistakes we done).

2nd trial and error- Taken 25 gm of soil and poured it into a Petri plate then put the seeds one by one using a scapula and then covered the seeds with a remaining half part that is 25 gm of soil and that moistened the soil only with water. Waited for seeds to germinate and then thought to use juices but the seeds were not germinated. (In the second trial we worked on our mistakes done in 1 trial but even the seeds were not germinated even in the second trial)

<u>Conclusion</u>- Coriander seeds can't germinate in Petri plates.

3rd trial Taken 1500gm of soil and poured it into pots then put the seeds one by one using a scapula and then covered the seeds with 200 gm of soil and that moistened the soil only with water. Amount of water used- 918ml. Waited for seeds to germinate and then thought to use juices.



❖ **Results-** Seeds germinated in pots by the 6th day.

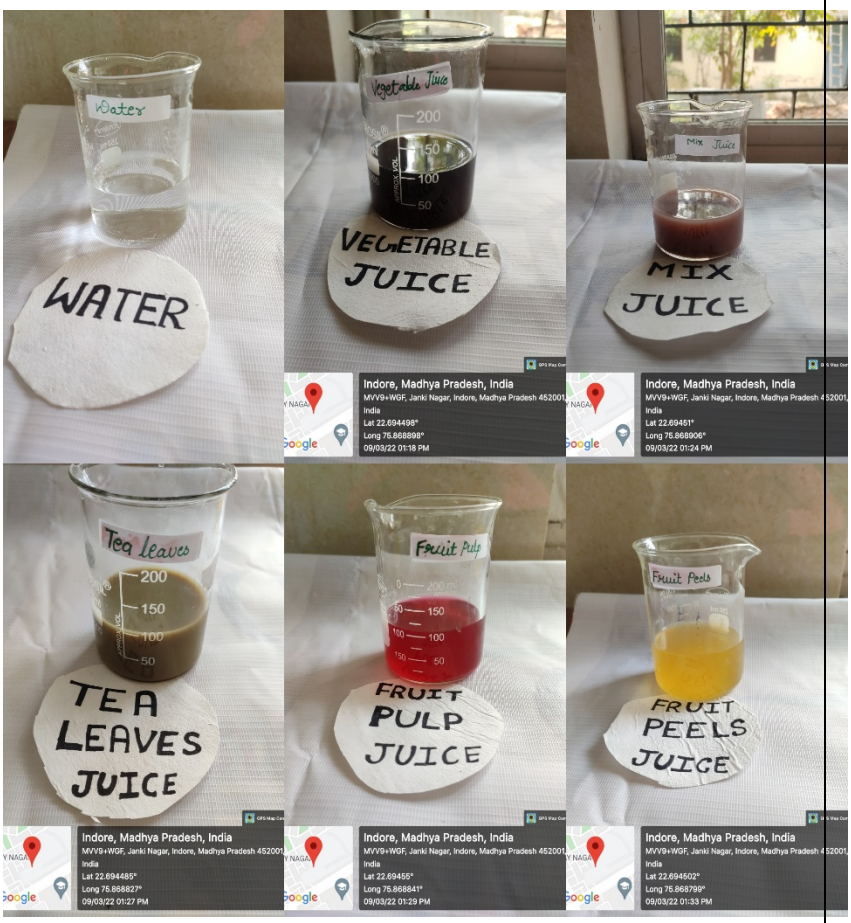
Details of irrigation in 1st trial and errors- The soil in the plates was irrigated by water and different Juices made by us. No Seeds were found to be germinated.

Details of irrigation in second trial and errors- The Soil in the plates was given different treatments. Water and various juices were given. The Juices were diluted and used for irrigating the soil. No seeds were found to be germinated.

Details of irrigation in third trial and errors-

Day 1: Sowing Seeds in pots. All pots were irrigated only with water till the 6th day. On Day 6th Seeds started germinating in almost all the pots. Then different pots were given different treatments for irrigation purposes.

- Pot 1- Water
- Pot 2- Fruit Peels Juice
- Pot 3- Fruit Pulp Juice
- Pot 4- Tea Leaves Juice
- Pot 5- Vegetable Juice
- Pot 6- Mixed Juice



Pot 1: Water – Used as Control.

We used normal tap water for irrigation of pot 1. It was observed on Day 6th seeds started germinating. The seedling was seen above the soil but the very next day it was eaten by a mouse. From Day 7th seedlings with leaves starts growing in paired and single form as shown in the above figure. On the 12th day, the Highest seeds germination can be seen. All the plants were dead on Day 14th

Pot 2: Fruit Peels -

On day 6th one paired seedling can be seen inside the soil. Started using Fruit peel juice for irrigating on day 6th. The same seedling was eaten by a mouse. On day 7th one paired seedling inside the soil can be seen and the other 2 single seedlings with leaves were grown. The highest germination showed by seeds on Day 11th. Two to Three seedlings with leaves were dead and the other starts tilting. The tilting of leaves was found to be a lesser extent. The growth using Fruit peel juice during 14 days can be seen below.

Pot 3: Fruit Pulp-

On Day 6th single seed was germinated inside the soil. Then started using Fruit pulp juice for irrigating the soil. The next day 2 seedlings appeared above the soil i.e., on the 7th day. The dying of seedlings with leaves started on Day 11th. Two seedlings with leaves died on the 11th day. On Day 12th six of the paired seedling with leaves died and one single died. Maximum seedling with leaves died on day 14th and all others were shown tilting. The highest germination occurred on Day 11th.

Pot 4: Tea Leaves –

No seedlings were found on the 6th Day. The Tea leaves juice is then used for irrigation of soil. On Day 7th one seedling appeared. From Day 8th seedlings with leaves started growing in single or paired form. The highest germination was shown on the 12th day of irrigation. On the 14th Day, 2-3 seedlings with leaves were found to be dead. The remaining of them might also get dead.

Pot 5: Vegetable Juice

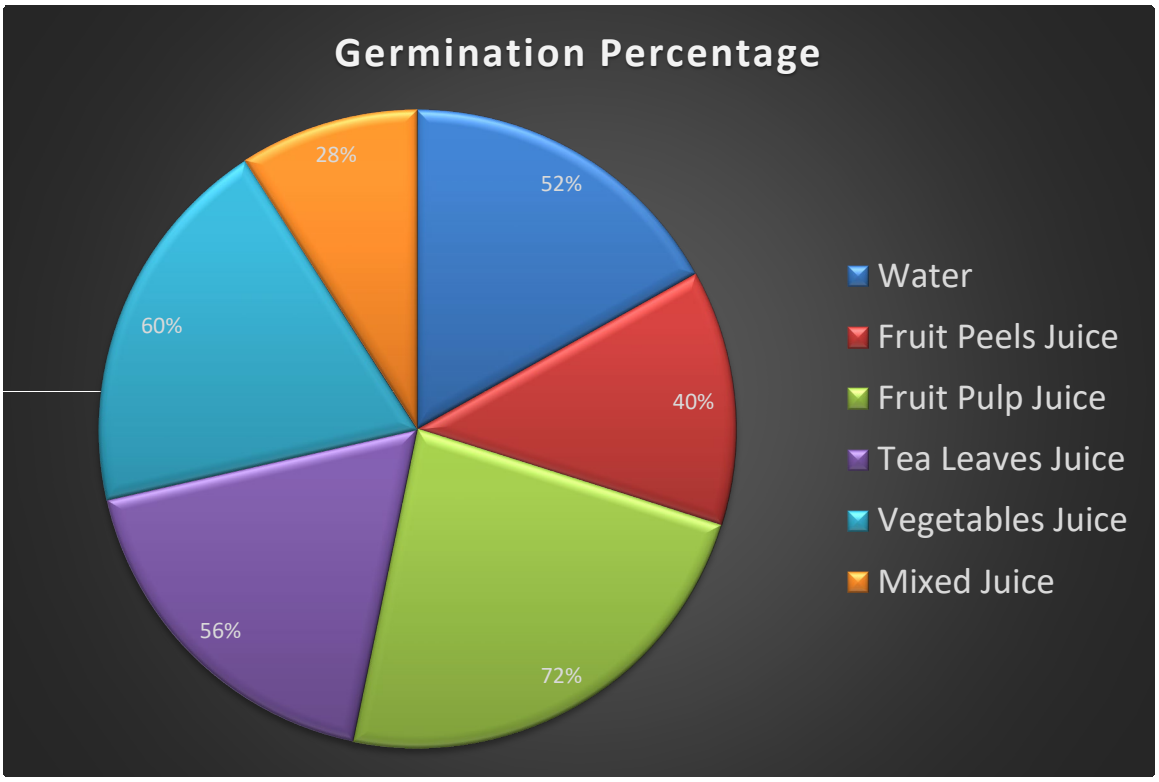
None of the seeds germinated till the 6th day. Vegetable juice is now being used as a treatment for irrigation of soil. On the 7th day, one single seedling with leaves appeared. After the 8th Day seedlings with leaves started growing in a paired or single form. On the 12th Day one paired and two seedlings with leaves died. The highest germination was shown on Day 12th only. On day 14th it can be seen 2-3 seedlings died, some got tilted while others were still in the grown position.

Pot 6: Mixed Juice-

On Day 6th one single seedling and another paired seedling can be seen. The Mixed juice is now started being given as a treatment to the soil for irrigating purposes. It can be seen on day 7th only one single seedling from the previous day is found while paired seedling was eaten by a mouse. The seedling with leaves started growing on day 8th. On the 11th day, a leaf is found dead in one of the seedlings with leaves. The highest germination was on Day 12th. Two paired seedlings with leaves died on Day 14th.

	Highest No. of Plants Germinated	Germination Percentage
Water	13	52%
Fruit Peels Juice	10	40%
Fruit Pulp Juice	18	72%
Tea Leaves Juice	14	56%
Vegetable Juice	15	60%
Mixed Juice	7	28%

Note: Paired Seedling with leaves is considered as one.



❖ Discussions:

As compared to Control the seed germination is found to be lesser in Fruit Peels Juice and Mixed Juice while higher in Tea leaves, Vegetable, and Fruit pulp Juice respectively.

Expected reasons due to which plant failed to grow-

After soaking, the coriander seeds should be spread evenly on the soil and kept damp. If you're growing coriander plants in pots, you need to maintain a constant moisture level, which should be around 60 to 70 degrees Fahrenheit.

To ensure that cilantro seeds germinate, it's best to soak the seeds before planting them. In addition, the soil should be moist enough to support the seedlings. Overwatering, however, will cause the seeds to rot. Besides soaking the seeds, you should make sure that the soil isn't too dry. During the first week, they'll need consistent moisture for a few weeks.

Another reason your cilantro (coriander) is not germinating is that you have sown seeds too deep in the soil. Sow the seeds ½ to ¼ inches deep in the ground. The seeds need oxygen for germination. If buried too deep, the seeds may fail to get the required oxygen levels crucial for growth.

Planting seeds when the soil temperature is extremely high causes the seeds to suffer thermal stress. Though these are warm-season seeds, they'll not grow until the soil temperature is favorable for growth. For successful germination, the temperature of the soil should be between 64-75 degrees Fahrenheit (18 to 24 degrees Celsius). And the night temperature should be between 50-64 degrees Fahrenheit (10 to 18 degrees Celsius).

Coriander seeds require enough moisture for germination. However, overwatering and moisture retention will cause seed rot. Make sure to keep the soil moist but not waterlogged. If the seeds are not sprouted even after 3 weeks, check a few seeds by digging. If seeds are rotten, sow again and be careful to provide the right amount of moisture. On the other hand, cilantro seeds will not germinate if the soil is too dry.

❖ Precautions-

Keep an eye on the pests such as the mice in your garden/area. Mice and birds love to eat freshly sown/grown seeds. If you notice mice droppings near the seed bed, there's a possibility that mice have eaten the seeds. So, install mice traps in your garden.

An Internship Report
on
INDORE SAHAKARI DUGDH SANGH MARYADIT INDORE

A project submitted in the partial fulfilment of the requirements
for the award of the degree of

Master of Science
in
Biotechnology
(Session: 2021-2022)

Under the Guidance of
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And

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Declaration

I am Aayushi Goswami D/o Anil Puri Goswami certify that the training report of training in Milk Procduction, Packaging, Analysis from Sanchi Dugdh Sangh MYDT Indore, Madhya Pradesh is prepaced by me and my personal authentic work carried out under the guidance of Dr. Mahajbeen Qureshi.

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Govt. Holkar Science College, Indore (MP)
Master of Science (Biotechnology)

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1. Introduction
2. RMRD and Milk Prepack / Distribution
3. Processing
4. T.P. Section
5. Butter and Ghee
6. Quality Control
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1.

Introduction

A diary is a business enterprise established for the harvesting or processing of animal milk - mostly for cows or goats but also from buffaloes, sheep, horses or camels - for human consumption.

A diary is typically located on a dedicated dairy farm or in a section of a multi-purpose farm that is concerned with the harvesting of milk.

- Terminology differs between countries. For e.g. → in the United States, the entire diary farm is commonly called a "diary".
- The building or farm area where milk is harvested from the cow is often called "milking parlor".
- The farm area where milk is stored in bulk tanks is known as the farm's "milk house".
- Milk is then hauled to a "diary plant" also referred to as a "diary", where raw milk is further processed and prepared for commercial sale of diary product.

2. Raw Milk Reception Dock (RMRD)

The milk as soon as it is received at plant, is weighted, dumped into the dump tank (weight tank) and has to be chilled before it is stored for processing. This has to be done in quick succession through equipment well planned and installed at milk reception dock and receiving room.

The reception of milk at the raw milk reception dock (RMRD) is done in three ways i.e.- In cans, in tankers & combination of both.

Salient Features :-

- Capacity is 4.0 LLPD ; but receives 3.8 LLPD
- Reception Time :- Morning :- 09.30 – 12:00 pm
  Evening :- 09:30 – 11:30 pm
- Height of RMRD is 1.2 meter.
- RMRD is made of cast iron grid tiles & plates (30×30 cm)
- Preliminary Tests at RMRD : Organoleptic test (smell, color, taste)
- Identifying cow milk cans that are marked with black and red neck identification for separate processing.
- No such identification for buffalo milk can.

Description of Cans :-

1. Capacity of cans : 40 litres each.
2. Neck diameter of can : 200 mm
3. Height of cans : 515 mm
4. Weight of empty can : 6 - 6.5 kg
5. Cans made up of : Aluminum & SS (Stainless Steel)

Milk collection by cans at RMRD :-

Flow diagram of process of RMRD (unloading of cans)

Placing of cans on moving chain conveyor System

↓

Lids are removed by lids opener

↓

Quality evaluation / Grading

↓

Tipping (Done manually @ 5-6 cans per min.)

↓

Cans

↓

Milk	Put in Drip Saver	Lids
↓	↓	↓
Weighing Bowl	Chain conveyor	Chain Conveyor
↓	↓	↓
Sampling	S.T.C.W	S.T.C.W
↓	↓	↓
Dump tank	Washed cans back into trucks	Placed on cans
↓		
Centrifugal pump		
↓		
Process section		

[1.] Unloading of cans from trucks :-

Unloading is done as last in first out (LIFO) method & cans are arranged according to the societies by the worker manually.

[2.] Loading of cans :-

Cans are placed on chain conveyor manually, moving forward to the weighing bowl.

[3.] Opening of can lids :-

Lids of cans are opened by lid opener machine (mechanically and manually checked)

[4.] Grading :-

For grading milk is vigorously agitated by Stainless steel plunger & organolaptic tests are performed by smelling and observing the physical appearance of milk and by tasting it by an experienced personnel. Sour milk is separated, weighted and conveyed to sour milk tank to use it for ghee making. Curd is also prepared & separated and churned it to obtain white butter for ghee manufacturing.

[5.] Weighing :-

Organoleptically accepted milk in cans is dumped into the weighing balance through can tipping bar through a nylon filter & total weight of each consignment is recorded. Outlet valve of weighing bowl is manually operated to release the milk into dump tank to directed raw milk to process section.

[6.] Sampling :-

The sample for each society is taken from the weighing bowl into a 100 ml sample bottle and marked for individuality. One thing should be kept in mind that sample of the society will be taken separately cow or buffalo milk individually. Method of sampling composite.

Amount of sample about → 100 ml

Capacity of crate → 50 bottle.

[7.] Dumping :-

After weighing, milk is collected in to dump tank, from where it is pumped through centrifugal pump to processing section.

[8.] Drip Saver :-

Cans are placed on drip saver for 20-30 seconds.

[9.] Washing of Cans :-

Cans & lids both are washed by straight through Can washer. Cans of two or three societies are also washed manually by can scrubber after every reception.

[10.] Reloading of cans on truck :-

Washed cans are loaded on the trucks by FIFO.

Flow Chart :-

Milk collection by tankers at RMRD

↓

Weighing Milk loaded tankers are weighed on Weight Bridge

↓

Testing First sampling then platform testing

↓

Pumping Milk is pumped to raw milk storage tank (Capacity 30000 liter)

↓

Weighing Unloaded tankers are weighed on Weigh Bridge

Equipments on RMRD :-

1. Chain Conveyor (for cans) → 2
   Type → Mechanically driven
   Motor → 3HP.
2. Lid opener → 2 (both mechanical)
3. Weighing bowl → 2 (500kg. capacity each)
4. Dump tank → 2
   Capacity → 2000 litres each
5. Milk pump → 4 (1 - Can reception, 2 - Tanker reception, 1 - Tanker Dispatch)
6. Can Washers → 2
   - Capacity → 15 cans/min.
7. Can Scrubber → 2
   Capacity → 3 to 4 cans/min.

Washing of Cans :-

Flow chart of Can washing :-

Pre-Rinse with tap water (30-35°C)

↓

Hot detergent washing by pressure jetting (80-85°C)
(Strength : 0.7% alkalinity)

↓

Hot water rinse (75-80°C)

↓

Steam jetting for sterilization

↓

Hot air blowing to dry cans & lids (102-106°C)

Cleaning parameter of the equipment →

Equipment	Washing	Frequency
Weighing bowl, dump tank, can drip saver, filters	Cold water rinse and manual cleaning and then sterilization with hot water	After every reception
Can washer and lid washing trough	Manual cleaning	Once in a day
Receiving pipe lines	CIP	After every reception
cleaning of drain point	Manual cleaning	once in a day
Silos & tanks	cold water rinse & then sterilization with hot water	After every empty
	CIP	Every week

Milk Pre-Pack Section

Introduction → Milk pre pack section refers to the section in the dairy plant where the packaging of all fluid milk (tonned milk, double tonned milk, standared milk, full cream milk etc.) is carried out, packaging of milk product is carried out because of protecting the milk from environment, and to protect from microbial contaminations, protect milk from direct contact from sunlight and air, and for identification of products and its nutritional value, and to provides protections from other contaminations, and to keep milk for long time and make milk safe and healthy for human consumption, for packaging of pouch milk polythene (LDPE) is used, which is soften at approx, 100°C it can sealed at 150°C. It is resistant to cold & odor free.

★ The daily demand of pouch milk is nearly approx.

1,60,000 to 1,80,000 packets.

▸ Specification of packaging materials :-

S.no.	Type of package	Length of package
1.	200ml	80-90 mm
2.	500ml	148-149 mm
3.	1 Litre	225-228 mm
4.	5 Litre	390 mm

Packing of Milk →

1. Gold (FCM) → 200 ml, 500ml, 1L, 6L
2. DTM → 200 ml and 500ml
3. Standard → 500ml
4. Cow milk → 500ml & 5L
5. Tea special → 1 L
6. Skimmed milk → 500 ml
7. Homogenized toned milk → 1 L (chah special)

Capacity of Machine →

- Capacity of machine during packaging –
  - 200 ml → 70-75 package per min.
  - 500 ml → 60-65 package per min.
  - 1 Litre → 40-45 package per min.
  - 6 Litre → 10-12 package per min.

Weight of Packaging Material →

S. no.	Type of package	weight
1.	200ml	1gram
2.	500ml	2gram
3.	6L	22gram

Milk Cold Room →

cold room → 3

capacity → 40,000 litre (each)

Operating parameters for pouch Filling Machine :-

1. Air pressure

   Line → 7 kg/sq.cm.

   Machine → 6 kg/sq.cm

2. Temperature of milk during filling in pouch 4°C.

Specification of Pre packs section →

1. Pre-Pack Filling Machine →

   Number → 11

   Make → Samarpan fabricators Ltd., Deccan packaging RMC packaging

   Electricity → 415 volt

   Compressed air pressure → 5 kg/sq.cm

   Air Consumption → 50 cu.m/hr

   Cooling water → 100 ltr/hr

   Cooling water temp. → 20°C

   Oil used → SAE 211

   Header Tank Capacity → 40 Litre

2. Crate Washer →

No. → 1
Make → Larsen & Toubro
Capacity → 720 Caret/hr
Hot water Temp. → 40-45°C
Detergent Temp. → 65-70°C
Steam Pressure → 4 kg/sq.cm.
Strength of detergent → 0.3-0.5%

3. Crate

No. of crate → 1.5 Lack
Weight → 1.5 kg
Length → 44 cm
Breath → 35 cm
Capacity → 24 nos. 1/2 ltr pouches

Starting of Pre-Pac Machine →

1. Turn on the general switch.
2. Press the pack length using liter knob as desired capacity.
3. Fine adjustment is made by rotating knob when the machine is in operation. Rotation clockwise increase the length and vice versa.
4. Check that film is correctly overlapped beneath the vertical seal electrode. Then turn on the vertical seal switch.

5. Adjust the length of the packs required.
6. Turn on auto switch, injection switch, horizontal seal
Make final adjustment as follows :- Filling accuracy, The pack length, The seal strength.

▶ Stopping of Pre-pac. Machine →

1. Turn off the auto, injection, horizontal seal switches.
2. Turn on the auto switches & follow the film to feed forward for one meter in each head.
Turn auto switch off.
3. Shut off the supply of the liquid to the header tank.
Place the order of the film tube in can.
4. Turn on manual injection switch & tank will empty into the cans.
When flow stops turn off manual injection switch.
5. Turn off the general switch.

▶ CIP (cleaning in place) Cleaning of Packaging Machine →

1. Pre-rinse with normal water to remove loose milk.
↓
2. Cleaning with Caustic alkali solution for 20-25 minutes, at 70°C
↓
3. Hot water circulation 80-90°C for 20 minutes
↓
4. Final rinsing with normal water for 15 minutes.

3. Milk Processing Section

Milk Processing Section & city supply →

Processing of milk is one of the main things of any dairy industry. So the proper way of milk processing is very important to get good quality of products.

The diary also has well organized milk processing section. Here three types of pasteurized fluid milk is produced such as DTM (1.5% fat, 9% SNF), Standardized milk (4.5% fat, 8.5% SNF), Cow milk (3.8% fat, 9% SNF). Full cream Milk (6% fat, 9% SNF), Chah (fat, SNF), Tea special (fat, SNF) & Parivar light

▶ Various Activities of Processing Section →

- Chilling of raw milk
- Separation of cream and skimmed milk
- Standardization
- Pasteurization of milk
- Homogenization.
- Cream Pasteurization.
- Packaging of fluid milk.
- Reconstitution

Flow Diagram of Milk Processing :-

Reception of Raw milk

↓

Unloading, grading, weighing, sampling & testing (RMRD)

↓

Dump tank (RMRD)

↓

Filtration raw milk (RMRD)

↓

Plate chiller (4°-5°C) (RMRD)

↓

chilled milk in storage tank & silos

↓

Standarization

↓

Balance tank

↓

Centrifugal pump

↓

Regeneration - I

↓

Filtration

Regeneration - II ← Homogenization

↓

Regeneration - III

↓

Heating (77°C / 15 sec.)

↓

Regeneration - III

↓

Regeneration - II

↓

Regeneration - I

↓

chilling

↓

Packaging

Cream

Skim milk

↓

Regeneration - II

↓

Regeneration - III

↓

Heating (85-88°C)

↓

Regeneration III

↓

Regeneration - II

↓

Regeneration - I

↓

chilling

↓

Milk silo

Cream

↓

Regeneration - I

↓

Regeneration - II

↓

Heating (85-90°C)

↓

Regeneration - II

↓

Regeneration - I

↓

chilling

↓

Cream storage tank

Standardization :-

Standardization means adjustment i.e. raising or lowering of the fat and SNF % as per requirement. Standardization of various products is done in the following way:

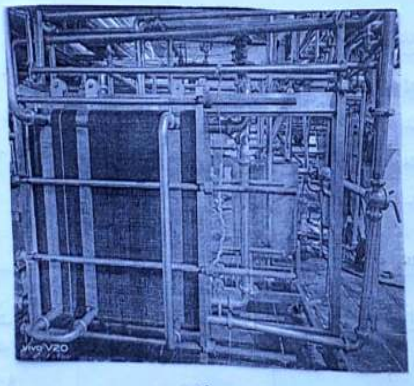
- For DTM Cream is to be separated for lowering the fat and SMP is to be added for increasing SNF.
- For standardized milk fat & SNF adjustment is done as above.
- For full cream milk fat and SNF adjustment.
- For SMP milk should contain 0.1% fat & 8.5% SNF.

Pasteurization :-

Pasteurization is done by heating every particle of milk to 72°C for 15 sec. to minimize the bacterial load. Then phosphates test should be negative, after pasteurization milk should be cooled to 5°C or below.

Standards for milk

TYPE OF MILK	% FAT	% SNF
DTM	1.5	9.0
Cow milk	3.0	8.5
Std. milk	4.5	8.5
FCM	6.0	9.0
Skim milk	NMT 0.5	8.7
Homogenised milk	4.0	9.0
Tea special	3.8	8.7



Chiller

Operating parameters for Pasteurizers :-

Pasteurized milk temp. → 72°C
Chilled milk temp. → Maximum 4°C
Chilled water inlet temp. → 1.5°C
Hot water inlet temp. → 85 - 90°C
Steam Pressure → 1.5 - 3.0 Kg/cm²

Cream Separation :-

Cream is the fat rich portion of milk obtained by keeping it undisturbed by gravity method or by centrifugation. It's separated & used for other products preparation.

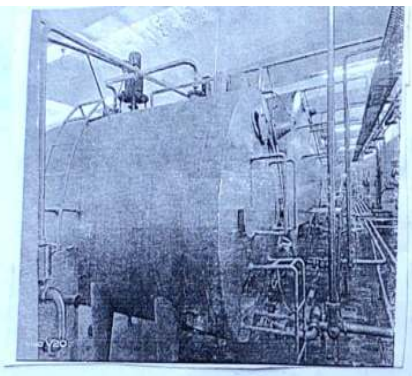
Homogenization :-

It is used to breakdown the fat globules to reduce tendency of fat to float on the surface and formatio of the cream layer on the top.

Specification

[1] Chiller

Number of chiller → 4 (2 for Raw milk, 2 for pr
Type → Plate heat exchanger
Capacity → 20,000 KLPH & 10,000 KLPH



Silo

- No. of plates → 71 and 64
- Cooling medium → Chilled water
- Temp Range → 3°C - 4°C
- Water circulation → 30,000 lph

[2.] **Raw Milk Tanks**

- No. of tanks → 5
- Capacity → 15,000 L (each)

[3.] **Pasturised Milk Tanks**

- Number of Tanks → 3
- Capacity → 15,000 L (each)

[4.] **Silo**

- Number of Silos → 9
- Capacity → 30,000 L (each)
- RMST (Raw milk storage tank) → 3 tanks
- PMST (Pasteurized milk storage tank) → 6 tanks

[5.] **Pump**

- Pump → 12
- Type → Centrifugal
- Capacity → 20,000 LPH (automation unit)

[6.] Cream Separation

3 Cream Separator (2 Mannual and 1 Automated)

Separation	45-48°C	45-48°C
Fat in cream	38-42%	38-42%
Make	Alpha Laval	TetraPak
Power of Motor	15HP	15HP
RPM of Motor	1450	1450
No. of disc	125	135
Capacity	10000 LPH	10000 LPH
Inner diameter of Bowl	20.5l	20.5l
RPM of Bowl	6500	6500
Volt	415	415
Frequency	50hz	50hz

[7.] Homogenizer

- Number → 2 (1 mannual & 1 auto)
- Type → Double stage
- Homogenization Temp. → 55-65°C
- Pressure → 1st Stage - 2500 psi . 2nd Stage - 500 psi
- Capacity → 10,000 LPH , 20,000 LPH
- Oil used → Servo 90

[8.] Reconstitution Vat

- Number → 1
- Make → Process Equipment Co.
- Capacity → 500L

Flow chart :-

Milk Receipt in cans
↓
Unloading
↓
Opening of Lids
↓
Plungering
↓
Grading of Milk
↓
Pouring in weighment tank
↓
Weighment
↓
Quality Analysis
↓
Dump Tank
↓
Chilling & storage of Raw Milk
↓

Regeneration – 35°C
Regeneration – II · 65°C
Heating at 75-80°C
Holding
chilling to below 6°C

↓
Pasturized milk tank 5°C
↓
Sachet filling
↓
Cold Storage

4. Indigenous Product

A dairy product or milk product is food produced from the milk of mammals. Dairy products are usually high energy yielding food products. A production plant for the processing of milk called a dairy or a dairy factory.

Types of dairy products :-

[1.] Butter :- Mostly milk fat, produced by churning cream.

[2.] Buttermilk :- The liquid left over after producing butter from cream.

[3.] Paneer :- Fermented milk product.

[4.] Lassi :- Indian subcontinent.

[5.] Curd :- The soft, curdled part of milk used to make cheese.

[6.] Ice-milk :- Low fat version of ice-cream.

[7.] Ice-Cream :- Slowly frozen cream, milk, flavors and emulsifying

[8.] Ghee :- Clarified butter by gentle heating of butter and removal of the solid matter.

[9.] Cheese :- Produced by coagulating milk, separating from whey and letting it ripen, generally with bacteria and sometimes also with certain molds.

[10.] Whey :- The liquid drained from curds and used for further processing or as a livestock feed.

[11.] Yogurt :- Milk fermented by Streptococcus salivarius spp. thermophilus and Lactobacillus delbrueckii spp. bulgaricussometimes with additional bacteria, such as Lactobacillusacidophilus.

[12.] Evaporated milk :- Milk without added sugar.

[13.] Khoa :- Milk which has been completely concentrated by evaporation, used in Indian cuisine including gulab jamun, peda etc.

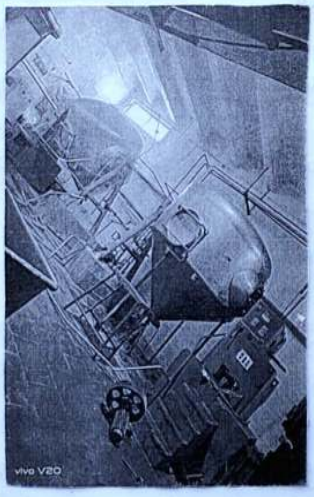
[14.] Condensed Milk :- Milk which has been concentrated by evaporation, with sugar added for reduced process time and longer life in an opened can.

[15.] Skim milk :- Whey product, high milk fat and nutritional product.

[16.] Milk powder :- Produced by removing the water from milk.

[17.] Cultured Milk :- Resembling buttermilk but uses different yeast and bacterial cultures.

[18.] Clotted cream :- Thick, spoonable cream made by heating milk



5. Butter & Ghee

Butter Butter is a solid dairy product made by churning fresh or fermented cream or milk, to separate the butterfat from the buttermilk. Butter consists of butterfat, milk protein & water.

→ Most frequently made from cows milk.

→ Butter is a water-in-oil emulsion resulting from an inversion of the cream, in a water-in-oil emulsion, the milk proteins are the emulsifiers.

Production of Butter:- Butter is produced by churning, a process which damages the membranes of butterfat found in cream resulting in the production of small butter grains. These butter grains float in the water-based portion of the cream called buttermilk. The buttermilk is then drained and if required more buttermilk can be removed by rinsing the grains with water. Finally the grains are pressed. Slight variations in the production method

Melting of butter

allow the creation of butter with different consistencies.

→ There are several type of butter but sweet cream butter, which is made from pasteurised cream, is the most common type used in the UK.

→ All categories of butter are sold as salted or unsalted. Salt is added as flavouring.

Ghee → Ghee is a class of clarified butter that originated in ancient India. Ghee is prepared by simmering butter, which is churned from cream and removing the liquid residue.

→ Spices can be added for flavor.

→ The texture, color and taste of ghee depend on the quality of the butter, source of milk used in the process & the duration of boiling.

Production of Ghee:- Different method are used for the preparation of ghee these methods are

1. Indigenous (desi) method
2. Direct Cream method.

1. Indigenous Method :- It is an age-old process and adopted in rural areas and in household levels because of simplicity in equipment & technique.

→ This method usually involves two routes :-

I. Lactic acid fermentation of raw or heated milk is followed by churning of curd into butter.

II. Separation of clotted cream from the boiling milk and its churning into butter.

2. Direct Cream Method :- The small dairies use a technologically improved method for ghee making which involves the separation of cream from milk by centrifugation.

→ This process omits the need for production of butter because cream is directly converted into ghee.

→ The fresh cream or refined cream or even washed cream is heated in a heating kettle to evaporate moisture.

→ The kettle may be an ordinary kettle heated by gas or a steam heated double jacketed kettle made up of stainless steel.

→ The final product will have a less intense cooked flavor when low solid not fat cream is used.

6. Quality Control & Milk Testing

Introduction :- Milk testing and quality control is an essential component of any milk processing industry whether small, medium or large scale. Milk being made up of 87% water is prone to adulteration by unscrupulous middlemen and unfaithful farm workers.

A milk processor or handler will only be assured of the quality of raw milk it certain basic quality tests are carried out at various stages of transportation of milk from the producer to the processor and finally to the consumer.

Milk Testing and Quality Control :-

➤ What is milk quality control ?

Milk quality control is the use of approved tests to ensure the application of approved practices, standards and regulations concerning the milk and milk products.

The tests are designed to ensure that milk products meet acepted standards for chemical composition & purity as well as levels of different micro-organism.

➤ Techniques used in milk testing and quality control

- **Milk Sampling :-** Accurate sampling is the first pre-requisite for fair and just quality control system. Liquid milk in cans and bulk tanks should be thoroughly mixed to disperse the milk fat before a milk sample is taken for any chemical control test.

  Representative samples of packed products must be taken for any investigation on quality. Plungers and dippers are used in sampling milk from milk cans.

- **Sampling milk for bacteriological testing :-**

  Sampling milk for bacteriological tests require a lot of care. Dippers used must have been sterilized in an autoclave or pressure cooker for at least 15 mins at 120°C before hand in order not to contaminate the sample.

  On the spot sterilization may be employed using 70% Alcohol swab and flaming or scaling in hot steam or boiling water for 1 minute.

- **Preservation of sample :-** Milk samples for butterfat testing may be preserved with chemicals like Potassium dichromate. Milk samples that have been kept cooling a refrigerator or ice-box must first be warmed in water bath at 40°C, cooled to 20°C, mixed and a sample then taken for butterfat determination.

If the laboratory cannot start work on a sample immediately after sampling, the sample must be cooled to near freezing point quickly and be kept cool till the work can start.

If samples are to be taken in the field e.g. at a milk cooling center, ice boxes with ice packs are useful.

- **Labelling and records keeping :-** Samples must be clearly labelled with name of farmer or code no. and records of dates and places include in standard data sheets.

Good record must be kept neat and in a dry place.

It is desirable that milk producers should see their milk being tested and the records should be made available to them if they so require.

• Test conducted at Sanchi lab. →

There are number of tests carried, some of them are as follows:

→ Alcohol Test

→ Organoleptic Test

→ Acidity Test

→ Corrected lactometer reading (CLR)

→ Gerber method for fat test.

→ Moisture test

→ Solid not fat (SNF) test

[1.] **Organoleptic Test :-** The organoleptic test permits rapid segregation of poor quality milk at the milk receiving plateform.

→ No equipment is required but the milk grader must have good sense of sight, smell and taste.

→ The result of the test is obtained instantly and the cost of the test are low.

Procedure

Open a can of milk

↓

Immediately smell the milk

↓

Observe the appearance of the milk

↓

If still unable to make a clear judgement, taste the milk but do not swallow it.

↓

Spit the milk sample into a bucket provided for that purpose or into a drain, flush with water

↓

Look at the can lid and the milk can to check cleanliness

[2.] **Alcohol Test** :- The test is quick and simple. It is based on instability of the proteins when the levels of acid and rennet are increased and acted upon by the alcohol. Also increased levels of albumen and salt concentration result in a positive test.

Procedure →

The test is done by mixing equal amount of milk and 68% of ethanol sol^{n} in a small bottle or test tube.

↓

If the tested milk is of good quality, there will be no coagulation, clotting or precipitation but it is necessary to look for small lumps.

↓

The first clotting due to acid development can first be seen at 0.21 – 0.23 % lactic acid.

↓

For routine testing 2 mls is mixed with 2 mls 68% alcohol

[3.] **Acidity Test :-** Bacteria that normally develop in raw milk produce more or less of lactic acid. In the acidity test the acid is neutralized with 0.1 N Sodium hydroxide and the amount of alkaline is measured.

The natural acidity of milk is 0.16 – 0.18%.

Procedure →

1 ml of the milk measured into the procelain disk flask

↓

1 ml of Phenopthalein is added and then slowly from the burette.

↓

0.1 N Sodium hydroxide under continuous mixing, until a faint pink colour appears

↓

The number of mls of sodium hydroxide solution divided by 10 expresses the percentage of lactic acid

[4.] **Gerber Method :-** This is the most accurate Scientific method of checking the fat content in the milk. In this method 10% of H_2SO_4 (90% dilute) + 10.75 ml of milk is taken in a test tube with appropriate marking. To this 1 ml of Amyl alcohol is added. Shake well & centrifuge it at 1200 rpm for 3 minutes. This gives amount of fat content in the milk.

Out of these some tests are carried out for milk product such as moisture test etc. & the remaining are carried for milk.

Procedure

In Butyrometer add 10ml H_2SO_4 (10·1·)

↓

With the help of pipette add 10·75ml milk from side of the walls

↓

Add 1ml of Amyl alcohol

↓

Mix well

↓

Centrifuge for 3-4 min at 1200 rpm

↓

Observe reading

[5.] **Lactometer Test** :- Addition of water to milk can be a big problem where we have unfaithful farm workers, milk transporters and greedy milk hawkers. A few farmers may also fall victim of this illegal practice.

Milk has a specific gravity. When its adultered with water or other materials are added or both misdeeds are committed, the density of milk change from its normal value to abnormal.

The lactometer test is designed to detect the change in density of such adulterated milk.

Procedure

Mix the milk sample gently and pour it gently into a measuring cylinder

↓

Let the lactometer sink slowly into the milk

↓

Read and record the last lactometer degree just above the surface of milk

Instrument

- **Centrifuge**:- This article is about the scientific device A laboratory tabletop centrifuge.

A laboratory is a piece of equipment that puts an object in rotation around a fixed axis applying a potentially a potentially strong force perpendicular to the axis of spin. The centrifuge works using the sedimentation principle, where the centripetal acceleration causes denser substances and particles to move outward in the radial direction. A laboratory centrifuge that uses sample tube, the radial acceleration causes denser particles to settle to the bottom of the tube while low density substances rise to the top.

There are 3 types of centrifuge designed for different application:-

→ Industrial scale centrifuge are commonly used in manufacturing and waste processing to sediment suspended solids, or to separate immiscible liquid.

→ An example is the cream separator found in dairies.

→ Large centrifuge are used to simulate high gravity or acceleration environments (for e.g., high-G training for test pilots).

→ Medium sized centrifuge are used in washing machines and some swimming pools to wring water out of fabrics.

- **Adulteration Test Kit** :- Ready-to-use kit has been developed and commercialized for detection of commonly used adulterants in milk. Simple and rapid test procedures used in kit can detect the presence of urea, ammonia fertilizers, starch, sucrose, glucose, salt, hydrogen peroxide by comparing the colors developed after addition of test reagents to milk.

→ The kit is available in three pack sizes, "small", "medium" and "large", each suited for specific usage, namely, at household level, dairy cooperative & dairy plant level.

Moisture Balance

Electronic Balance

- **Moisture Balance :-**

The amount of moisture in a product can greatly affect perceived quality. You can use a moisture analyzer to measure the original weight of a product before the drying process.

- **Electronic Balance :-**

The quickest way to understand the principle of how electronic balances work, is to first understand how they are constructed.

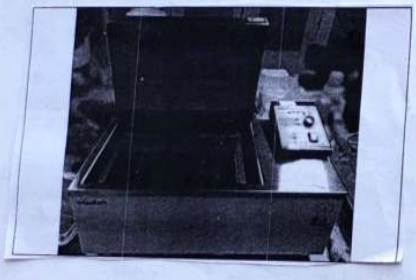
→ Two types -

1) Electromagnetic balancing type
2) Electrical resistance wire type (load cell type)

- **Magnetic Stirrers :-**

A magnetic stirrer or magnetic mixer is a laboratory device that employs a rotating magnetic field to cause a stir bar (also called "flea") immersed in a liquid to spin very quickly, thus stirring it.

Hot Plate



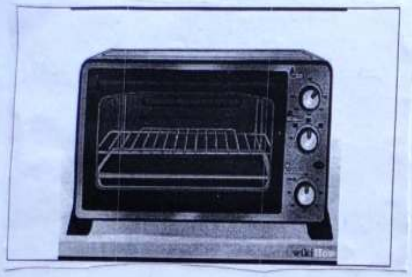
Water bath

BOD Incubator

- **Hot Plate :-** A hot plate is a portable self-contained tabletop small appliance that features one, two or more gas burners or electric heating elements.

- **Water bath :-** A water bath is laboratory equipment made from a container filled with heated water.
  → It is used to incubate samples in water at a constant temp. over a long period of time.
  → It is also used to enable certain chemical reactions to occur at high temperature.

- **B.O.D. Incubator :-** Incubator is a device used to grow and maintain microbiological cultures or cell cultures.
  → The incubator maintains optimal temp., humidity and other conditions such as the CO_2 and oxygen content of the atmp. inside.
  → The most commonly used temp. both for bacteria such as the frequently used E. coli. as well as for mammalian cells is approx. 37°C as these organisms grow well under such conditions



Oven

Microwave

Colony Counter

vivo V20

- **Oven** :- An oven is a thermally insulated chamber used for the heating, baking or drying of a substance, and most commonly used for cooking. Kilns & furnaces are special-purpose ovens, used in pottery and metal-working, respectively.

- **Microwave** :- This article is about the electro-magnetic wave. For the cooking appliance.

→ Microwaves are a form of electromagnetic radiation with wavelengths ranging from 1m to 1mm. with frequency between 300 MHz (100 cm) & 300 GHz (0.1 cm)

- **Colony Counter** :- In microbiology, a colony-forming-unit (CFU) is a unit used to estimate the no. of viable bacteria or fungal cells in a sample.

→ Viable is defined as the ability to multiply via binary fission under the controlled conditions. Counting with colony-forming units requires culturing the microbes and counts only viable cells.

7. Conclusion

Milk and dairy products are naturally rich sources of a wide range of essential nutrients and make a significant contribution to nutrient intakes and diet quality. The milk and dairy product group form an important part of product based dietary guidelines across and dairy is with good reason, recognized as one of the components of a healthy dietary pattern.

Milk & dairy products are versatile and often their nutritional benefits in an enjoyable, convenient & affordable way.

8. Reference

I have completed this report by the various type of source. That is internet and other source of knowledge book. I thankful to my teachers who guided me for making this project and I also thankful my friend who help me in making this project.

Aayushi Goswami

इन्दौर सहकारी दुग्ध संघ मर्यादित
INDORE SAHAKARI DUGDH SANGH MYDT.

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No..0127../GM(PO)/PRODUCTION/ISDSM/2022 Date:- 28.04.2022

TRAINING CERTIFICATE

This is to certify that **"Ms. Aayushi Goswami"** Student of M.Sc. (Biotechnology) IVth Semester from Government Holkar (Model, autonomous) Science Collage Indore (M.P.) has undergone 15 Days Internship Training from **11/04/2022** to **25/04/2022** at Indore Sahakari Dugdh Sangh Maryadit, Indore.

During the training period she has taken keen interest tolearn the various activities of our dairy plant.

I appreciate her work & wish her best of luck.

Place:- Mangliya Indore (M.P.)

Date:- 28.04.2022

General Manager (Po)

Indore sahakari dugdh sangh mydt

NAAC Accredited (“A” Grade)
Indore
GOVT. HOLKAR(Model, Autonomous) SCIENCE COLLEGE , 452001(MP

SESSION:-2021-22

TOPIC:- Identification of metals in soil by AAS

SUBMITTED TO
DR. ANAMIKA JAIN(HOD)
DEPARTMENT
OF CHEMISTRY

SUBMITTED BY
SHIVKUMAR SINGH PARASTE
M.Sc. Final year

Enrollment no:-
DS1712820

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The journey started as a student towards the Professional Life with the aim in mind to learn the Practical aspects of life, ended as a memorable experience, which also helped me to come off with flying COLOURS.

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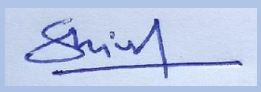


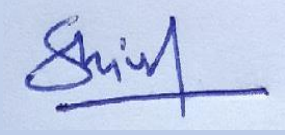
SHIVKUMAR SINGH PARASTE

M.Sc. FINAL

DECLARATION

I SHIVKUMAR SINGH PARASTE , Student of M.Sc. (Chemistry) IV Semester from Government Autonomous Holkar Science College, hereby declare that the presented report of my Internship titled "INTERNSHIP TRAINING ON INSTRUMENTATION TECHNIQUES" is uniquely prepared by me after the completion of 15 days of training i.e. from 23/03/2022 to 05/04/2022 from Government Autonomous Holkar Science College.
I also confirm that the report is performed for my academic requirements only, not for any other purposes.

The report is truly based on laboratory works, research and training.

Signature:- 

SHIVKUMAR SINGH PARASTE
M.Sc. FINAL

PLAC:- INDORE

INDEX

- ***Atomic absorption spectroscopy (AAS)***
  - ✓ Introduction
  - ✓ Invention
  - ✓ Principle
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  - ✓ Soil introduction
  - ✓ Material and method
  - ✓ Chemical required
  - ✓ Instrument required
  - ✓ Sample collection
  - ✓ Digestion of soil sample
  - ✓ Soil sample taken

- ***Detection of metal by uv spectrometer***

- ***Peak observed and detection of metal ions***

- ***Analysis of soil sample by AAS***

- ***Result and Discussion***

- ***Conclusion***

ATOMIC ABSORPTION SPECTROSCOPY

In lab

INTRODUCTION

- **Atomic absorption spectrometry (AAS) is a technique in which free gaseous atoms absorb electromagnetic radiation at a specific wavelength to produce a corresponding measurable signal. The absorption signal is proportional to the concentration of the free atoms present in the optical path.**
- **In analytical chemistry the technique is used for determining the concentration of a particular element (the analyte) in a sample to be analyzed. AAS can be used to determine over 70 different elements in solution, or directly in solid samples via electrothermal vaporization,[citation needed] and is used in pharmacology, biophysics, archaeology and toxicology resear**
- **Atomic absorption spectrometry has many uses in different areas of chemistry such as clinical analysis of metals in biological fluids and tissues such as whole blood, plasma, urine, saliva, brain tissue, liver, hair, muscle tissue. Atomic absorption spectrometry can be used in qualitative and quantitative analysis.**

INVENTION

scientist Alan Walsh,

The concept of atomic absorption spectroscopy (AAS) came to CSIRO scientist Alan Walsh in a flash of inspiration as he was gardening at his Melbourne home. This led to an invention that has since been labelled as one of the most significant achievements in chemical analysis last century.

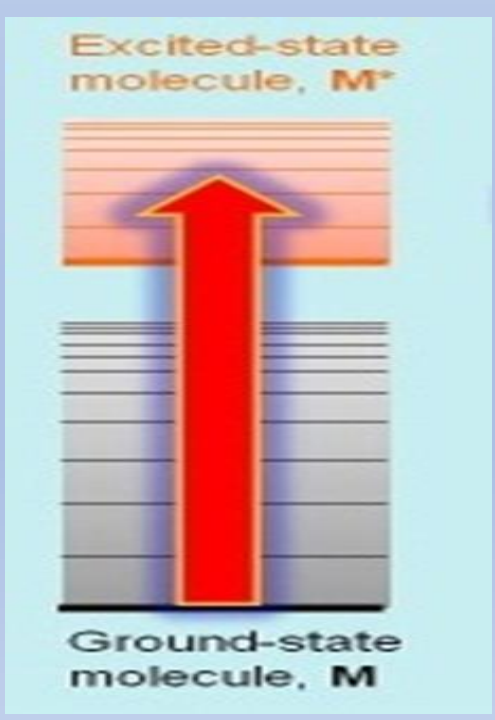
Atomic Absorption Spectroscopy: An Aussie Invention

- Developed by Alan Walsh (below) of the CSIRO in early 1950s.

ATOMIC ABSORPTION SPECTROSCOPY PRINCIPLE

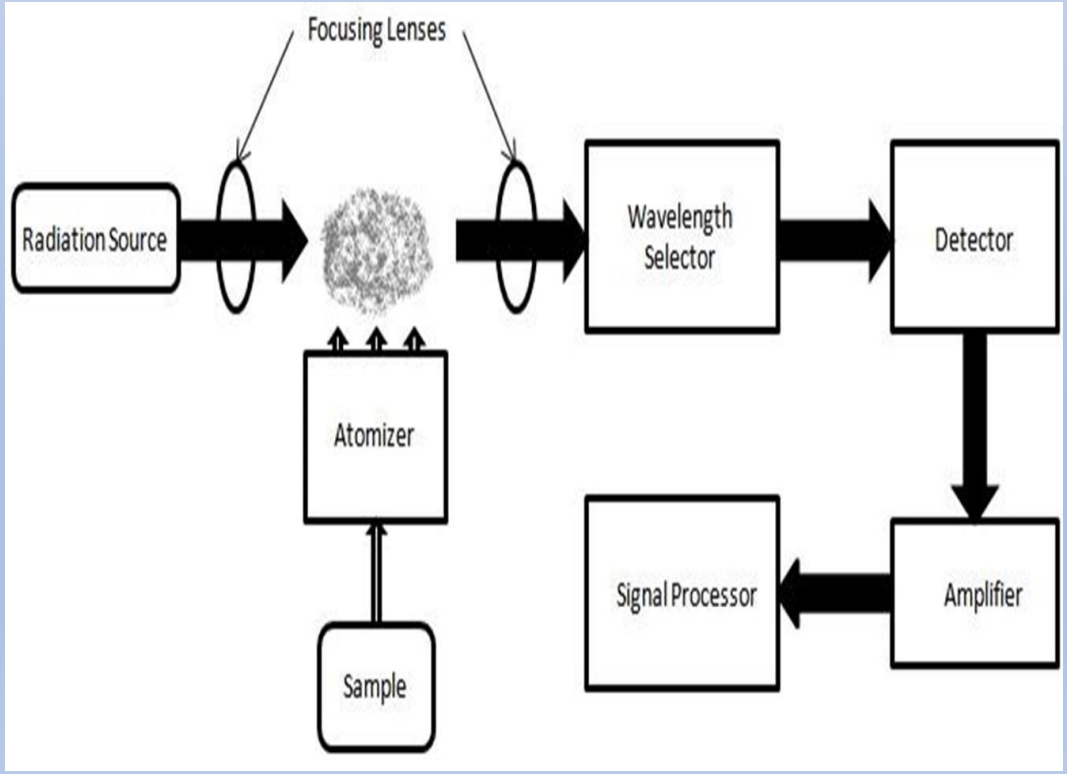
- **The technique makes use of the atomic absorption spectrum of a sample in order to assess the concentration of specific analytes within it. It requires standards with known analyte content to establish the relation between the measured absorbance and the analyte concentration and relies therefore on the Beer–Lambert law.**

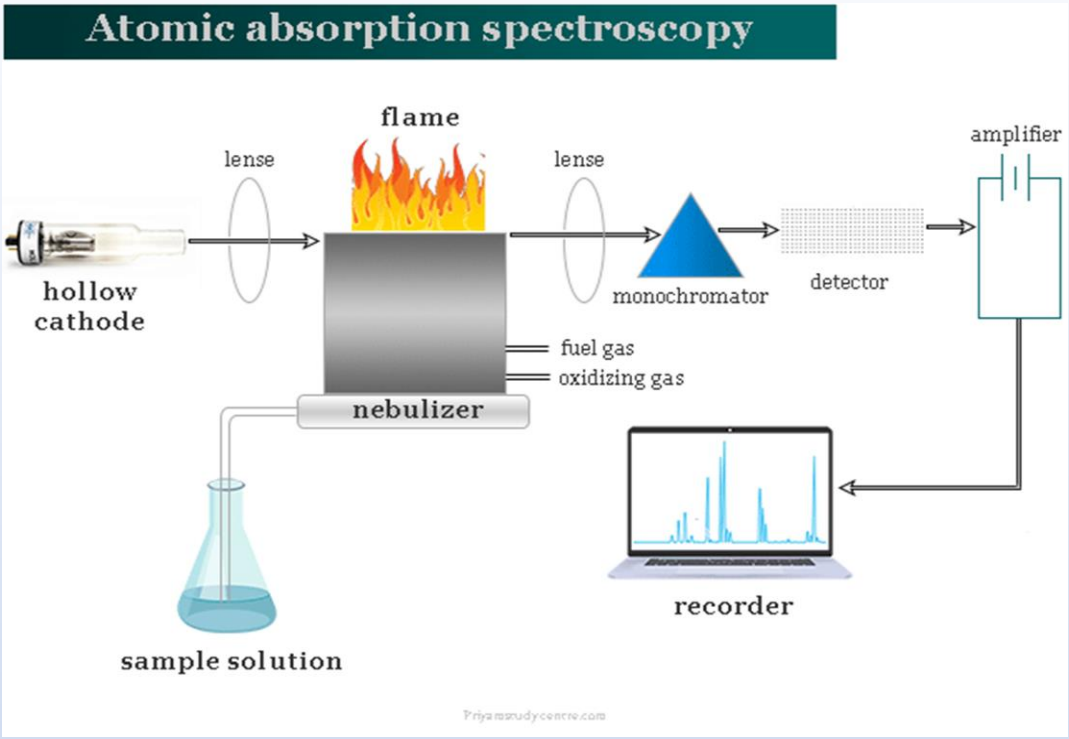
- **Electrons promote to higher orbitals for a short amount of time by absorbing a energy**
- **M + hv → M***
- **Relises on Beer-Lambert Law**
- **A= a.b.c**



AAS INSTRUMENTATION

- **For instrumentation, flame,non-flame, and graphite furnace is available in atomic absorption instrumentation . Any atomic absorption spectroscopy instrumentation has the following types of components,**
- **Radiation source-(*HOLLOW CATHODE LAMP*)**
- **Atomizer-(*flame atomizer*)**
- **Monochromater**
- **Detecter**
- **Amplifier**
- **Recorder**

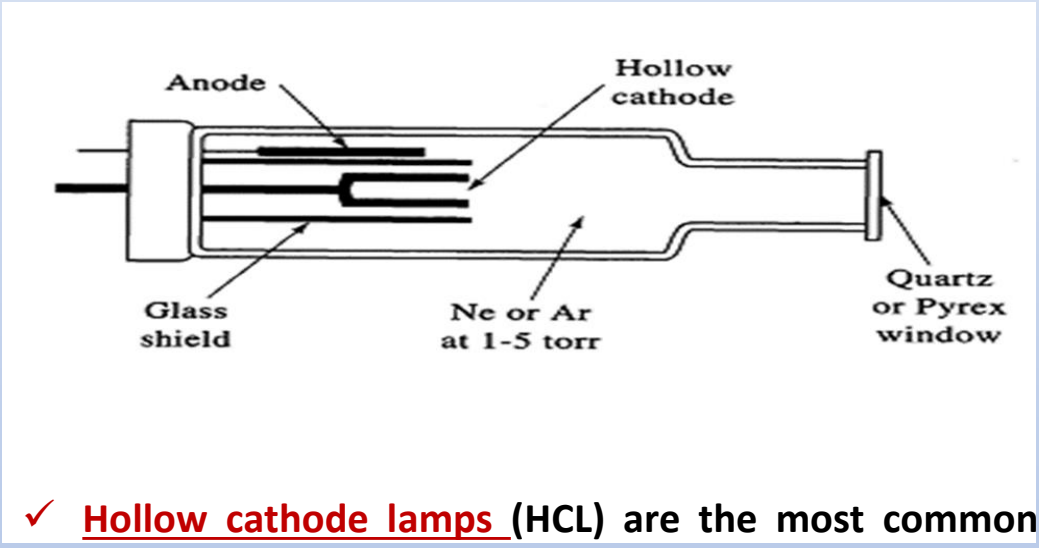




Fuel-Oxidant mixture	Temperature (°C)
Natural gas-Air	1700
Propane-Air	1800
Hydrogen-Air	2000
Hydrogen-Oxygen	2650
Acetylene-Air	2300
Acetylene-Oxyen	3200
Acetylene-Nitrous oxide	2700
Cyanogen-Oxygen	4800

❑ *RADIATION SOURCE*

➢ HOLLOW CATHODE LAMP



✓ **Hollow cathode lamps (HCL) are the most common radiation source in LS AAS.[citation needed] Inside the sealed lamp, filled with argon or neon gas at low pressure, is a cylindrical metal cathode containing the element of interest and an anode. A high voltage is applied across the anode and cathode, resulting in an ionization of the fill gas. The gas ions are accelerated towards the cathode and, upon impact on the cathode, sputter cathode material that is excited in the glow discharge to emit the radiation of the sputtered material, i.e., the element of interest.**

❑ *ATOMIZER*

The atomizers most commonly used nowadays are (spectroscopic) flames and electrothermal (graphite tube) atomizers. Other atomizers, such as glow-discharge atomization, hydride atomization, or cold-vapor atomization, might be used for special purposes

➢ *Flame atomizer*

The oldest and most commonly used atomizers in AAS are flames, principally the air-acetylene flame with a temperature of about 2300 °C and the nitrous oxide[3] system (N_2O)-acetylene flame with a temperature of about 2700 °C. The latter flame, in addition, offers a more reducing environment, being ideally suited for analytes with high affinity to oxygen.

A laboratory flame photometer that uses a propane operated flame atomizer
Liquid or dissolved samples are typically used with flame atomizers.

Name of the element	Emitted wavelength range (nm)	Observed colour of the flame
Potassium (K)	766	 Violet
Lithium (Li)	670	 Red
Calcium (Ca)	622	 Orange
Sodium (Na)	589	 Yellow
Barium (Ba)	554	 Lime green

❑ Monochromator

- A monochromator is an optical device that transmits a narrow band of wavelengths of light or other radiation from a wider range of wavelengths. The atoms in the AAS instrumentation accept the energy of excitation and emit radiation. A desired band of lines can be isolated with a monochromator by passing a narrow band. The spectra through a monochromator can be shown by a curve.

➢ *Detector*

- ✓ A detector can convert light coming from a monochromator to a simplified electrical signal. Generally, we used a photomultiplier tube as a detector in the atomic absorption spectroscopy instrument.
- ✓ A detector can be tuned to respond by a specific wavelength or frequency.

➢ Recorder

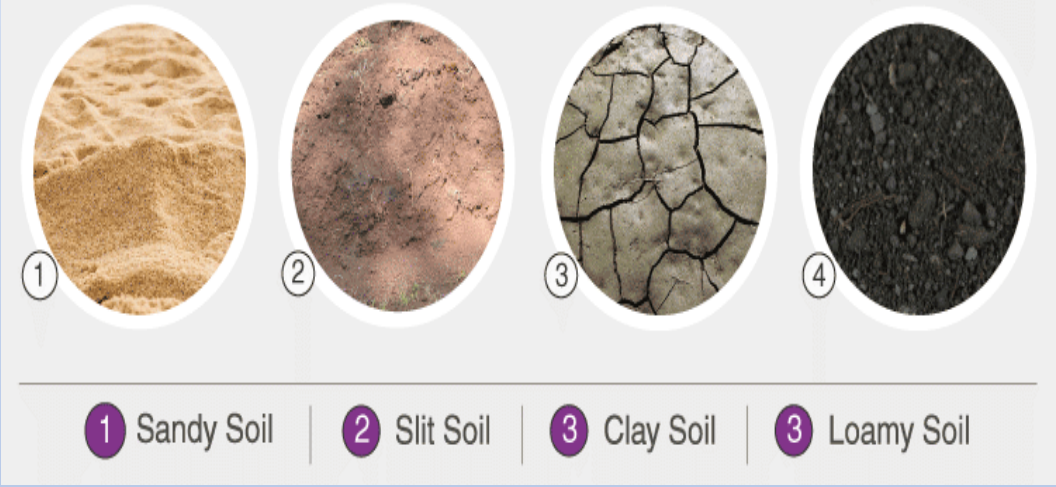
- ✓ The recorder can receive electrical signals from the detector to convert them into a readable response.
- ✓ In atomic absorption spectroscopy instrumentation, today we used a computer system with suitable software for recoding signals coming from the detector

❑ SOIL INTRODUCTION

- **Soil is a mixture of organic matter, minerals, gases, liquids, and organisms that together support life. Earth's body of soil, called the pedosphere, has four important functions:**

- **as a medium for plant growth**
- **as a means of water storage, supply and purification**
- **as a modifier of Earth's atmosphere**
- **as a habitat for organisms**

- **the soil consists of 45% minerals, 50% empty spaces or voids and 5% organic matter.**



❑ *MATERIAL AND METHODS*

- **Metals are natural constituents of the earth's surface, yet aimless human exercises have radically modified their geochemical cycles and biochemical adjust**
- **Drawn out introduction to metals, for example, cadmium, copper, lead, nickel, and zic can cause injurious wellbeing impact in people.These metals are a reason for ecological contamination from sources, for example, leaded oil, mechanical effluents, wastage, and draining of metal particals not with standing regular starting point from earth layer earth outside layer. They exist in the street side siltb because of weathering, interruption of tainting through the above said sources and ensuring affidavit along the street side from the water stream. Any metal species might be viewed as a "contaminant" on the off chance that it happens where it is undesirable, or in asharp or fixation that cause an unfavorable human or natural impact the experimental site covers the be area around the agricultural sites of indore(Raw). This research will be carried out in agricultural area,**
- **industrial sites and the soil of Mumbai (red soil).**

❖ *Material required*

- **Soil samples, Plastic bag, shovel, 2mm sieve, beakers, Measuring cylinder, funnel, 100ml air tight bottle, Whatman filter paper No.42, Distilled water.**

❖ *Chemical required*

- **30% HCL, 70%High Purity HNO3**

❖ *Instrument required*

- **Perkin Elmer Atomic Absorption Spectrophotometer A Analyst 400.**

❖ *Sample collection*

- **The sample was collected from the sample location using a clean shovel. The soil sample was collected at 15cm depth around the sample area, it was thoroughly mixed and transferred into clean and labelled bottles for onward analysis.The samples were mixed, gently homogenized, and sieved through a 2mm mesh sieve. The sample were first air dried. The resulting fine powder will be kept at room temperature for digestion.**

❖ *Digestion of soil sample*

- **1mg of the oven dried sample was weighed using a top loding balance and placed in a 250 ml Beakers seperatly to which 15 ml of aquaregia (30%HCL and 70%h High purity HNO3, in 3:1 ratio) will be added.The mixture was then digest at 70% till the solution became transparent. The resulting solution was filtered through whatman filter paper no. 42 and into a 50 ml dilute to 50 ml volumetric flask and diluted to mark volume using deionised water and sample solution was analyze for concentration.**

❖ *SOIL SAMPLES TAKEN*

Sample1:- Agriculture soil (Mau indore)
Sample2:- Industrial soil (Mau Indore)
Sample3:- red soil (Indore)

❖ *Detection of metal by uv spectrometer*

- **By this we know the different absorption on different wavelength. The peak was shown by uv spectrometer of different wavelength by this we know the metal ions present in the soil sample.**

❖ Peak observed and detection of metal ions

Sample1:- Agriculture Soil

1st:- 400nm- Nitrogen is present

2nd :- 320nm- Nritrite ion is present

3rd:- 300nm-Calcium ion is present

Sample 2 :- Industrial Soil
1st:-350nm -Iron is present

2nd:-310-Calcium ion is present

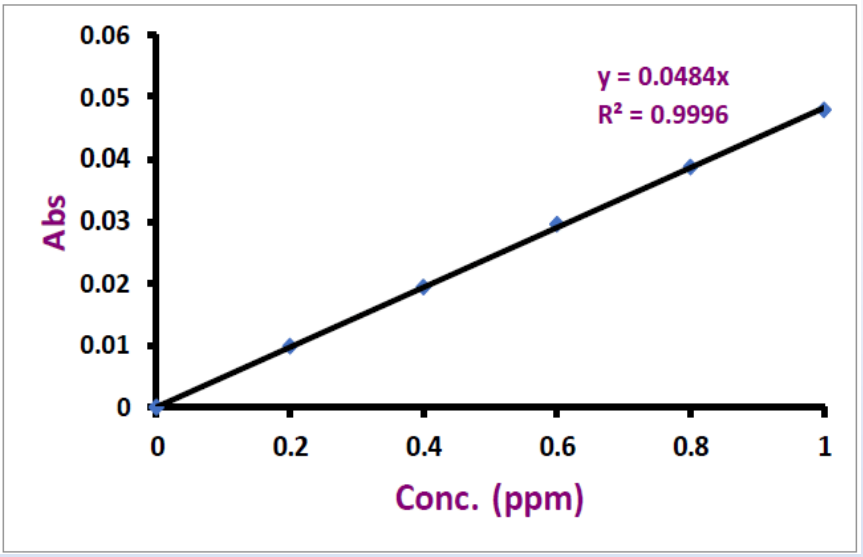
Sample 3:- Red soil

1st:-350nm-Iron is present

2nd:-320-Nitrite ion is present

3rd:-300nm-Calcium ion is present

- **In Agriculture soil, I found 3 metal ions Nitrogen, Nitrite,and Calcium ion**
- **In Industrial soil, I found 2 metal ions iron and calcium**
- **In Red soil, I found 3 metal ions, Nitrite, and calcium**


y = 0.0484x
R² = 0.9996
Abs
Conc. (ppm)
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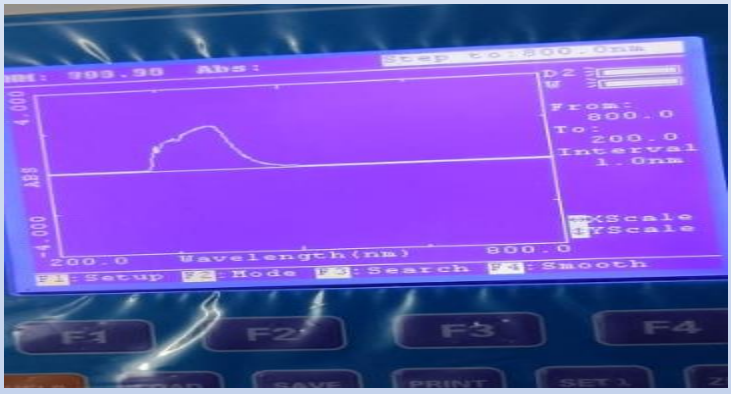
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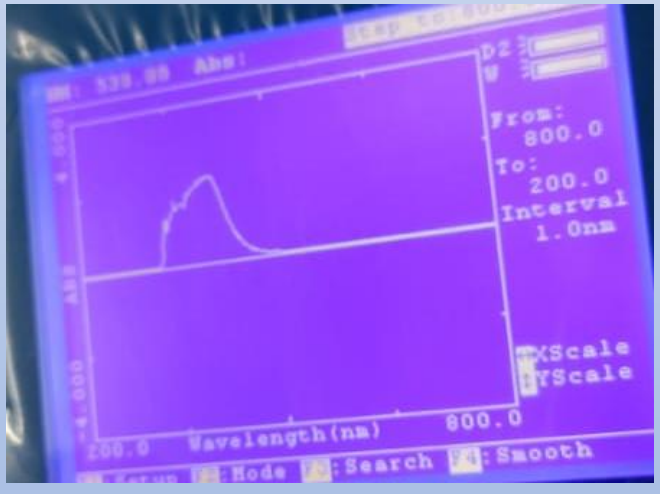
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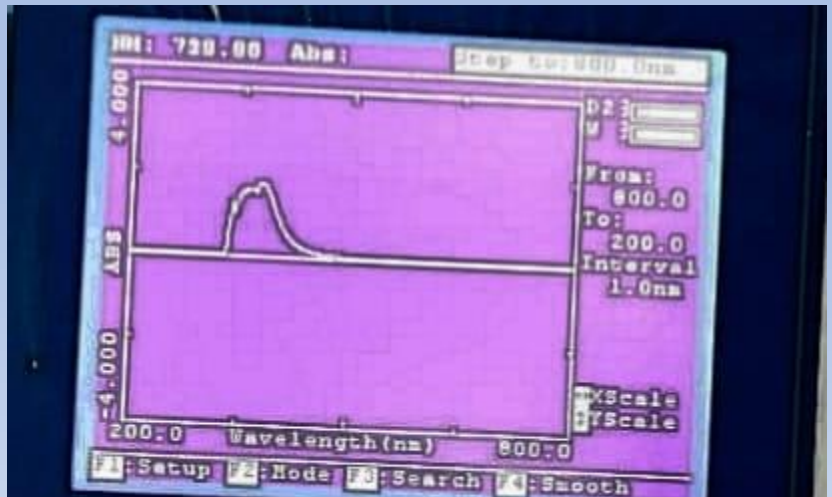
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Analysis of soil samples by AAS

AAS Aanalyst 400 model used in determining the content of metal ions in the previously digested soil samples. The nitrous oxide, acetylene gas and compressor were fixed and compressor turned on and the liquid trap blown to rid of any liquid trapped. The Extractor and the AAS control were turned on. The slender tube and nebulizer piece were cleaned with purifying wire and opening of the burner cleaned with an arrangement card. The worksheet of the AAS programming on the joined PC was opened and the empty cathode light embedded in the light holder. The light was turned on, beam from cathode adjusted to hit target zone of the arrangement card for ideal light throughput, at that point the machine was touched off. The fine was set in a 10 ml graduated chamber containing deionized water and yearning rate estimated. The analytical blank was prepared, and a series of calibration solutions of known amounts of analyte element (standards) were made.

The blank and standards were atomiz d in turn and their responses measured. A calibration graph was plotted for each of the solutions, after which the sample solutions were atomized and measured. The various metal concentrations from the sample solution were determined from the calibration, based on the absorbance obtained for the known sample.

We find the concentration of metal ions present in the soil samples.

RESULT AND DISCUSSION

Sample:- 10mg/100ml

ELEMENTS	Calcium ion	Nitrite ion	Nitrogen ion	Iron ion
SAMPLES				
Agriculture soil	0.3 mg	0.4 mg	0.6mg	_
Industrial soil	2 mg	_	_	0.4 mg
Red soil (Mumbai)	0.6	0.4		1.4 mg

INTERPRETATIONS-

In this study result shows the variation in the soil samples of the Agriculture area, Industrial area, and Red soil area

The results of the study revealed that there are no heavy metals in any of the soil sample.

The percentage of Calcium is higher in Industrial soil this could harm the plant severely. With the high level of calcium, the pH of the soil increases. This can also affect humans beings, by the high level of calcium in the body leads to hypercalcemia which can affect kidneys and bones.

The percentage of iron is higher in Red soil which leads to red color in the soil. It is not that harmful to human beings

CONCLUSION:-

The growth of urbanized regions is occurring worldwide, and, as a result, research in the area of soil contamination by metals has become increasingly important, excessive amounts of these elements can become harmful to organisms. Significantly large concentrations of toxic metals not only diminish soil quality but also can lead to human intake through the trophic food web. Metal is providing a unique fingerprint to any soil. it gives a unique soil profile from one region to another region which helps grow crops and many more.


Indore
D.A.V.V.


FUMEHOOD
HOT
DO NOT TOUCH
2022/04/15 16:13

Where you see yourself in the next 5 years

- ✓ *First off all I want to fulfill my parent's dream.*
- ✓ I am willing to work in a better position in the company then I will always be ready for the profit of the company.
- ✓ I want to do my work with full dedication and devotion.
- ✓ *My main motive is to secure good position in future and to be Financially Independent.*
- ✓ *I want my parents to be free from there financial duties and definitely I will support my parents in every aspect.*
- ✓ *I had always focused on helping and supporting people and my colleagues , in the same way I will continue supporting people for good cause.*
- ✓ *Happiness is my major priority in life, So I will focus on being happy and will work more better for keeping my family happy !*

SHIVKUMAR SINGH PARASTE
M.Sc. final

GOVT. HOLKAR SCIENCE COLLEGE INDORE (M.P.)

SESSION: 2021-2022

DEPARTMENT OF GEOLOGY

INTERNSHIP REPORT ON

TOPIC- PLANNING OF ANY MINE AREA

NAME OF THE INSTITUTE: GOVT. HOLKAR SCIENCE COLLEGE, INDORE

UNDER THE GUIDANCE OF MAHIPAL SOLANKI SIR

SUBMITTED TO:
DR. VISHNU GADGIL
[HOD , Geology Department]

SUBMITTED BY:
NAINI LILHARE
[M.Sc. Final Year]
DS2014987

ACKNOWLEDGEMENT

"It is not possible to prepare a project report without the assistance and encouragement of other people. This one is certainly no exception."

On the very outset of this report, I would like to extend my sincere and heartfelt obligation towards all the personages who have helped me in this endeavour. Without their active guidance, help, cooperation and encouragement, I would not have made headway in this project.

I am ineffably indebted to **MAHIPAL SOLANKI SIR (M.Sc. GEOLOGY) RQP/DGMMP/203/2018** for conscientious guidance and encouragement to accomplish this assignment.

I am extremely thankful and pay my gratitude to my faculty **DR. VISHNU GADGIL SIR [HOD]** and **DR. SHAILESH CHAURE SIR** for his valuable guidance and support on completion of this project in its presently.

I extend my gratitude to **GOVT. HOLKAR SCIENCE COLLEGE, INDORE** for giving me this opportunity.

Any omission in this brief acknowledgement does not mean lack of gratitude.

THANK YOU

1.WHAT IS MINING?

Mining is the process of excavating ore minerals along with minimum waste rocks from Earth's crust for the benefit of humankind. The activities consist of handling lose ground, drilling and blasting of hard rocks, removal of broken materials from the workplace, and supporting the ground for safe operations. Various mining methods are available to exploit different types of deposits.

The prime objective is to mine in the safest conditions and economically without sacrificing the interest of the conservation of minerals - a non-renewable wasting asset.

The choice of mining techniques depends on the following:

1. Nearness to surface.
2. Nature of overburden.
3. Shape, size, regularity, and continuity.
4. Strike, dip, thickness, and rock strength.
5. Nature of mineralization.
6. Host and wall rock condition.
7. Stripping/overburden and ore-to-waste removal ratio.
8. Possibility of minimizing internal and external dilution.
9. Availability of infrastructures.
10. Cost of mining and mineral dressing.
11. Production target and resource/reserve status.
12. Value of primary, associated commodities and value-added elements.

The first choice of hard rock mining is the adoption of open pit techniques if the orebody is exposed to or exists near to the surface. Underground mining methods are appropriate to that part of the orebody where open pit operation is uneconomic due to high ore-to-overburden ratio.

Deep-seated deposits are exclusively mined by underground methods. An open pit mine continues and changes to the underground method at a later period if the orebody persists beyond the ultimate economic limit of the open pit option.

Mining can be categorized as:

1. Small-/medium-/large-scale production.
2. Manual/semi-mechanized/fully mechanized operation.
3. State/private/joint venture ownership.

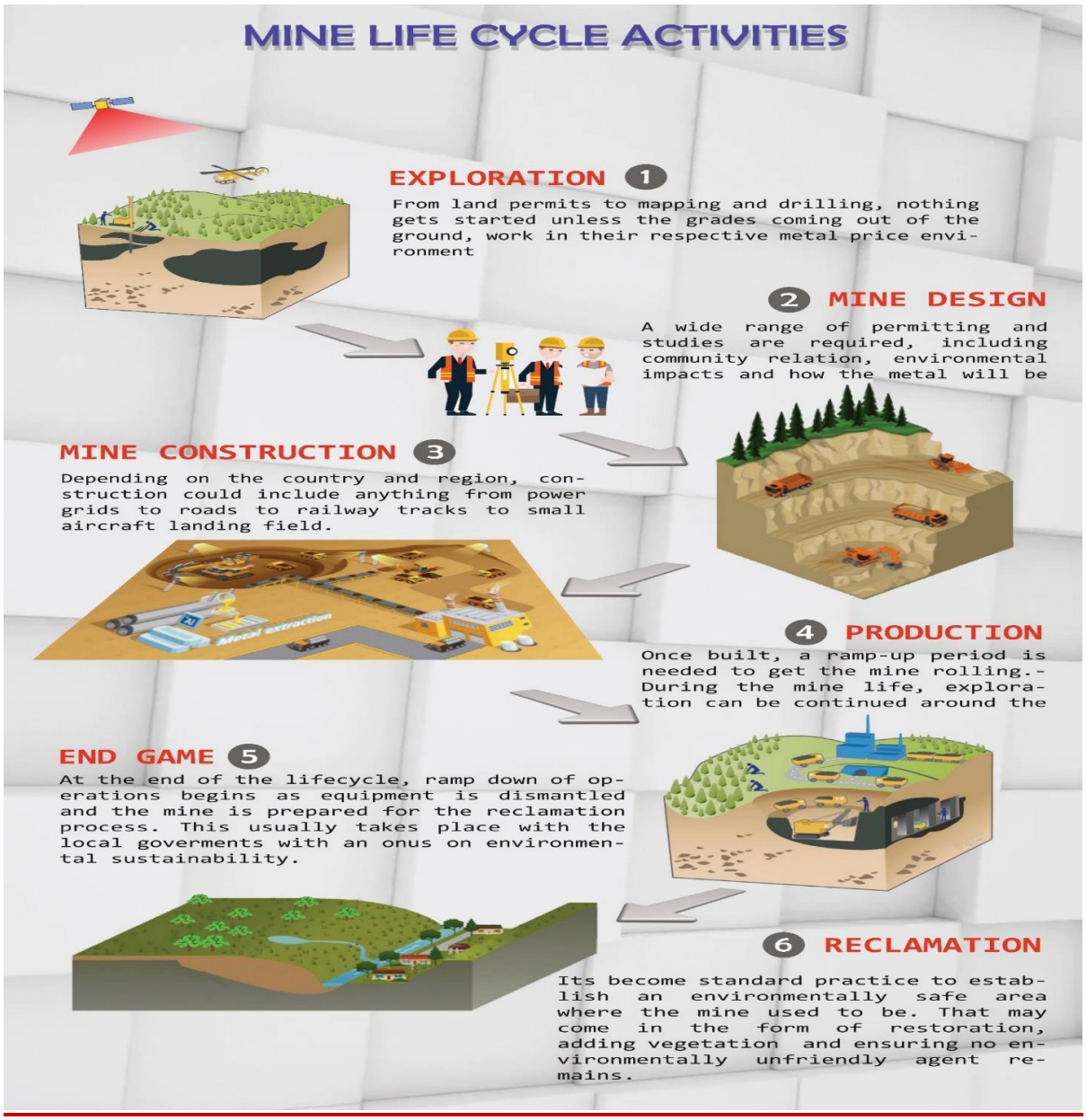


FIGURE NO. 01

1.1 UNITED NATIONS FRAMEWORK CLASSIFICATION FOR RESOURCES:

The UNFC system is a recent development in reserve categorization (E/2004/37-E/ECE/1416, February 2004) (UNFC, 2004). The scheme is formulated giving equal emphasis to all three criteria of exploration, investment, and profitability of mineral deposits. The format provides:

1. stage of geological exploration and assessment,
2. stage of feasibility appraisal, and
3. degree of economic viability.

The model is represented by multiple cubes (4 * 3 *3 blocks) with **geological (G) axis, feasibility (F) axis, and economic (E) axis.** The three decision-making measures for resource estimation are further specified in descending order:

1.1(a) Geological axis (G)

1. Detailed exploration
2. General exploration
3. Prospecting
4. Reconnaissance

1.1(b) Feasibility axis (F)

1. Feasibility study and mining report
2. Prefeasibility study
3. Geological study

1.1(c) Economic axis (E)

1. Economic
2. Potentially economic
3. Intrinsically economic

The scheme is presented in a **3D perspective** {as shown in figure 2} with simplified numerical codification facilitating digital processing of information. Each codified class displays a specific set of assessment stages with associated economic viability. The scheme is internationally understandable, communicable, and acceptable across national boundaries under economic globalization, which makes it easy for the investor to take the right decision. The government of India has accepted and adopted the UNFC classification reporting code for submission of annual mineral reserves and resources updates for all official purposes.

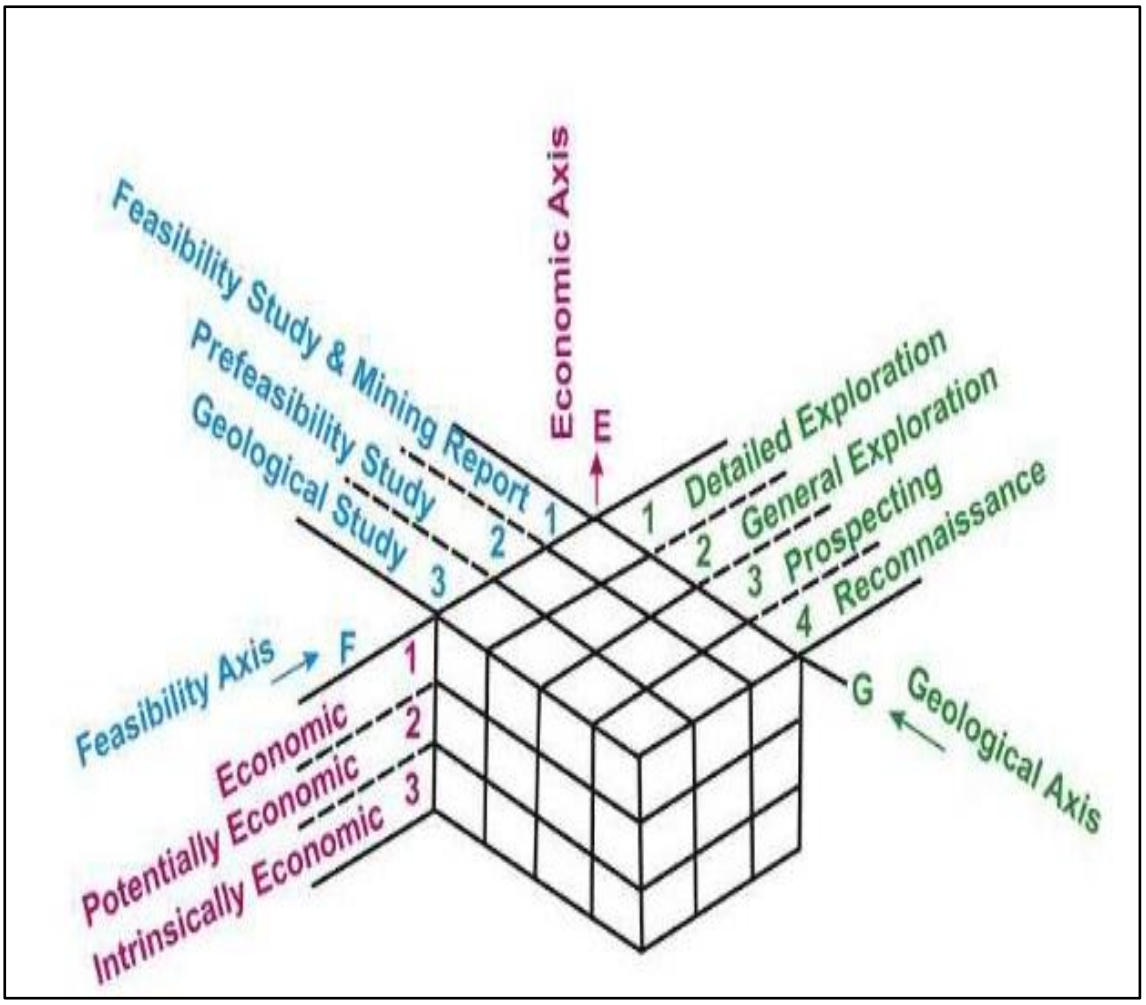

Economic Axis
E
Feasibility Study & Mining Report
Prefeasibility Study
Geological Study
1
2
3
1 Detailed Exploration
2 General Exploration
3 Prospecting
4 Reconnaissance
Feasibility Axis
F
Economic
Potentially Economic
Intrinsically Economic
1
2
3
G
Geological Axis

FIGURE NO. 02

2. WHAT IS MINE PLAN?

Mine Plan means the life of mine plan as updated by the Licensee from time to time for sequencing of the development of the Project.

Mine Plan means a proposal for mining on a mining site, including a description of the systematic activities to be used for the purpose of extracting minerals.

Mine Plan means a detailed description of the mine and proposed mining works to optimize return on investment, through capital investment, design, extraction scheduling, and preparation of the mineral product in accordance with mineral specifications.

Mine Plan means the mining plan proposed by Lessee and approved by Lessor. The Mine Plan shall be agreed upon by Lessor and Lessee within twelve (12) months of the Effective Date and shall identify all portions of the Leased Premises to be mined.

Mining plan is prepared as per manual of **IBM** in line with SDF principle.

The Indian Bureau of Mines (IBM) established in **1948**, is a multi-disciplinary government organisation under the Department of Mines, Ministry of Mines, engaged in promotion of conservation, scientific development of mineral resources and protection of environment in mines other than coal, petroleum & natural gas, atomic minerals and minor minerals.

The primary mission of Indian Bureau of Mines is to promote systematic and scientific development of mineral resources of the country (both onshore and offshore), through regulatory inspections of the mines, approval of mining plans and environment management plans to ensure minimal adverse impact on environment.

2.1 SOME IMPORTANT PERSONS RESPONSIBLE FOR THE MINING PROCESS:

Recognised qualified person [RQP]:

The persons earmarked for preparation of mining plans either by themselves or for guiding and supervising the work of a team engaged in the preparation of the mining plans.

Directorate General of Mines Safety [DGMS]:

DGMS is the Regulatory Agency under the Ministry of labour and employment, Government of India in matters pertaining to occupational safety, health and welfare of persons employed in mines. As an arm of the Ministry of Labour, the role of DGMS is **to act as a watch dog to see that the mine management comply with the statutory provisions relating to occupational safety and health in mines**. DGMS officers make periodic inspections to make sample checks.

Directorate of Geology and Mining [DGM] :

The twin function of Directorate of Geology and Mining are Mineral Exploration and Mineral Administration.
The main functions and activities of the Directorate are systematic survey and assessment of mineral deposits of the state. The Directorate also strives for ground water monitoring & its exploration for sustainable development of ground water Grant of exploration licenses, mining leases on minerals and petroleum to both public and private sector organization sources. The Directorate is also engaged in the work of geological disaster management like earthquake, landslides and any incidents time to time to mitigate the geological disaster as well as for its better preparedness.
The Directorate supports necessary administration and information to our leases and potential investors.

2.2 SOME POINTS WHICH WE DISCUSS IN ANY MINING REPORT ARE ELABORATED BELOW:

Introduction: This point includes the general information of the applicant, the prospecting agency, the RQP who designed the plan, and the locality. This information includes the name of the applicant, address, contact details, e-mail…….

Location and accessibility: This includes the complete details of the area (with location map) and the surrounding region. The information includes: location details with map, the existence of public road/ railway line.

Geology and exploration: It includes a brief description of the topography and the general geology of the area including mine geology, drainage pattern, and a topographic plan of the lease area.

Mining: It includes a brief description of the mining methodology including the existing and proposed method for developing the deposit with all the parameter designs.

Blasting: The blasting briefly describes the methodology of the blasting to be used in the mine including the blasting method, types of explosives, the blasting parameters, the powder factor in ore, and the details about secondary blasting if needed, and the storage of the explosives.

Mine drainage: Mine drainage involves the details about the water level in the area including the depth of the water table in the area as studied by the observations from nearby wells, quantity and quality.

Stacking of mineral rejects and disposal of the waste: Stacking of mineral rejects and disposal of the waste deals with the brief information about the nature and the quantity of top soil or the overburden, and the mineral rejects. It includes a brief description of how the waste mineral rejects would be generated and deposited in the next five years.

Use of mineral: It describe briefly the end use of the mineral (sale to intermediary parties, captive consumption, export, industrial use), physical and chemical specifications stipulated by buyers and blending of different grades of ores.

Others: It includes all information related to site services and manpower (operator, keeper, labor etc.)

Mineral Processing: ROM sizing & sorting will be done at mine site.

Environmental management plan: It includes following points-

- **Base line information:** It includes detailed information about existing land use pattern.
- **Details of land around 60 m and 500 m radius of the applied area.**
- **Water Regime.**

- **Flora and Fauna.**
- **Quality of air, ambient noise level and water.**
- **Climatic conditions:** It includes temperature, rainfall, relative humidity of the area.
- **Human satellite chart.**

Compliance of safety rules: It includes safety measures such as stabilization and vegetation of dumps, measures of minimizing effect on water regime, treatment and disposal of water from mine, protective measures for ground vibration/ air blast caused by blasting etc.

Progressive mine closure plan: It includes all the points related to mine closure such as –

- **Water quality management.**
- **Acid mine management.**
- **Air quality management.**
- **Waste management.**
- **Top soil management.**
- **Disposal of mining machinery.**
- **Disaster management and risk assessment.**
- **Afforestation.**

3.EXERCISE:

Here is a mine plan sample which we made by taking an area in our college campus as an example.

We took an area of cricket ground of Holkar Science College, Indore.

SATELLITE IMAGE OF GOVT. HOLKAR SCIENCE COLLEGE, INDORE

As shown in the image we took 07 coordinates (shown in Table no. 01) and made a polygon which represent our mining area.

Following are the coordinates of the given area:

TABLE NO. 01

S. No.	X	Y
1.	589565	2510120
2.	589565	2510220
3.	589615	2510270
4.	589715	2510320
5.	589765	2510270
6.	589715	2510220
7.	589665	2510120
8.	589565	2510120

The area of given coordinates is calculated by shoelace formula.

3.1 SHOELACE FORMULA:

The **shoelace formula**, **shoelace algorithm**, or **shoelace method** (also known as **Gauss's area formula** and the **surveyor's formula**) is a mathematical algorithm to determine the area of a simple polygon whose vertices are described by their Cartesian coordinates in the plane. It is called the shoelace formula because of the constant cross-multiplying for the coordinates making up the polygon, like threading shoelaces. It has applications in surveying and forestry, among other areas.The formula was described by **Albrecht Ludwig Friedrich Meister in 1769.**

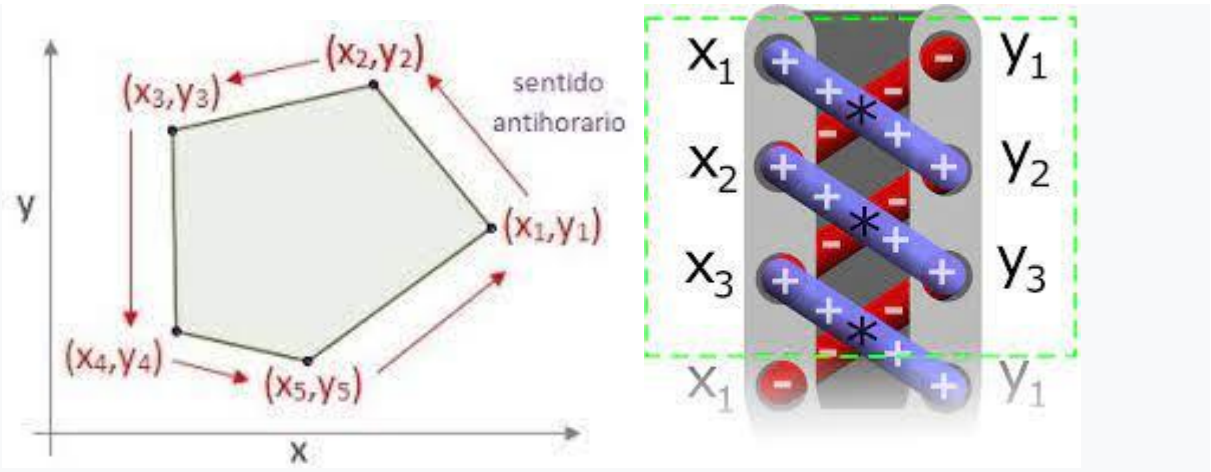


FIGURE NO. 03

Now, as per Shoelace formula we are calculating the area of the given coordinates:

TABLE NO. 02

S. No.	X	Y	X c * Y p -Y c * X p
1.	589565	2510120	0
2.	589565	2510220	-58956500
3.	589615	2510270	96032750
4.	589715	2510320	221546250
5.	589765	2510270	155001750
6.	589715	2510220	-96025250
7.	589665	2510120	-66539500
8.	589565	2510120	-251012000
			Total = 47520

Area of the given coordinates

= 47,520/2 = 23,760 m sq.

Volume of the calculated area

= 23,760*30

=7,12,800 cum.

Hence total mineral resource is 712800 cum.

Details or reserves calculation by Surface Geological method are as follows:

3.2 CALCULATION OF GEOLOGICAL RESERVE PROBABLE G2

Measured mineral resource:

TABLE NO. 03

Mineral	**Area (m sq.)**	**Avg. thickness of mineral body (m)**	**Volume of mineral body (cum)**
-	23,760	30	712,800

Mineral blocked due to barrier zone:

TABLE NO. 04

Mineral	**Barrier zone area (m sq.)**	**Avg. thickness of mineral body(m)**	**Vol. of mineral body (cum)**
-	4,559	30	136,770

Mineral blocked due to slope stability:

TABLE NO. 05

Mineral	Bench No.	Area blocked in bench (m sq.)	Bench height from base level	Vol. of mineral (cum)
-	B - 1	0	30	0
-	B - 2	4,559	24	109,416
-	B - 3	3,343	18	60,174
-	B - 4	2,802	12	33,624
-	B - 5	2,531	6	15,186

Probable mineral reserves = Indicated mineral resource – Pre-feasibility mineral resources

Pre-feasibility mineral = (Mineral blocked in 7.5m BZ + Mineral blocked due to slope stability).

TABLE NO. 06

Mineral	Indicated mineral resource	Mineral blocked in 7.5mBZ	Mineral blocked due to slope stability	Pre-feasibility mineral resource	Probable mineable reserve
-	**A**	**B**	**C**	**D=(B+C)**	**E=(A-D)**
-	712,800	136,770	218,400	355,170	357,630

3.3 YEAR WISE DEVELOPMENT AND PRODUCTION FOR THE FIVE - YEAR PERIOD:

FIRST YEAR:

During the year 19,201m sq. area will be excavated. Ultimately at the end of the year bench B-1 will be formed having face height of 6m. Bench will be developed in all direction side of area will be leveled according to surface level.

TABLE NO. 07

Bench	B-1 Development and Production
Avg. area of excavation (m sq.)	19,021
Face height (m)	6
Avg. thickness	6
Volume of bench excavation (cum)	11,5206

SECOND YEAR:

During the year 15,858m sq area will be excavated. Ultimately at the end of the year bench B-2 will be formed having face height of 6m. Bench will be developed in all direction side of area will be leveled according to surface level.

TABLE NO. 08

Bench	B-2 Development and Production
Avg. area of excavation (m sq.)	15,858
Face height (m)	6
Avg. thickness	6
Volume of bench excavation (cum)	95,148

THIRD YEAR:

During the year 12,786m sq area will be excavated. Ultimately at the end of the year bench B-3 will be formed having face height of 6m. Bench will be developed in all direction side of area will be leveled according to surface level.

TABLE NO. 09

Bench	B-3 Development and Production
Avg. area of excavation (m sq.)	12,786
Face height (m)	6
Avg. thickness	6
Volume of bench excavation (cum)	76,716

FOURTH YEAR:

During the year 9,984m sq area will be excavated. Ultimately at the end of the year bench B-4 will be formed having face height of 6m. Bench will be developed in all direction side of area will be leveled according to surface level.

TABLE NO. 10

Bench	B-4 Development and Production
Avg. area of excavation (m sq.)	9,984
Face height (m)	6
Avg. thickness	6
Volume of bench excavation (cum)	59,904

FIFTH YEAR:

During the year 7,453m sq area will be excavated. Ultimately at the end of the year bench B-5 will be formed having face height of 6m. Bench will be developed in all direction side of area will be leveled according to surface level.

TABLE NO. 11

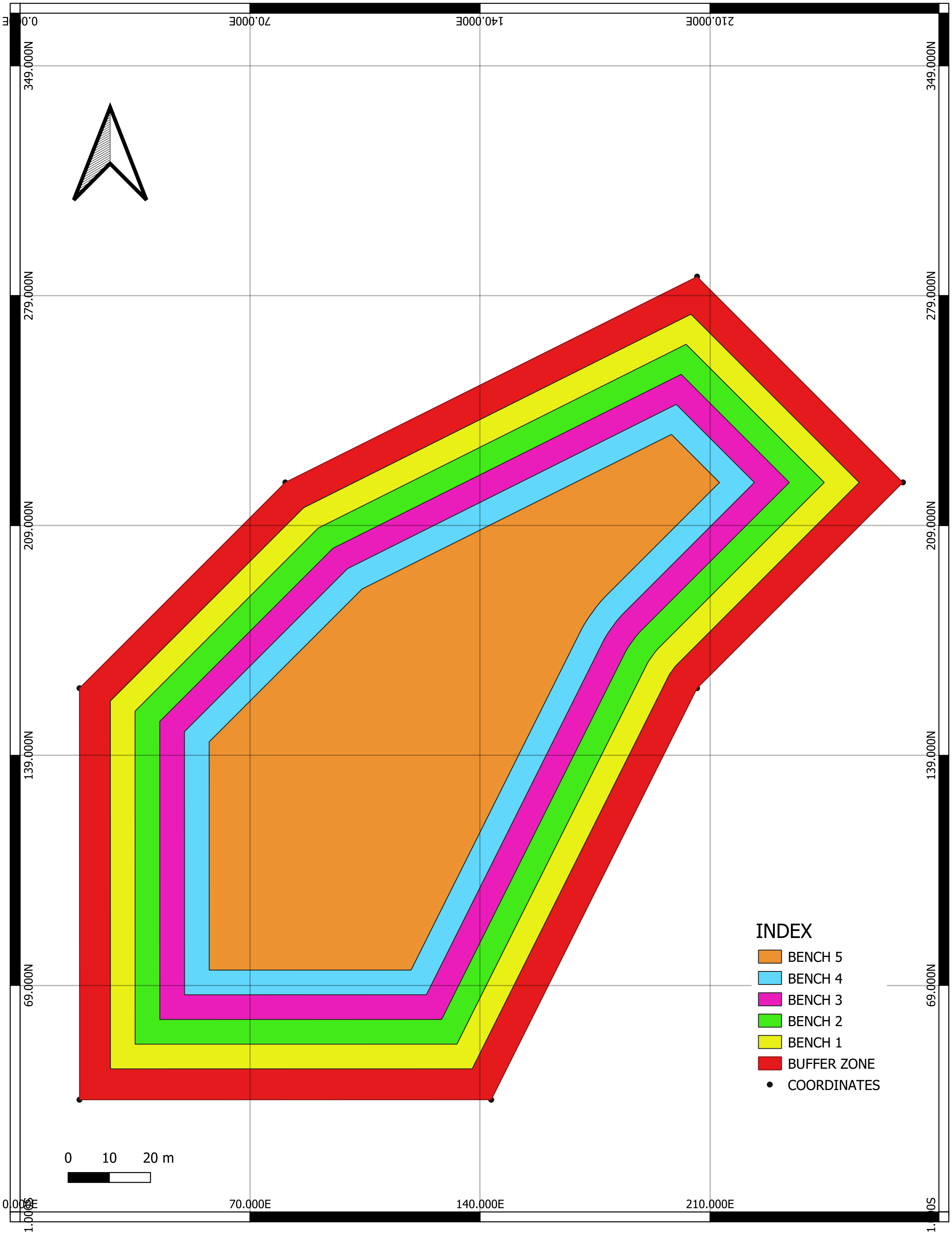
Bench	B-5 Development and Production
Avg. area of excavation (m sq.)	7,453
Face height (m)	6
Avg. thickness	6
Volume of bench excavation (cum)	44,718

3.4 RESULT:

- Mineable reserves = 357,630 cum.
- Five Year Production = 355,170 cum.
- Average rate of production = 71,034 cum.

The expected life of the mine is five years.

MINE PLAN OF AN AREA



Mining Plan Format (A & B Category Mines)

Mining Plan Format (A&B cagtegory Mines)

INTRODUCTORY NOTES	
1. 'A' category mines :	all mines excluding 'B' Category mines.
B' category mines :	all 'B' Category mines excluding very small 'B' category mines i.e. manual opencast mines not using explosives and where the average daily employment (as per explanation furnished in MCDR,1988) does not exceed 25.
2. If more space is needed to fill out a block of information, use additional sheets and attach to form. All the plans and sections should be in accordance with MCDR,1988 and or MMR,1961	

1.GENERAL	
a) Name of the applicant	
Address	
District	
State	
Pin Code	
Phone	
Fax	
Gram	
Telex	
e-mail	
b) Status of the applicant	
Private individual	
Cooperative Association	
Private Company	
Public Company	
Public Sector Undertaking	
Joint Sector Undertaking	
Other (pl.specify)	
c) Mineral(s) which are occuring in the area and which the applicant intends to mine	

d) Period for which the mining lease is granted / renewed / proposed to be applied	
e) Name of the RQP preparing the mining plan	
Address	
Phone	
Fax	
e-mail	
Telex	
Registration No.	
Date of grant / renewal	
Valid upto	
f) Name of the prospecting agency	
Address	
Phone	
g) Reference no. and date of consent letter form the State Govt.	
2. LOCATION AND ACCESSIBILITY	
a) Details of area (with location map)	
District and State	
Taluka	
Village	
Khasra No./ Plot No./ Block Range / Felling Series etc.	
Lease Area (hectares)	
Whether the area is recorded to be in forest (please specify whether protected , reserved etc.)	
Ownership / Occupancy	
Existence of public road / railway line, if any nearby and approximate distance	
Toposheet No. with latitude and longitude	
Land Use Pattern (Forst, Agricultural, Grazing, Barren etc.)	

b) Attach a general location and vicinity map showing area boundaries and existing and proposed acess routs. It ispreferred that the area to be marked on a Survey of India topographical map or a cadestral map or forest map as the case may be. However if none of these are available, the area should be shown on an accurate sketch map on scale of 1 : 5000.

PART - A

3. GEOLOGY AND EXPLORATION

a) Briefly describe the topography and general geology and local / mine geology of the mineral deposit including drainage pattern.

b) The topographic plan of the lease area prepared on a scale of 1 : 1000 or 1 : 2000 with contour interval of 3 to 10 m. depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan.

c) Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1 : 2000.

d) Broadly indicate the yearwise future programme of exploration, taking into consideration the future production programme planned in next five years as in table below :-

Year	No. of boreholes	Total meterage	No. of Pits and Dimensions	No. of Trenches and Dimensions
First				
Second				
Third				
Fourth				
Fifth				

e) Indicate geological and recoverable reserves and grade, duly supported by standard method of estimation and calculations alongwith required sections (giving split up of various categories i.e. proved, probable,possible). Indicate cut-off grade. Availabilty of resources should also be indicated for the entire leasehold.

f) Indicate mineable reserves by slice plan / level plan method, as applicable, as per the proposed mining parameters.

4. MINING

a) Briefly describe the existing / proposed method for developing / working the deposit with all design parameters.

Note : In case of pocket deposits, sequence of development / working may be indicated on the same plan.

b) Indicate quantum of development and tonnage and grade of production expected

pitwise as in table below :-

Year	Pit No. (s)	Overburden	ROM Ore	Saleable Ore	Sub-grade Ore	Mineral Rejects	Ore to Overbuden ratio
First							
Second							
Third							
Fourth							
Fifth							

c) Attach - Individual yearwise plans and sections.	In case of 'A' class mines
Composite plans and yearwise sections	In case of 'B' class mines

d) Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any, etc.

e) Indicate proposed rate of production when the mine is fully developed, and the expected life of the mine and the year from which effected.

f) Attach a note furnishing a conceptual mining plan for the entire lease period (for 'B' Category mines) and upto the life of the mine (for 'A' Category mines) based on the geological, mining and environmental considerations.

g) Opencast mines :

i) Describe briefly giving salient features of the mode of working (mechanised, semi-mechanised, manual)

ii) Describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden / waste. A reference to the plans enclosed under 4(b) and 4 (d) will suffice.

h) Underground mines :

i) Mode of entry (adit, incline, shaft, ramp / decline)

briefly describe the reason for choosing the mode of entry indicated above (keeping in mind the considerations of systematic mining and prevention of damage to the environment)

ii) System of winding / hoisting

attach a note briefly descibing the system and linking it with :

- it's adequacy for the desired rate of production and raising / lowering of men and material

- the ventilation system

iii) Underground layout

attach a note briefly describing the underground layout using longitudinal sections and level plans where necessary. Indicate :

- sizes and intervals of levels and raises / winzes with proper reasoning

- proposed extent of development, yearwise, for the first five years alongwith the support system

iv) Method and sequence of stoping

- describe briefly the method of stoping to be adopted illustrated by cross sections and longitudinal sections

v) Mine ventilation:

attach a not outlining the steps to be taken for securing an adequate supply of air in all parts of the mine and prevention of noxious gases produced and excessive rise of temperature or humidity so as to ensure adequate ventilation of the mine, accompanied by mine ventilation plan / diagram

i) Extent of mechanization

describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.

(1) Drilling Machines

Type	Nos.	Dia. of hole (mm)	Size / capacity	Make	Motive Power	H.P.
1						
2						
3						

(2) Loading Equipment

Type	Nos.	Bucket capacity in Cu.m.	Make	Motive Power	H.P.
1					
2					
3					

(3) Haulage and Transport Equipment

(a) Haulage within the mining leasehold

Type	Nos.	Size / capacity	Make	Motive Power	H.P.
1					

2					
3					

whether the dumpers are fitted with exhaust conditioner should be indicated

(b) Transport from mine head to the destination

Describe briefly the transport system (please specify)

- ore transported by : own trucks / hired trucks

- main destination to which ore is transported (giving to and fro distance)

Details of hauling / transport equipment :

Type	Nos.	Size / capacity	Make	Motive Power	H.P.
1					
2					
3					

(4) Miscllaneous

describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

(A) Operations

(B) Machineries deployed

Type	Nos.	Size / capacity	Make	Motive Power	H.P.
1					
2					
3					
4					

5. BLASTING

describe briefly

a) broad blasting parameters like charge per hole, blasting pattern, charge per delay, maximum number of holes blasted in a round, manner and sequence of firing, etc.

b) type of explosives used / to be used

c) powder factor in ore and overbuden / waste / development heading / stope

d) whether secondary blasting is needed, if so describe it briefly

e) storage of explosives (like capacity and type of explosive magazine)

6.MINE DRAINAGE

a) likely depth of water table based on observations from nearby wells and water bodies

b) workings expected to be _____ m. above / reach below water table by the year _____ .

c) quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

7. STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

a) indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years :

Year	Top Soil	Overburdern / waste	Mineral Rejects*
First			
Second			
Third			
Fourth			
Fifth			

* Threshold values in respect of apatite and rock phosphate, bauxite, barytes, chromite, chinaclay / kaoline and sillimanite, limestone, manganese, magnesite, talc / steatite / soapstone, and wollastonite minerals as evolved by IBM may be adopted , as applicable

b) land chosen for disposal of waste with proposed justification

c) attach a note indicating the manner of disposal and cofiguration, sequence of build up of dumps alongwith the proposals for the stacking of sub-grade ore, to be indicated yearwise.

8. USE OF MINERAL

a) describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)

b) indicate physical and chemical specifications stipulated by buyers

c) give details in case blending of different grades of ores is being practised or is to be practised at the mine to meet specifications stipulated by buyers.

9.OTHER

Describe briefly the following :

a) Site services :

b) Employment potential :

Highly Skilled

Skilled

Semi-Skilled

Un-Skilled
10. MINERAL PROCESSING
a) If processing / beneficialtion of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly descibe the nature of the processing / beneficialtion. This should indicate size and grade of feed material and concentrate (finished marketable product), recovery rate.
b) Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond , toxic effect of such tailings, if any, with process adopted to neutralise any such effect before their disposal and dealing of excess water from the tailing dam).
c) A flow sheet or schematic diagram of the processing procedure should be attached.
d) Specify quantity and type of chemicals to be used in the processing plant.
e) Specify quantity and type of chemicals to be stored on site / plant.
f) Indicate quantity (cu.m. per day) of water required for mining and processing and sources of supply of water. Disposal of water and extent of recycling.
PART - B
11. ENVIRONMENTAL MANAGEMENT PLAN
a) Attach a note on the status of baseline information with regard to the following :
- existing land use pattern indicating the area already degraded due to quarrying / pitting, dumping, roads, processing plant, workshop, township etc in a tabular form.
- water regime
- flora and fauna
- quality of air, ambient noise level and water
- climatic conditions
- human settlements
- public buildings, places of worship and monuments
- attach plans showing the locations of sampling stations
- does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution), Act, 1974
b) Attach an Environmental Impact Assesment Statement describing the impact of mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines)
i) Land area indicating the area likely to be degraded due to quarrying / pitting, dumping, roads, workshop,processing plant, township etc.
ii) Air quality
iii) Water quality

iv) Noise levels
v) Vibration levels (due to blasting)
vi) Water regime
vii) Socio-economics
viii) Historical monuments etc.
c) Attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used) :
- temporary storage and utilisation of topsoil
- yearwise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A' category mines) clarifying the extent of back filling and recontouring and / or alternative use of unfilled / partially filled excavations / road sides / slopes and mine. In case abandoned quarries / pits are proposed to be used as reservoir, their size , water holding capacity and proposal for utilisation of such water be given.
- programme of aforestation, yearwise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating the number of plants with name of species to be afforestated under different areas in hectares.
- stabilisation and vegetation of dumps alongwith waste dump management yearwise for the first five years (and upto conceptual plan period for 'A' category mines).
- measures to control erosion / sedimentation of water courses.
- treatment and disposal of water from mine.
- measures for minimising adverse effects on water regime.
- protective measures for ground vibrations / air blast caused by blasting,
- measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity.
-socioeconomic benefits arising out of mining.
d) Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)
Note : Ground vibration studies are to be carried out for virgin area / new leases after one year from the commencement of mining activities. (for 'A' category mines only)
Note : While preparing mining plans various circulars issued by CCOM particularly the Circular No. 2/91 regarding conceptual plan , 5/91 regarding requirement of exploration and existence of mineral, 3/92 regarding generation of baseline data by mechanised mines etc. may also be referred and taken into account.

HYDRO GEO EXPLORATION ANDMINING CONSULTANCY SERVICES
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CERTIFICATE

This is to certify that **Ms. NAINI LILHARE**, student of M.Sc. IV Semester of Department of Geology, Govt. Holkar (Model Autonomous) Science College, Indore, Madhya Pradesh has successfully completed his Internship under my guidance on **Mine Plan Preparation**.

Place: Indore, M.P.

Date: May 05, 2022

Mahipal Singh Solanki
Geologist/RQP
RQP/DGMMP/203/2018

Address- 135-B, Prime Park Colony, Limbodi, Indore, Madhya Pradesh-452020
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AN INTERNSHIP REPORT

On

"PATHOLOGICAL & MICROBIOLOGICAL TESTS"

To be submitted to

THE DEPARTMENT OF MICROBIOLOGY

GOVERNMENT (MODEL) HOLKAR SCIENCE COLLEGE, INDORE (M.P.)

By

SANJEEV DWIVEDI

M.Sc. Final, Microbiology

(Session: 2021-2022)

Under The Guidance Of

DR. SURAJ RAGHUVANSHI

(PATHOLOGIST OF KARTIC PATHOLOGY, INDORE)

AND

Co-Guidance of

DR. DEEPTI KHARE

Senior Professor, Department of Microbiology

Government (Model) Holkar Science College, Indore (M.P.)

बी.एस.सी. अंतिम वर्ष एवं बी.सी.ए. षष्ठम सेमेस्टर इंटर्नशिप कार्यक्रम

महाविद्यालय का नाम : शासकीय होलकर विज्ञान महाविद्यालय, इन्दौर (म.प्र.)

छात्र/छात्रा का नाम : SANJEEV DWIVEDI

कक्षा एवं विषय : M.Sc. Microbiology

कार्यानुभव की विधा : Internship.

प्रशिक्षण संस्था का नाम : Kartik pathology, Indore.

निर्देशक प्रशिक्षक का नाम : Dr. Suraj Raghuvanshi

निर्देशक प्राध्यापक का नाम : Dr. Deepti Khare

कार्यानुभव प्रशिक्षण दैनिक उपस्थिति

क्र.	दिनांक	छात्र/छात्रा के हस्ताक्षर	प्रशिक्षण के हस्ताक्षर	क्र.	दिनांक	छात्र/छात्रा के हस्ताक्षर	प्रशिक्षण के हस्ताक्षर
1	15-03-2022	Sujeet		21	04-04-22	Sujeet	
2	16-03-22	Sujeet		22	05-04-22	Sujeet	
3	17-03-22	Sujeet		23	06-04-22	Sujeet	
4	18-03-22	Sujeet		24	07-04-22	Sujeet	
5	19-03-22	Sujeet		25	08-04-22	Sujeet	
6	20-03-22	Sujeet		26	09-04-22	Sujeet	
7	21-03-22	Sujeet		27	10.04.22	Sujeet	
8	22-03-22	Sujeet		28	11-04-22	Sujeet	
9	23-03-22	Sujeet		29	12-04-22	Sujeet	
10	24-03-22	Sujeet		30	13-04-22	Sujeet	
11	25-03-22	Sujeet		31			
12	26-03-22	Sujeet		32			
13	27-03-22	Sujeet		33			
14	28-03-22	Sujeet		34			
15	29-03-22	Sujeet		35			
16	30-03-22	Sujeet		36			
17	31-03-22	Sujeet		37			
18	01-04-22	Sujeet		38			
19	02-04-22	Sujeet		39			
20	03-04-22	Sujeet		40			

KARTIK PATHOLOGY & DIAGNOSTIC CENTRE
287, TILAK NAGAR, MAIN ROAD,
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स्नातक षष्ठम एवं स्नातकोत्तर चतुर्थ सेमेस्टर

कार्यस्थल प्रशिक्षण प्रतिवेदन का प्रारूप

1. विद्यार्थी का नाम - Sanjeev Dwivedi कक्षा - M.Sc. (Microbiology)
2. पिता का नाम - Mr. Umesh Kumar Dwivedi
3. महाविद्यालय का नाम - Govt. Holkar Science College, Indore 452001
4. विद्यार्थी का पता एवं दूरभाष क्रमांक - 122, Janki nagar Ext. Indore.
   (निवास एवं मोबाइल नंबर) - 7509436580
5. शिक्षक निर्देशक का नाम - Dr. Deepti Khare
6. कार्यस्थल प्रशिक्षण संस्था का नाम/पता एवं दूरभाष क्रमांक - Kartik Pathology, Indore
7. सर्वेक्षित (विजिट की गयी संस्थाओं से प्राप्त जानकारी/किये गये कार्यों का तिथिवार विवरण -

क्रमांक	दिनांक	संस्था का नाम	सम्पर्क किये गये व्यक्तियों का		कार्य/प्राप्त की गयी जानकारी का संक्षिप्त विवरण
			नाम	दूरभाष	
01	15-03-22	Kartik	Dr. Suraj		
	to	Pathology	Raghuvanshi		
	13-04-22	Indore	sir		

8 प्रगति विवरण -

(अ) प्रशिक्षण के दौरान सौंपा गया कार्य - Pathological test

(ब) पूर्ण किया गया कार्य - Pathological test.

9. संस्था द्वारा निर्धारित प्रतिनिधि/संस्था प्रमुख द्वारा विद्यार्थी के संबंध में आकलन

(अ) समय की पाबंदी - yes

(ब) वेशभूषा एवं व्यवहार - Good

(स) संस्था के नियमों का पालन - yes

(द) आवंटित कार्य के प्रति निष्ठा - Good

(इ) संवाद/संप्रेषण क्षमता - Good

(ई) व्यक्तित्व में किस प्रकार के सुधार की आवश्यकता है तथा विद्यार्थी द्वारा इसके लिये किये गये प्रयास सुधार की प्रगति - NO

(उ) आवंटित कार्य के प्रति जिज्ञासा/सीखने की क्षमता/किये गये कार्य की प्रगति - Good

10. मैं यह प्रमाणित करता हूँ कि विद्यार्थी Sanjeev Dwivedi (पूरा नाम) द्वारा मेरी संस्था/मेरे संपर्क में न्यूनतम 60 घंटे की उपस्थिति दी है।

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हस्ताक्षर

संस्था प्रमुख/प्रतिनिधि

Certificate of Internship

THIS IS TO CERTIFY THAT PROJECT REPORT ON PATHOLOGICAL TESTS ISPREPARED BY

SANJEEV DWIVEDI

UNDER THE SUPERVISION OF PATHOLOGIST

DR.SURAJ RAGHUVANSHI

OF **KARTIC PATHOLOGY,INDORE.**

DURING THE PERIOD OF HIS INTERNSHIP WE FOUND HIS HONEST, SINCERE, AND HARD WOKING BEHAVIOUR.WHOSE CHARACTER AND CONDUCT ARE FOUND BE SATISFACTORY.

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ISSUED ON.....

DR. SURAJ RAGHUVANSHI
PATHOLOGIST
KARTIC
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ACKNOWLEDGEMENT

I have taken efforts in this internship project. However, it would not have been possible without the kind support and help of many individuals and organisations. I would like to extend my sincere thanks to all of them.

I express my deep sense of heartfelt gratitude to my supervisor **Dr. Suraj Raghuvanshi** for providing me excellent infrastructure facilities to carry out the project work. During my internship, he provides me full support and his valuable time to learn and perform my project work excellently. I am thankful for his guidance during project work.

My sincere thanks to **Dr. Sanjay Vyas (Head of Department of Microbiology, Govt. Holkar Science College, Indore)** his valuable support in my work. I would like to thank **Dr. Deepti Khare (Prof. Department of Microbiology, Govt. Holkar Science College, Indore)** for his valuable support.

I am thankful to my friends and parents for their co-operation and support during this period.

DATE-

PLACE- KARTIC PATHOLOGY, INDORE

Sanjeev Dwivedi

M. Sc. Microbiology

Govt. Holkar Science College,

Indore (M.P.)

DECLARATION

I **SANJEEV DWIVEDI** S/O **MR. UMESH KUMAR DWIVEDI** hereby declare that my project report title **"PATHOLOGICAL & MICROBIOLOGICAL TESTS"** is not copied from any prior reports or documentations and the work was carried out by me under the guidance **DR. SURAJ RAGHUVANSHI** (PATHOLOGIST OF KARTIK PATHOLOGY, INDORE) and co-guidance of **DR.DEEPTI KHARE**

DATE-

PLACE- KARTIK PATHOLOGY, INDORE

Sanjeev Dwivedi

M. Sc. Microbiology

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INDORE (M.P.)

CONTENTS

Types of Pathological Tests

The pathological tests which are described in the following internship report are as follows:

- Blood Group Detection
- Quantitative estimation of hemoglobin by Sahli's Method
- Blood Glucose Test
- Detection of Malaria using FIELD STAIN KIT
- Detection of Typhoid using WIDAL TEST.
- Detection of Syphilis using VDRL TEST.
- Uric Acid Test

What is Pathology?

Pathology has been derived from the Greek word pathos which means "experience" or "suffering", and -logia-, which means "study of". It is a significant component of the causal study of disease and a major field in modern medicine and diagnosis.

The term pathology itself may be used broadly to refer to the study of disease in general, incorporating a wide range of bioscience research fields and medical practices (including plant pathology and veterinary pathology), or more narrowly to describe work within the contemporary medical field of "general pathology," which includes a number of distinct but inter-related medical specialties that diagnose disease—mostly through analysis of tissue, cell, and body fluid samples. Used as a count noun, "a pathology" (plural, "pathologies") can also refer to the predicted or actual progression of particular diseases (as in the statement "the many different forms of cancer have diverse pathologies"), and the affix path is sometimes used to indicate a state of disease in cases of both physical ailment (as in cardiomyopathy) and psychological conditions (such as psychopathy). Similarly, a **pathological** condition is one caused by disease, rather than occurring physiologically. A physician practicing pathology is called a **pathologist.**

As a field of general inquiry and research, pathology addresses four components of disease: cause/etiology, mechanisms of development (pathogenesis), structural alterations of cells (morphologic changes), and the consequences of changes (clinical manifestations).[2] In common medical practice, general pathology is mostly concerned with analyzing known clinical abnormalities that are markers or precursors for both infectious and non-infectious disease and is conducted by experts in one of two major specialties, anatomical pathology and clinical pathology. Further divisions in specialty exist on the basis of the involved sample types (comparing, for example, cytopathology, hematopathology, and histopathology), organs (as in renal pathology), and physiological systems (oral pathology), as well as on the basis of the focus of the examination (as with forensic pathology).

What is Diagnosis?

Diagnosis is the identification of the nature and cause of a certain phenomenon. **Medical diagnosis** is the process of determining which disease or condition explains a person's symptoms and signs. The information required for diagnosis is typically collected from a history and physical examination of the person seeking medical care. Often, one or more **diagnostic procedures**, such as diagnostic tests, are also done during the process. Sometimes Posthumous diagnosis is considered a kind of medical diagnosis.

Types of Diagnosis:

Clinical diagnosis
A diagnosis made on the basis of medical signs and patient-reported symptoms, rather than diagnostic tests.

Laboratory diagnosis
A diagnosis based significantly on laboratory reports or test results, rather than the physical examination of the patient. For instance, a proper diagnosis of infectious diseases usually requires both an examination of signs and symptoms, as well as laboratory characteristics of the pathogen involved.

Radiology diagnosis
A diagnosis based primarily on the results from medical imaging studies. Greenstick fractures are common radiological diagnoses.

Principal diagnosis
The single medical diagnosis that is most relevant to the patient's chief complaint or need for treatment. Many patients have additional diagnoses.

Admitting diagnosis
The diagnosis given as the reason why the patient was admitted to the hospital; it may differ from the actual problem or from the *discharge diagnoses*, which are the diagnoses recorded when the patient is discharged from the hospital.

Differential diagnosis
A process of identifying all of the possible diagnoses that could be connected to the signs, symptoms, and lab findings, and then ruling out diagnoses until a final determination can be made.

Diagnostic criteria
Designates the combination of signs, symptoms, and test results that the clinician uses to attempt to determine the correct diagnosis. They are standards, normally published by international committees, and they are designed to offer the best sensitivity and specificity possible, respect the presence of a condition, with the state-of-the-art technology.

Prenatal diagnosis
Diagnosis work done before birth

Diagnosis of exclusion
A medical condition whose presence cannot be established with complete confidence from history, examination or testing. Diagnosis is therefore by elimination of all other reasonable possibilities.

Dual diagnosis
The diagnosis of two related, but separate, medical conditions or co-morbidities; the term almost always refers to a diagnosis of a serious mental illness and a substance addiction.

Self-diagnosis
The diagnosis or identification of medical conditions in oneself. Self-diagnosis is very common.

Remote diagnosis
A type of telemedicine that diagnoses a patient without being physically in the same room as the patient.

Nursing diagnosis
Rather than focusing on biological processes, a nursing diagnosis identifies people's responses to situations in their lives, such as a readiness to change or a willingness to accept assistance.

Computer-aided diagnosis
Providing symptoms allows the computer to identify the problem and diagnose the user to the best of its ability. Health screening begins by identifying the part of the body where the symptoms are located; the computer cross-references a database for the corresponding disease and presents a diagnosis.

Over diagnosis
The diagnosis of "disease" that will never cause symptoms, distress, or death during a patient's lifetime

Wastebasket diagnosis
A vague, or even completely fake, medical or psychiatric label given to the patient or to the medical records department for essentially non-medical reasons, such as to reassure the patient by providing an official-sounding label, to make the provider look effective, or to obtain approval for treatment. This term is also used as a derogatory label for disputed, poorly described, overused, or questionably classified diagnoses, such as pouchitis and senility, or to dismiss diagnoses that amount to overmedicalization, such as the labeling of normal responses to physical hunger as reactive hypoglycemia.

Retrospective diagnosis
The labeling of an illness in a historical figure or specific historical event using modern knowledge, methods and disease classifications.

The diagnoses carried out in the diagnostic centres which are most often called as pathologies come under the category **LABORATORY DIAGNOSIS.**

What are Diagnostic Centres?

The Diagnostic centre most commonly called as a **Pathology** or **Pathological Centres** is a where diagnosis of a patient's ailment is carried out generally by analyzing his body fluid samples (eg. Blood, Saliva, Urine etc.) , body tissues or body organs through series of manual tests and other computerized techniques.

What are Pathological Tests?

Pathology tests involve the laboratory testing of blood, body fluids and tissues**. Blood tests, urine tests** and **stool (or faeces)** tests are more common types of pathology tests.

The best choice of pathology tests and when to use a test depends on your individual circumstances. The following comes under **CLINICAL PATHOLOGY.** Clinical **pathology** is a medical specialty that is concerned with the diagnosis of disease based on the laboratory analysis of bodily fluids such as blood and urine, as well as tissues, using the tools of chemistry, clinical microbiology, hematology and molecular **pathology**.

You cannot separate passion from pathology any more than you can separate a person's spirit from his body.

~~~~~~~ *Richard Selzer*
~~~~~~~

Blood group Determination

Your blood group is identified by antigens and antibodies in the blood. Antibodies are part of your body's natural defenses against invading substances such as germs.

Antigens are protein molecules found on the surface of red blood cells. Antibodies are proteins found in plasma. Antibodies recognize anything foreign in your body and alert your immune system to destroy it.

The blood group system was first determined by **Dr. Karl Landsteiner.**

The ABO system

There are four main blood groups defined by the ABO system:

- **blood group A** has A antigens on the red blood cells with anti-B antibodies in the plasma
- **blood group B** has B antigens with anti-A antibodies in the plasma
- **blood group O** has no antigens, but both anti-A and anti-B antibodies in the plasma
- **blood group AB** has both A and B antigens, but no antibodies

The **original terminology** used by Dr. Karl Landsteiner in 1901 for the classification is A/B/C; in later publications "C" became "O". "O" is often called *0* (*zero*, or *null*) in other languages.

The Rh System

Red blood cells sometimes have another antigen, a protein known as the RhD antigen. If this is present, your blood group is RhD positive. If it's absent, your blood group is RhD negative. This means you can be one of eight blood groups:

- **A RhD positive (A+)**
- **A RhD negative (A-)**
- **B RhD positive (B+)**
- **B RhD negative (B-)**

- RhD positive (O+)
- RhD negative (O-)
- AB RhD positive (AB+)
- AB RhD negative (AB-)

In most cases, O RhD negative blood (O-) can safely be given to anyone. It's often used in medical emergencies when the blood type isn't immediately known. It's safe for most users because it doesn't have any A, B or RhD antigens on the surface of the cells, and is compatible with every other ABO and RhD blood group.

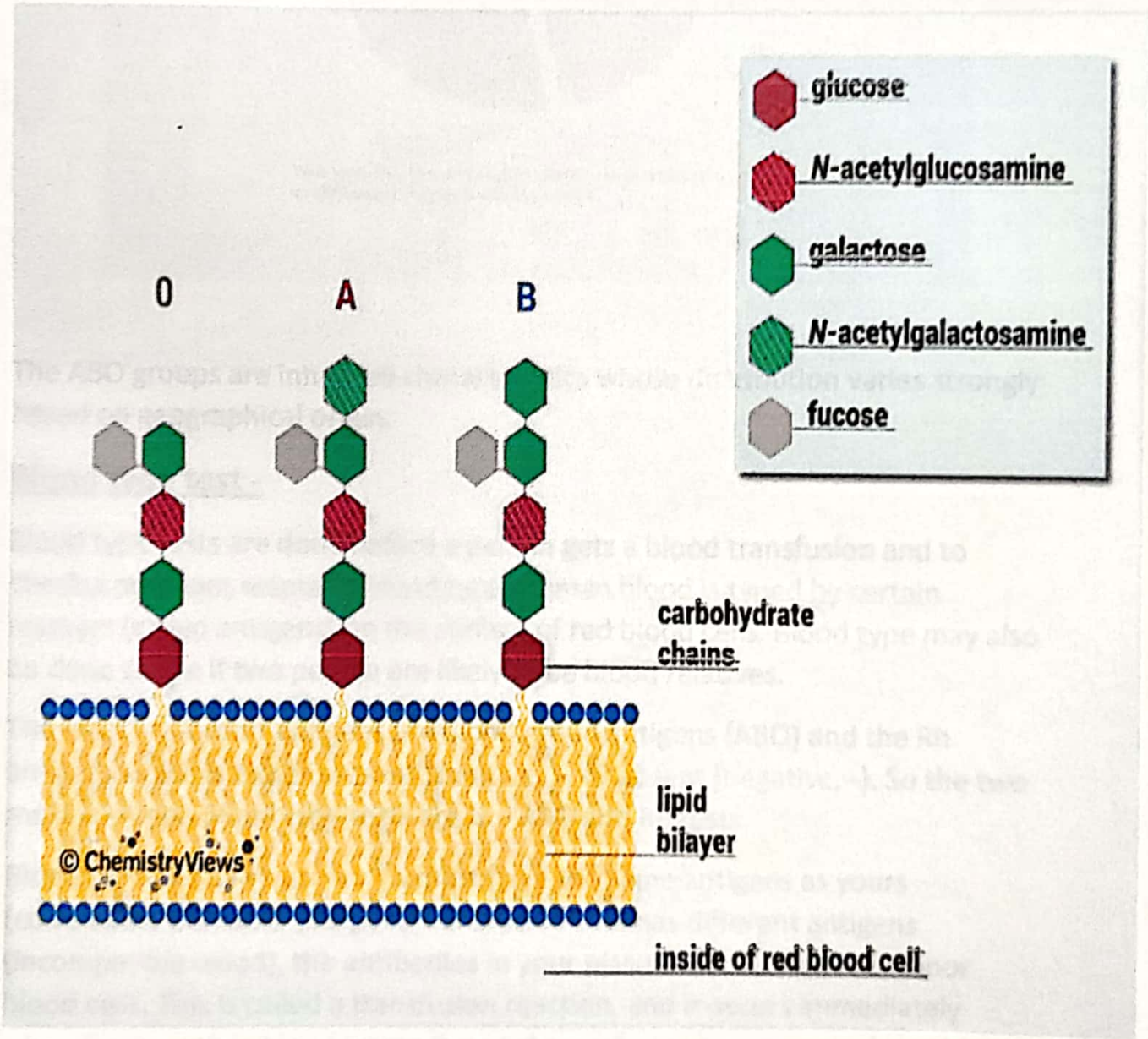
A person with type AB+ is considered to be a universal recipient because he can safely receive type A, B, AB, or 0.

RED BLOOD CELL COMPATIBILITY TABLE

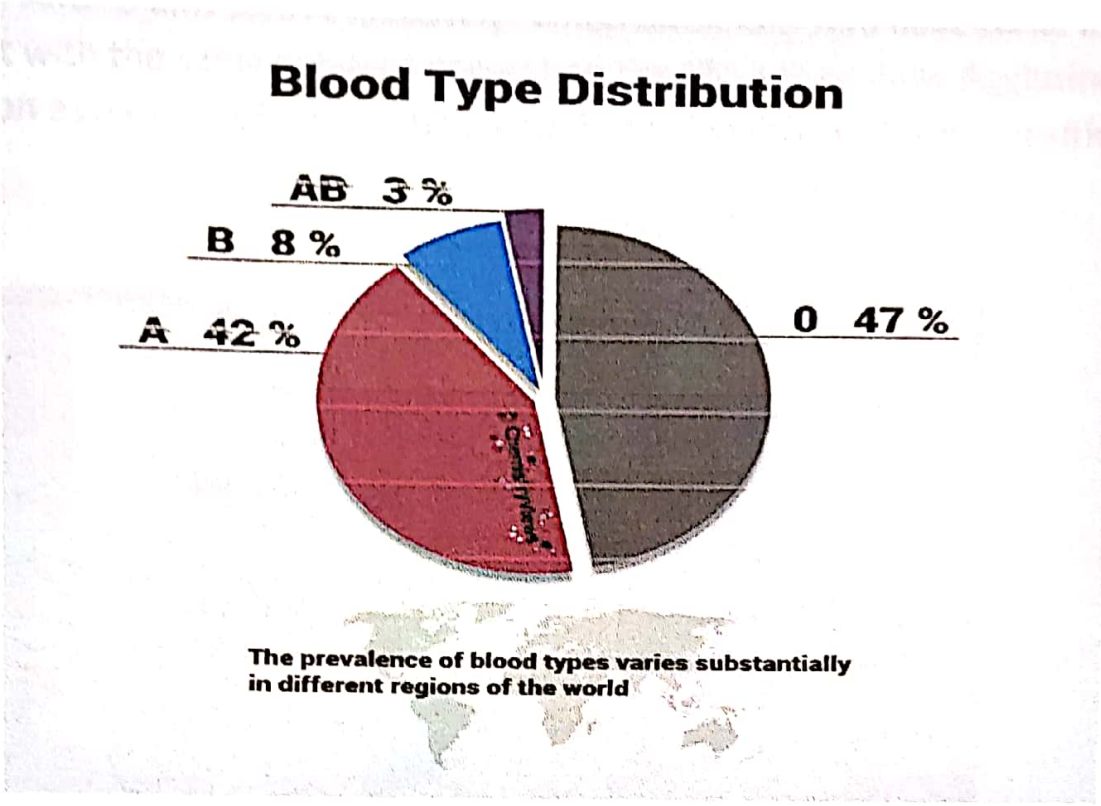
Recipient	Donor							
	O-	O+	A-	A+	B-	B+	AB-	AB+
O-	✓	✗	✗	✗	✗	✗	✗	✗
O+	✓	✓	✗	✗	✗	✗	✗	✗
A-	✓	✗	✓	✗	✗	✗	✗	✗
A+	✓	✓	✓	✓	✗	✗	✗	✗
B-	✓	✗	✗	✗	✓	✗	✗	✗
B+	✓	✓	✗	✗	✓	✓	✗	✗
AB-	✓	✗	✓	✗	✓	✗	✓	✗
AB+	✓	✓	✓	✓	✓	✓	✓	✓

Chemistry of blood groups

The types of oligosaccharides present on the surface of the red blood cells determine a person's blood type: if only the 0-type antigen is present, the blood type is 0, if only the antigen A or B is found, the blood is type A or B, respectively, and if both A and B antigens are present, the blood type is AB



Blood type distribution :-



The ABO groups are inherited characteristics whose distribution varies strongly based on geographical origin.

Blood type test -

Blood type tests are done before a person gets a blood transfusion and to check a pregnant woman's blood type. Human blood is typed by certain markers (called antigens) on the surface of red blood cells. Blood type may also be done to see if two people are likely to be blood relatives.

The most important antigens are blood group antigens (ABO) and the Rh antigen, which is either present (positive, +) or absent (negative, -). So the two most common blood type tests are the ABO and Rh tests.

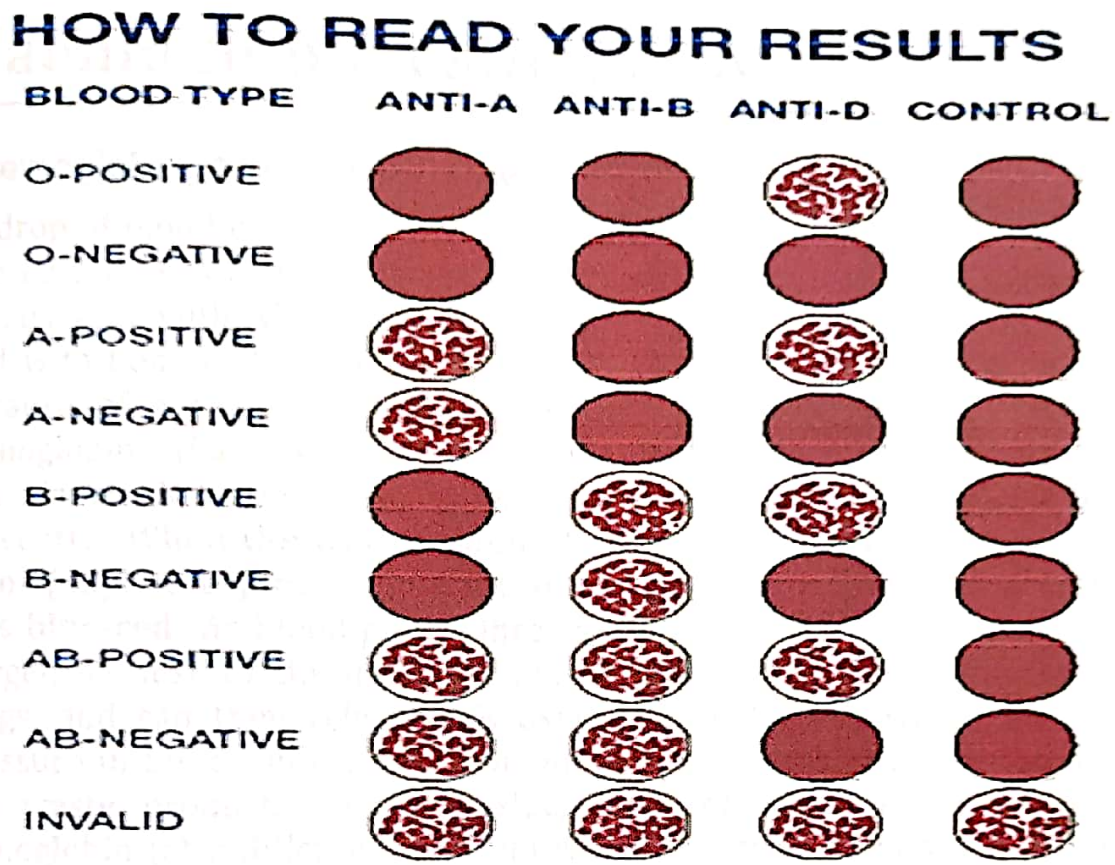
Blood received in a transfusion must have the same antigens as yours (compatible blood). If you get a transfusion that has different antigens (incompatible blood), the antibodies in your plasma will destroy the donor blood cells. This is called a transfusion reaction, and it occurs immediately when incompatible blood is transfused. A transfusion reaction can be mild or cause a serious illness and even death.

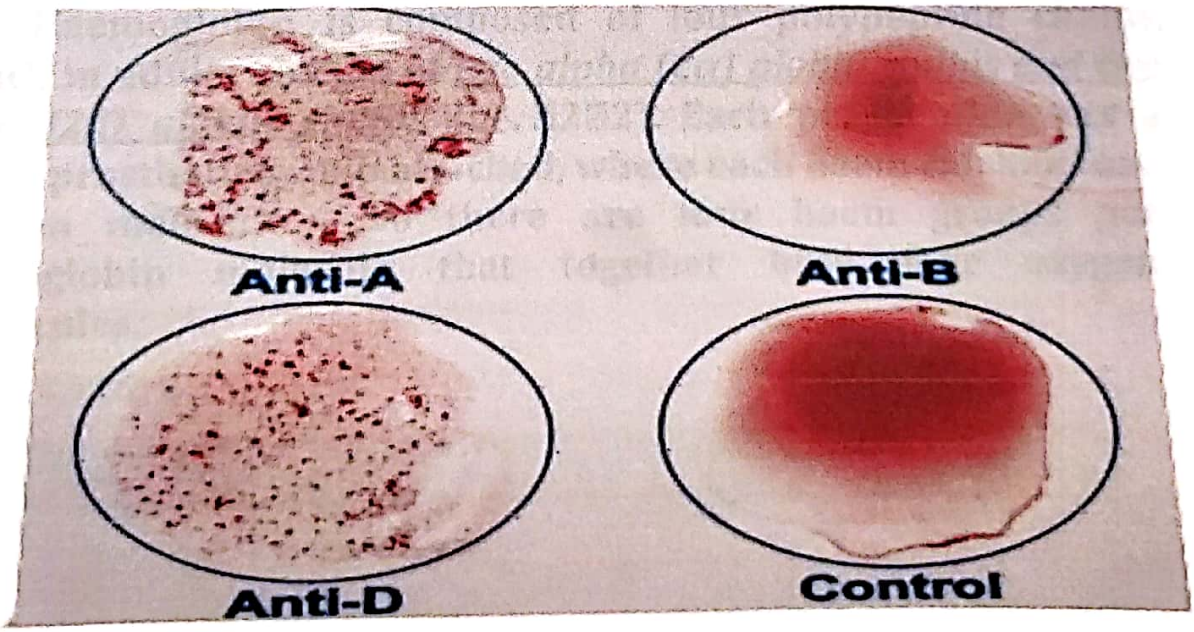
For the blood type test a special **blood test kit** is used which contains Anti -A, Anti- B, Anti- D anti sera respectively. When these anti sera have come in contact with the same antigens present on the RBS's they show **Agglutination Reaction** as a result of which clumps are formed which indicates a **positive test.**

Steps:

1. Take a clean glass slide.
2. Clean the index finger of the patient with cotton containing 2 or 3 drops of ethanol.
3. Prick the tip of the finger with a sterilized needle.
4. Discard the first drop of blood as it starts oozing.
5. Drop the 3 drops of blood carefully on the glass slide.
6. Now add one- one drop each of the above mentioned antisera over the blood quickly before it dries.
7. Slowly shake the gla slide for the proper mixing of blood and the anti serum and wait for 5 minutes.
8. Observe the results.

Observation table-



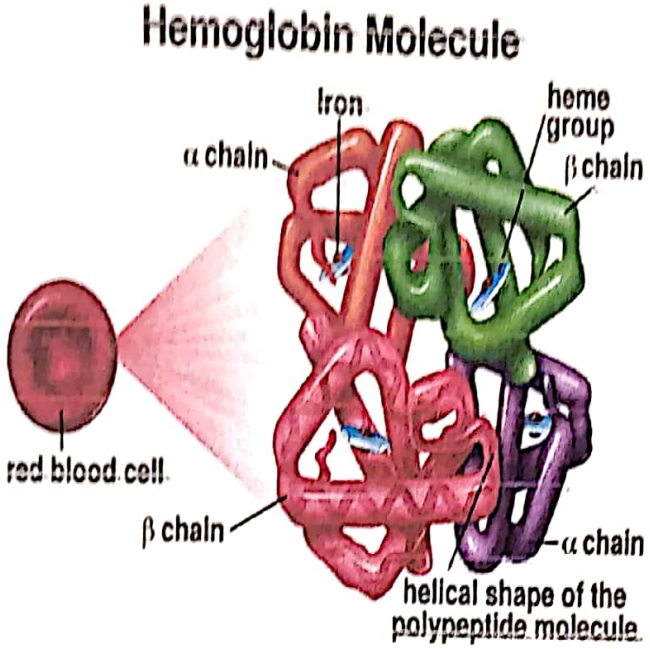


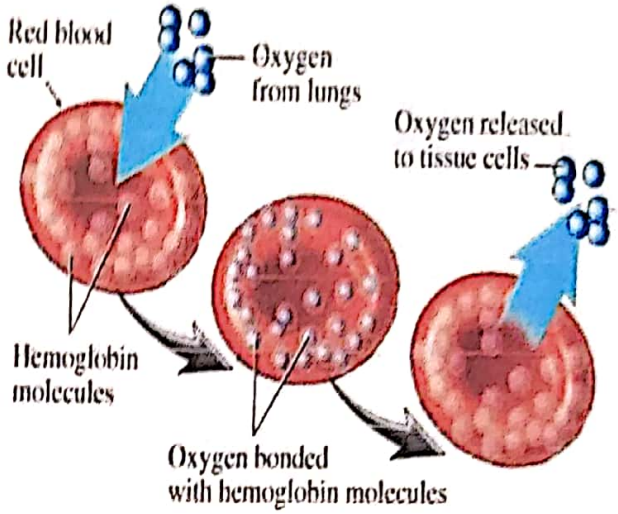
Haemoglobin estimation

Haemoglobin, an Oxygen Carrier

A drop of blood contains millions of red blood cells, or erythrocytes. These specialized cells are like flattened discs, which gives them a much greater surface area with which to exchange oxygen and carbon dioxide in the lungs and with body cells. Red blood cells are able to carry oxygen so efficiently because of a special protein inside them: hemoglobin. In fact, it is the hemoglobin that is responsible for the color of the red blood cell. Haemoglobin contains a haem prosthetic group that has an **iron atom** at its centre. **When the iron is bound to oxygen, the haem group is red in color (oxyhameoglobin), and when it lacks oxygen (deoxygenated form) it is blue-red.** As blood passes through the lungs, the hemoglobin picks up oxygen because of the increased oxygen pressure in the capillaries of the lungs, and can then release this oxygen to body cells where the oxygen pressure in the tissues is lower. In addition, the red blood cells can pick up the waste product, carbon dioxide, some of which is carried by the hemoglobin (at a different site from where it carries the oxygen), while the rest is dissolved in the plasma. The high carbon dioxide levels in the tissues lowers the pH, and the binding of hemoglobin to carbon dioxide causes a conformational change that facilitates the release of oxygen. The carbon dioxide is then released once the red blood cells reach the lungs.

Haemoglobin is composed of four polypeptide chains, which in adults consist of *two alpha (2α) globin chains and two beta (2β) globin chains* (i.e. 2222). Each polypeptide has a *haem* prosthetic group attached, where each haem can bind one oxygen molecule - so there are four haem groups per hemoglobin molecule that together bind four oxygen molecules.





Estimation of Haemoglobin by Sahli's Method

Hb count by Sahli's haemoglobinometer (acid haematin method):

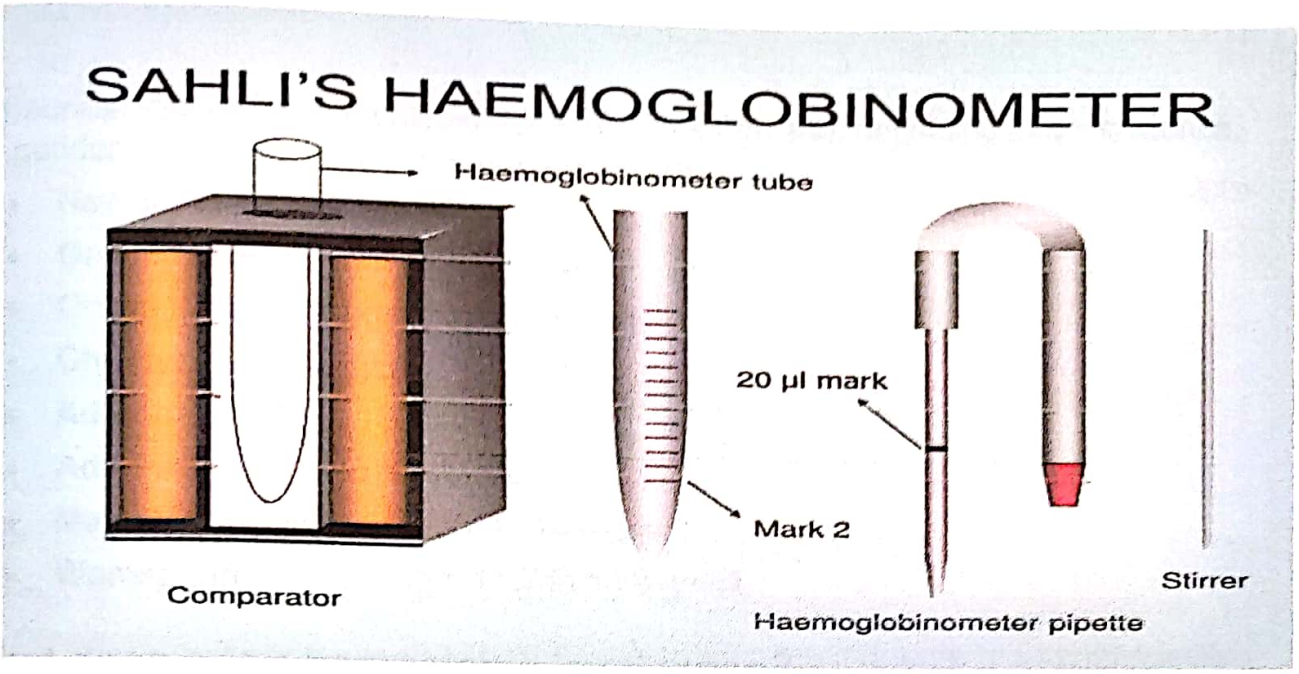
Principle: Anti- coagulated blood is added to the 0.1 N HCl and kept for 5-7 minutes to form acid haematin. The color of this acid haematin should be matched with the solution, present in the calibration tube. Distilled water is added to the acid haematin until the color matches and the final reading is directly noted from the graduation in the calibration tube.

Requirements: Sahli's haemoglobinometer, Hydrochloric acid, distilled water.

Procedure: Place N/10 HCL in diluting tube up to the mark 20. Take blood in the hemoglobin pipette up to 20-cubic-mm-mark and blow it into diluting tube and rinse well. After 10 minutes add distilled water in drops and mix the tube until it has exactly the same color as the comparison standards. Note the reading, which indicates the percentage of hemoglobin.

Precautions-

- Pipetting of blood should be done cautiously
- Mix the blood properly with HCl by using stirrer
- Match the color cautiously

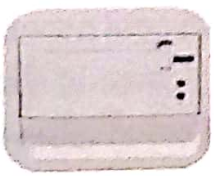


Haemoglobin measure by complete blood count (CBC) machine

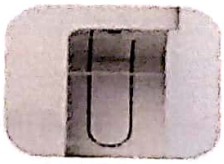
Hemoglobin is usually measured as a part of the routine complete blood count (CBC) test from a blood sample.

Several methods exist for measuring hemoglobin, most of which are done currently by automated machines designed to perform different tests on blood**. Within the machine, the red blood cells are broken down to get the hemoglobin into a solution. The free hemoglobin is exposed to chemical containing cyanide that binds tightly with the hemoglobin molecule to form cyanomethemoglobin.** By shining a light through the solution and measuring how much light is absorbed (specifically at a wavelength of 540 nanometers), the amount of hemoglobin can be determined.


10.4" Large Color LCD


Printer


Buttons Panel


Test Key

The normal ranges for hemoglobin depend on the age and, beginning in adolescence, the gender of the person. The normal ranges are:

- **Newborns**: 17 to 22 gm/dL
- **One (1) week of age**: 15 to 20 gm/dL
- **One (1) month of age**: 11 to 15 gm/dL
- **Children**: 11 to 13 gm/dL
- **Adult males**: 14 to 18 gm/dL
- **Adult women**: 12 to 16 gm/dL
- **Men after middle age**: 12.4 to 14.9 gm/dL
- **Women after middle age**: 11.7 to 13.8 gm/dL

What does a low hemoglobin level mean?

A **low hemoglobin level** is referred to as **anemia** or low red blood count. A lower than normal number of red blood cells is referred to as anemia and hemoglobin levels reflect this number. There are many reasons (causes) for anemia.

Some of the more common causes of anemia are:

- loss of blood (traumatic injury, surgery, bleeding, colon cancer, or stomach ulcer),
- nutritional deficiency (iron, vitamin B12, folate),
- bone marrow problems (replacement of bone marrow by cancer),
- suppression by red blood cell synthesis by chemotherapy drugs,
- kidney failure, and
- abnormal hemoglobin structure (sickle cell anemia or thalassemia)

What does a high hemoglobin level mean?

Higher than normal hemoglobin levels can be seen in people living at high altitudes and in people who smoke. **Dehydration** produces a falsely high hemoglobin measurement that disappears when proper fluid balance is restored.

Some other infrequent causes are high hemoglobin levels are:

- advanced lung disease (for example, **emphysema**);
- certain tumors;
- a disorder of the bone marrow known as **polycythemia rubra vera,** and;
- abuse of the drug **erythropoietin (Epogen)** by athletes for blood doping purposes (increasing the amount of oxygen available to the body by chemically raising the production of red blood cells)

Blood GLUCOSE Test

Glucose is the primary energy source for the body's cells and the only energy source for the brain and nervous system. A steady supply must be available for use, and a relatively constant level of glucose must be maintained in the blood. A few different protocols may be used to evaluate the glucose level in the blood. **Sometimes, glucose may be tested in urine**. During digestion, fruits, vegetables, breads and other dietary sources of **carbohydrates** are broken down into glucose (and other nutrients); they are absorbed by the small intestine and circulated throughout the body. Using glucose for energy production depends on **insulin**, a hormone produced by the pancreas. Insulin facilitates transport of glucose into the body's cells and directs the liver to store excess energy as **glycogen** for short-term storage and/or as **triglycerides** in adipose (fat) cells.

A blood sample drawn from a vein in your arm or a drop of blood from a skin prick; sometimes a random urine sample is used. Some diabetics may use a continuous glucose monitor, which uses a small sensor wire inserted beneath the skin of the abdomen to measure blood glucose at frequent intervals and provides a result.

In general, it is recommended that you **fast** (nothing to eat or drink except water) for at least 8 hours before having a blood glucose test. **For people with diabetes, glucose levels are often checked both while fasting and after meals to provide the best control of diabetes. For random, timed, and post-meal glucose tests, follow your health practitioner's instructions.**

Device used for glucose test

A glucose meter (or glucometer) is a medical device for determining the approximate concentration of glucose in the blood. It can also be a strip of glucose paper dipped into a substance and measured to the glucose chart.

A small drop of blood, obtained by pricking the skin with a lancet, is placed on a disposable test strip that the meter reads and uses to calculate the blood glucose level. The meter then displays the level in units of mg/dl.

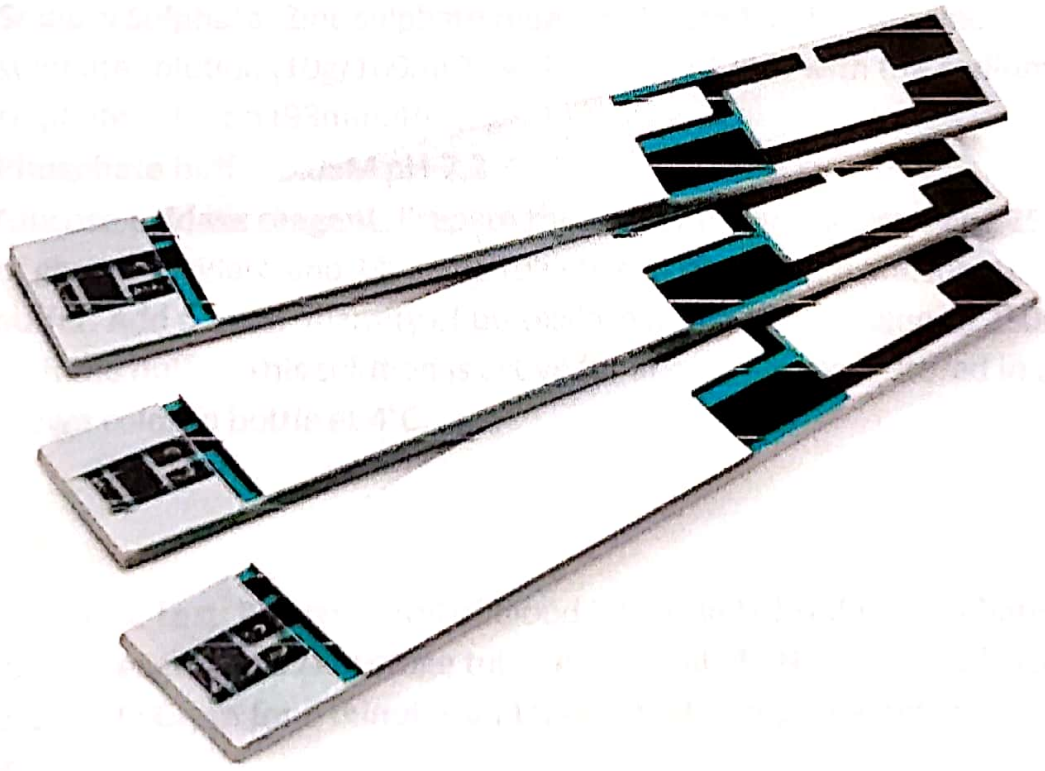
Working Principle

The glucometer determines the concentration of glucose in the solution. Most glucose meters, are based on **electrochemical technology**. They use electrochemical test strips to perform the measurement.

A small drop of blood to be tested is placed on a disposable test strip that the glucose meter uses for measurement.

Each test strip contains an enzyme called as **glucose oxidase**. This enzyme reacts with glucose in the blood sample and creates an acid called as **gluconic acid**. The gluconic acid then reacts with another chemical in the testing strip called as ferricynaide. The **ferricynaide** and the gluconic acid then combine to create ferrocyanide. Once **ferrocyanide** has been created, the device turns on an electronic current through the blood sample on the strip.

This current is then able to read the ferrocyanide and determine how much glucose is in the blood sample. The number is then displayed on the screen of glucometer.



GLUCOSE STRIP

Estimation of glucose by glucose oxidase method in laboratories

COLORIMETRIC METHOD

Collection of blood sample:

About 2ml of patient's blood should be collected by venipuncture into a tube containing a mixture of ethylenediaminetetraacetic acid and sodium fluoride in the ratio of 1:2 (W/W). Five mg of the mixture is adequate for 2ml of blood. The tube should be thoroughly shaken for complete mixing.

Preparation of anticoagulant mixture:

100mg of EDTA and 20mg of sodium fluoride should be mixed and ground. into a fine powder using a blender. This should preferably do in a fume hood. The mixture should be stored in a clean container.

Reagents:

- **2N Sodium hydroxide (NaOH)**- 8g of NaOH is dissolve and finally makes up the volume to 100ml with distilled water.
- **Sodium Sulphate**- Zinc sulphate reagent – Dilute 55ml of the zinc sulphate solution (10g/100ml $ZnSO4.7H_2O$) to 1 litre with the sodium sulphate solution (93mmol/liter).
- **Phosphate buffer** 0.05M pH-7.2
- **Glucose oxidase reagent**: Prepare this reagent fresh by dissolving 25mg of glucose oxidase and 1% ortho toluidine in the sodium phosphate buffer. Add a small quantity of peroxidase (2mg) and makeup to 250ml with the buffer. This solution is active for about 4 weeks if stored in a brown colored bottle at 4°C.

Procedure:

• Preparation of Test: Pipette 0.1ml of blood into 1.8ml of sodium sulphate-zinc sulphate reagent in a centrifuge tube. Add 0.1ml of 2N Sodium hydroxide, centrifuge at 3000rpm for 5 minutes and take 0.5ml of supernatant in duplicate.

- **Preparation of Blank:** Take 0.5ml of distilled water.
- **Preparation of Standard:** Prepare standard concentration of glucose (200mg/dl), use 0.5ml of a range of glucose solutions (50mg/dl, 100mg/dl, 150mg/dl and 200mg/dl) suitably diluted from standard.

1. 50mg/dl-125µl glucose standard + 375µl distilled water
2. 100mg/dl-250µl glucose standard + 250µl distilled water
3. 150mg/dl-375µl glucose standard + 125µl distilled water
4. 200mg/dl-500µl glucose standard

- Add 5ml of the glucose oxidase reagent incubate for 1h at 37°C and read the extinction at 540nm against the reagent blank.
- If the absorbance reading of the sample is too high, dilute the supernatant which was obtained earlier, 2x with distilled water and repeat the subsequent step.

Normal blood glucose numbers

Fasting

• Normal for person without diabetes: 70-99 mg/dl (3.9-5.5 mmol/L)

• Official ADA recommendation for someone with diabetes: 80-130 mg/dl (4.5-7.2 mmol/L)

2 hours after meals

• Normal for person without diabetes: Less than 140 mg/dl (7.8 mmol/L)

• Official ADA recommendation for someone with diabetes: Less than 180 mg/dl (10.0 mmol/L)

Detection of Malaria using Field Stain kit

Malaria is a **mosquito-borne infectious** disease affecting humans and other animals caused by parasitic **protozoans** (a group of single celled microorganisms) belonging to the ***Plasmodium*** type. Malaria causes **symptoms** that typically include **fever, fatigue, vomiting, and headaches.** In severe cases it can cause **yellow skin, seizures, coma, or death.** Symptoms usually begin ten to fifteen days after being bitten. If not properly treated, people may have recurrences of the disease months later. In those who have recently survived an infection, reinfection usually causes milder symptoms. This **partial resistance** disappears over months to years if the person has no continuing exposure to malaria.

The disease is most commonly transmitted by an infected **female Anopheles** mosquito. The mosquito bite introduces the parasites from the **mosquito's saliva** into a **person's blood.** The parasites travel to the liver where they mature and reproduce. Five species of Plasmodium can infect and be spread by humans. Most deaths are caused by ***P. falciparum*** because ***P. vivax, P. ovale***, and ***P. malariae*** generally cause a milder form of malaria.

Field Stain Kit

Field's Stain has been used for the detection of

Microfilaria, Leishmania, Plasmodium (malaria), Babesia,Trypanosoma, Trichomonas, and Acanthamoeba species.

Staining can facilitate early detection of protozoans directly from certain patient specimens.

Field stain kit has 2 reagent

Reagent A:-

Modified field stain solution A	
Sodium phosphate	2.6 gm
Potassium phosphate	2.6 gm
Methylene blue, certified	1.6 gm
Azure I (azure B)	1.0 gm

Reagent B:-

Modified field stain solution B:-

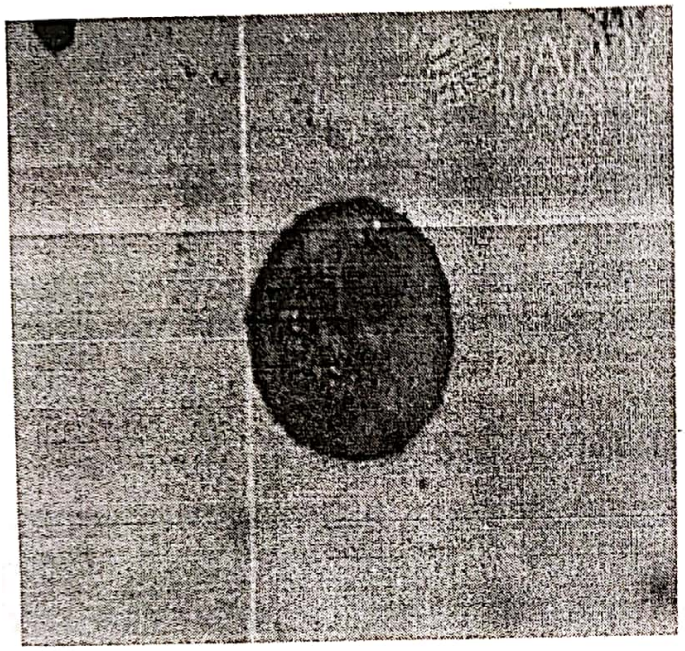
Eosin	2.0 gm

Staining Procedure:

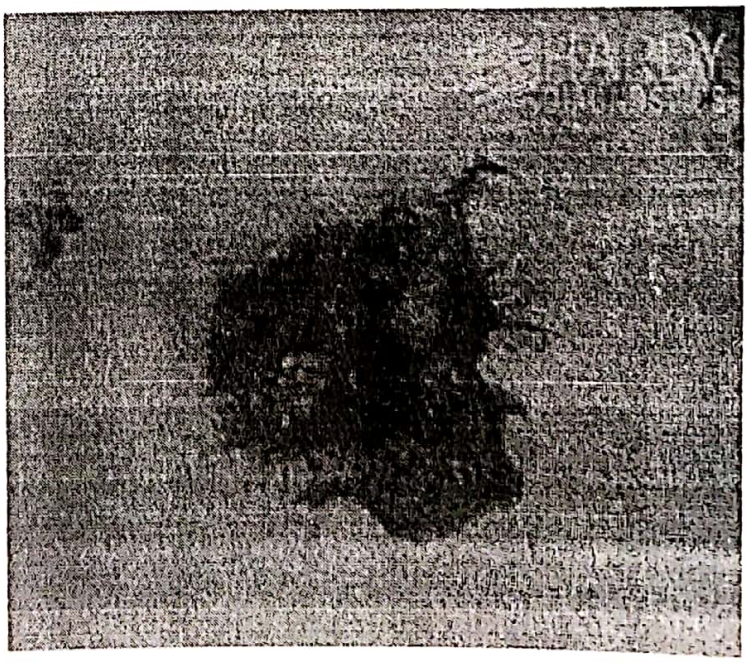
1. Fill up two coplin jars or wide mouth bottles :
    1. With Field Stain A (Blue stain).
    2. Field Stain B (Red stain).
2. Make blood smear on clean glass slide and dry at air.
3. Fix in methanol for one minute or get Spray 'Easy fix'.
4. Dry in air.
5. Dip fixed smear to Field Stain B (Red Stain) for 5 - 6 seconds.
6. Wash in running tap water.
7. Dip smear into Field Stain A (Blue Stain) for 10 to 30 seconds (adjust it).
8. Wash in running tap water.
9. Dry at air and see under oil immersion objective.

INTERPRETATION OF RESULTS

When examined under oil immersion, protozoans and their cytoplasm should **stain purplish blue**; the **nucleolus** and **flagella** should **stain dark blue** and **dark reddish purple**, respectively. **Nuclei, brain cells, and bacteria should stain pink.** Consult appropriate references for descriptions, drawings or pictures for specific information.



Acanthamoeba castellanii a trophozoite stained with Modified Field's Stain Kit. Nucleus is visible. 1,000x.



Acanthamoeba castellanii trophozoite stained with Modified Field's Stain Kit. Nucleus and acanthapodia are visible. 1,000x.

Detection of **Typhoid** using **Widal test**

Typhoid fever is an acute illness associated with fever caused by the ***Salmonella typhi*** bacteria. It can also be caused by ***Salmonella paratyphi,*** a related bacterium that usually causes a less severe illness. The bacteria are deposited in water or food by a human carrier and are then spread to other people in the area.

Typhoid fever is contracted by drinking or eating the bacteria in contaminated food or water. People with acute illness can contaminate the surrounding water supply through stool, which contains a high concentration of the bacteria. Contamination of the water supply can, in turn, taint the food supply. The bacteria can survive for weeks in water or dried sewage.

About 3%-5% of people become carriers of the bacteria after the acute illness. Others suffer a very mild illness that goes unrecognized. These people may become long-term carriers of the bacteria -- even though they have no symptoms -- and be the source of new outbreaks of typhoid fever for many years.

Widal test

The **Widal test** developed in 1896 and named after **Georges-Fernand Widal**, who introduced it, is a presumptive serological **test** for enteric fever or undulant fever whereby bacteria causing typhoid fever are mixed with a serum containing **specific antibodies** obtained from an infected individual.

Principle of Widal Test

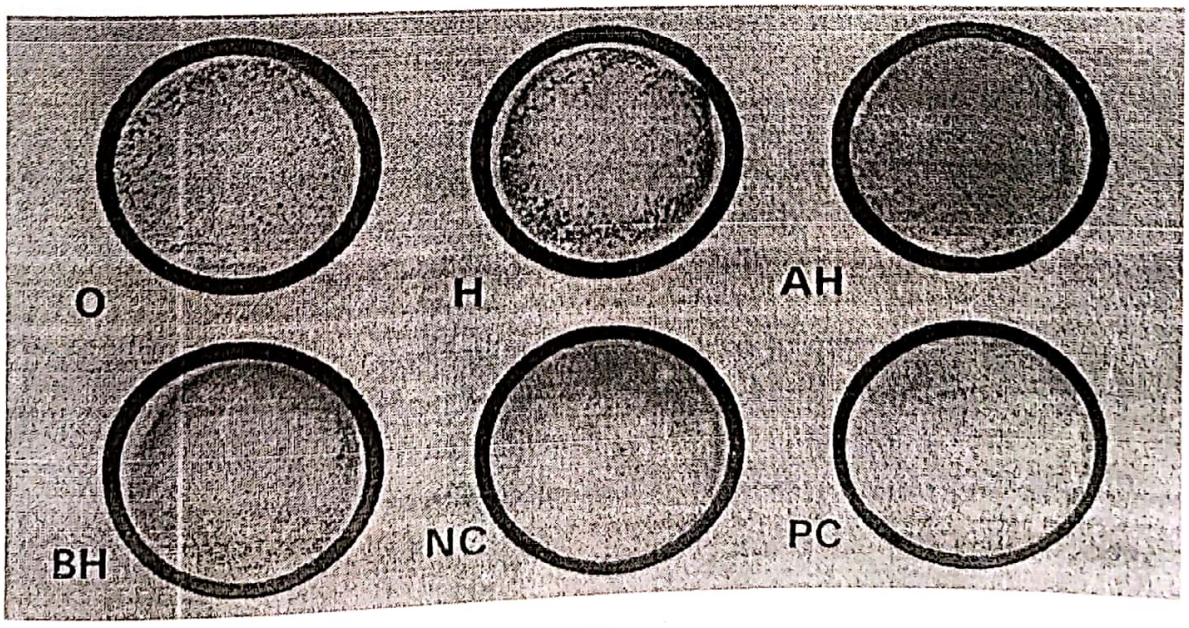
Bacterial suspension which carry antigen will agglutinate on exposure to antibodies to *Salmonella* organisms. Patients' suffering from enteric fever would possess antibodies in their sera which can react and agglutinate serial doubling dilutions of killed, coloured *Salmonella* antigens in a **agglutination test.**

Antigens used for the test:

- Salmonella typhi is used to prepare S. typhi O and S. typhi H antigens.
- O antigens for S. paratyphi A and S. paratyphi B are not taken as they cross-react with S.typhi O antigen.
- H antigen suspension is prepared by treating overnight broth culture or saline suspension of Salmonella with 0.1% formalin.
- For preparing O antigen suspension, Salmonella are grown on **phenol agar** (1:800) to **inhibit flagella**. The growth is then emulsified in small volume of saline, mixed with 20 times its volume of alcohol, heated at 40°C to 50°C for 30 minutes and centrifuged.
- The antigens are treated with chloroform (preservative) and appropriate dyes are added for easy identification of antigens.
- **"O" antigen is a somatic antigen and "H" is flagellar antigen.**

SLIDE TEST

1. Place one drop of positive control on one reaction circles of the slide.
2. Pipette one drop of isotonic saline on the next reaction cirlcle. (-ve Control).
3. Pipette one drop of the patient serum tube tested onto the remaining four reaction circles.
4. Add one drop of Widal test antigen suspension 'H' to the first two reaction circles. (PC & NC).
5. Add one drop each of 'O', 'H', 'AH' and 'BH' antigens to the remaining four reaction circles.
6. Mix contents of each circle uniformly over the entire circle with separate mixing sticks.
7. Rock the slide, gently back and forth and observe for agglutination macroscopically within one minute.



Detection of **Syphilis** using **VDRL test**

Syphilis is a sexually transmitted bacterial infection, caused by the bacterium ***Treponema pallidum***. It is often categorized into stages: Primary, secondary, latent, and late, or tertiary.

Syphilis is treatable, especially if it is **caught early** on. However, it will not go away on its own. Anyone who is concerned that they are infected should seek medical advice as soon as possible.

Syphilis is an infection that is transmitted by direct contact with a syphilitic sore via skin and mucous membranes such as the vagina, anus, rectum, lips, and mouth.

Most commonly, this occurs during oral, anal, or vaginal sexual activity. Although rare, syphilis can be spread during kissing.

Syphilis initially presents as a painless sore on the genitals, rectum, mouth, or skin surface, and can become dormant and live within the body for years and, at times, decades.

When syphilitic sores are present, there is an increased risk of **contracting HIV.**

VDRL TEST

The **Venereal Disease Research Laboratory test (VDRL)** is a blood test for syphilis that was developed by the eponymous lab. The test is usually done by using **serum or cerebrospinal fluid** of the patient.

Principle

Non-treponemal antigen (Cardiolipin-Cholesterol-Lecithin) is used to detect the presence of **"reagin antibodies"** *(IgM and IgG antibodies to lipoidal material released from damaged host cells as well as to lipoprotein-like material, and possibly cardiolipin released from the treponemes)* in patient's serum.

When the heat inactivated (to destroy complement) serum of patient is reacted with freshly prepared non-treponemal antigen, flocculation reaction (antigen and antibody complex are suspended) occurs. The flocculation can be observed by using microscope with 10x objective and 10 x eye pieces.

Qualitative Test

Serum

Slide flocculation tests for syphilis are affected by room temperature. For reliable and reproducible test results, the VDRL antigen suspension, controls, and test specimens must be at room temperature(23degree Celsius - 29 degree Celsius) when tests are performed.

Place 50 µl of serum into one ring of a paraffin or ceramic-ringed slide using a safety pipetting device. Do not use glass slides with concavities, wells, or glass rings.

Gently resuspend the VDRL antigen suspension.

Holding the VDRL antigen suspension dispensing needle and syringe in a vertical position, dispense several drops to clear the needle of air. Then add exactly 1 free-falling drop (17 µl) of antigen suspension to each circle containing serum.

Place the slide on the mechanical rotator. Rotate the slide for 4 minutes at 180 ±2 rpm. When testing in a dry climate, cover the slides with a moist humidifying cover during rotation to prevent excessive evaporation.

Immediately after rotating the slide, remove it from the rotator and read the test results.

Test quantitatively, to an endpoint, all serum specimens that produce reactive, weakly reactive or "rough" nonreactive results in the qualitative VDRL slide test.

Reading and Reporting Results

1. Read slide microscopically, using 10X oculars and a 10X objective.
2. Report the results as follows:

Reading	**Report**
Medium or large clumps	Reactive (R)
Small clumps	weakly reactive (W)
No clumping or very slight roughness	Nonreactive (N)

Uric Acid Test (Blood Analysis)

A uric acid blood test, also known as a serum uric acid measurement, determines how much uric acid is present in your blood. The test can help determine how well your body produces and removes uric acid.

Uric acid is a chemical produced when your body breaks down foods that contain organic compounds called **purines**. Foods and beverages with high **purine** content include:

- **liver**
- **anchovies**
- **mackerel**
- **dried beans**
- **beer**
- **wine**

Purines are also created through the natural process of cell breakdown in the body.

Most uric acid is dissolved in the blood, filtered through the kidneys, and expelled in the urine. Sometimes, the body produces too much uric acid or doesn't filter out enough of it. **Hyperuricemia is the name of the disorder that occurs when you have too much uric acid in your body.** High levels of uric acid are associated with a condition called **gout. Gout** is a form of arthritis that causes swelling of the joints, especially in the feet and big toes. Another cause of Hyperuricemia is **increased cell death, due to cancer or cancer treatments.** This can lead to an accumulation of uric acid in the body.

It's also possible to have **too little uric acid (HYPOURICEMIA)** in your blood, which is a symptom of liver or kidney disease. It's also a symptom of **Fanconi syndrome**, a disorder of the kidney tubules that prevents the absorption of substances such as glucose and uric acid. These substances are then passed in the urine instead.

Device used for studying the level of uric acid in blood

The device used for the test is similar to a glucometer and is called as a **uric acid meter.**

Steps for use:

1. First, you get a blood sample- and make sure your hands are clean and dry. You prick the side of a fingertip with the adjustable lancet device in the uric acid test kit to get six microlitres of blood.

2. Secondly, position the test strip into the meter and put the blood onto the reaction zone on the side of the test strip. The machine beeps when there's enough blood on the test strip. Don't have too much blood on the reaction zone or the reading will be wrong. The test strip can only be used once, so throw it away when you've finished.

3. The meter acknowledges it is working on the test strip by flashing timing bars on its LCD screen.

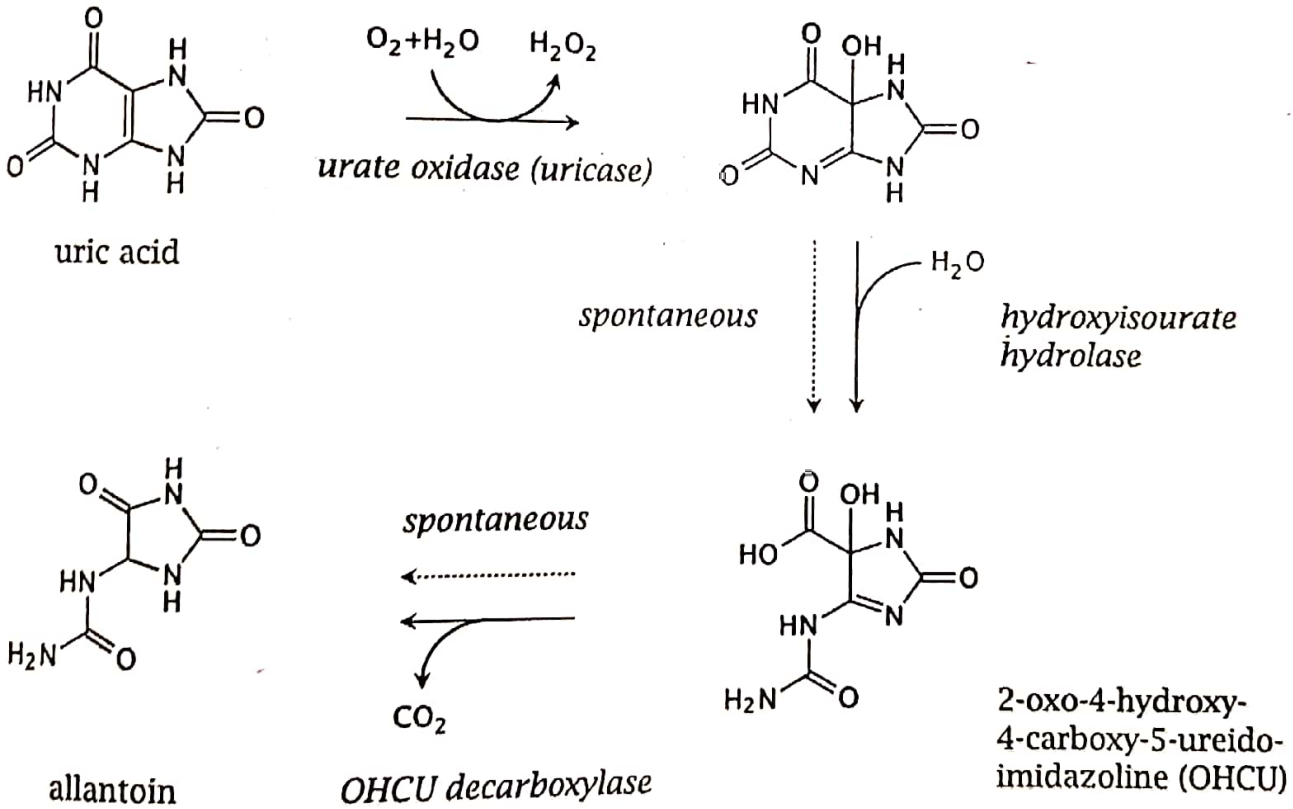
4. Fourthly, watch the timing bars for about 30 seconds. Then your uric acid level will show on the LCD screen.

You can set the meter's uric acid reading to mg/dL or µmol/L (pronounced mew mole) serum (blood) uric acid readings.

Apart from the above device currently, two methods are widely utilized to quantify uric acid. A **colorimetric method** depends on the reduction of a **chromogen** such as **sodium tungstate** by uric acid to produce a measurable color change.

This technique has been commonly employed in automated hospital screening (SMA systems). The method measures materials other than urate, such as ascorbic acid. Colorimetric determinations are generally considered an overestimation of true uric acid levels, and the normal range is usually 1 mg/dl higher than the more specific enzymatic techniques.

Enzymatic determination of uric acid results from the **specific oxidation** of uric acid by **uricase**, which converts its substrate to **allantoin**. The differential absorbance of these substances at **293 nm** allows quantification.



Normal value of uric acid in blood

- ***Women:*** 2.5 to 7.5 milligrams/deciliter (mg/dL)
- ***Men:*** 4.0 to 8.5 mg/dL.

Project Title

"Comparative Determination of Iron in Drugs By Using Atomic Absorption Spectroscopy"

A

INTERNSHIP TRAINING PROJECT

Submitted

To

DEPARTMENT OF PHARMA CHEMISTRY

Govt. Holkar (Model, Autonomous) Science College,

Indore (M.P.)

By

BHARTI SAHU

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(M.Sc. IV Sem. Pharma Chemistry)

Under the Guidance of
Dr. Aparna Gandhe
Department of Chemistry
2021-2022

DECLARATION

I,the undersigned BHARTI SAHU student of M.Sc PHARMA CHEMISTRY final year here by declare that the project work presented in this report is my own work presented in this report is my own work and has been carried out under the supervision of Mr. SUBODH THAKUR of Govt. Holkar Science college Indore.

This work has not been previously submitted to any other university for any examination.

Date-

Name of student-

Sign-

Place-

ACKNOWLEDGEMENT

I would like to express my greatest appreciation to everyone who helped and supported me throughout the project. I am thankful to Dr. Anamika jain (HOD of chemistry) for giving me this opportunity . I am also thankful to Dr. Aparna Gandhe for their ongoing support during the project .Their advice and encouragement had a huge role to finalize this project report. I would also like to thank Mr. Anand Bhaiya Who was always there in our chemistry lab for assistance.

I would also like to thank all of my classmates who helped me in completing the project by Exchanging interesting ideas and sharing their experiences.

I wish to thank my parents as well for their support and encouragement without which I could not have completed this project in the limited timeframe.

In the end, I want thank my friends who displayed appreciation for my work and motivated me to continue my work.

CERTIFICATE

This is to certify that the content of this project "**Comparative Determination Of Iron in Drugs By Using Atomic Absorption Spectroscopy" by Miss. BHARATI SAHU** is the bonifide work of her submitted to Govt. Holkar (Model Autonomous) Science College, Indore (M.P.) for consideration in the partial accomplishments of the provision of the institute. The original work was done by her under the supervision of Dr. Anamika Jain ma'am in the academic year 2021-2022. On the basis of declaration made by her I recommend the project report for evaluation.

Certified by- Dr. Aparna Gandhe

Govt. Holkar (Model, Autonomous) Science College, Indore

Department of Chemistry

Internship Training on

Instrumentation Techniques for Post Graduate Students

07th April to 18th April 2022

CERTIFICATE

This is to certify that

Mr./Miss. ....BHARTI.....SAHU.....

of ..M.Sc.....FINAL..[PHARMACEUTICAL...CHEMISTRY]....

has successfully completed the Internship Training from 07th April to 18th April 2022 on **"Instrumentation Techniques"** organized by the Department of Chemistry, Govt. Holkar (Model, Autonomous) Science College, Indore (M.P.).

Dr. Aparna Gandhe	Dr. M.K. Dwivedi	Dr. Anamika Jain	Dr. Suresh T. Silawat
Convener	Co-ordinator	HOD, Chemistry	Patron & Principal

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Introduction

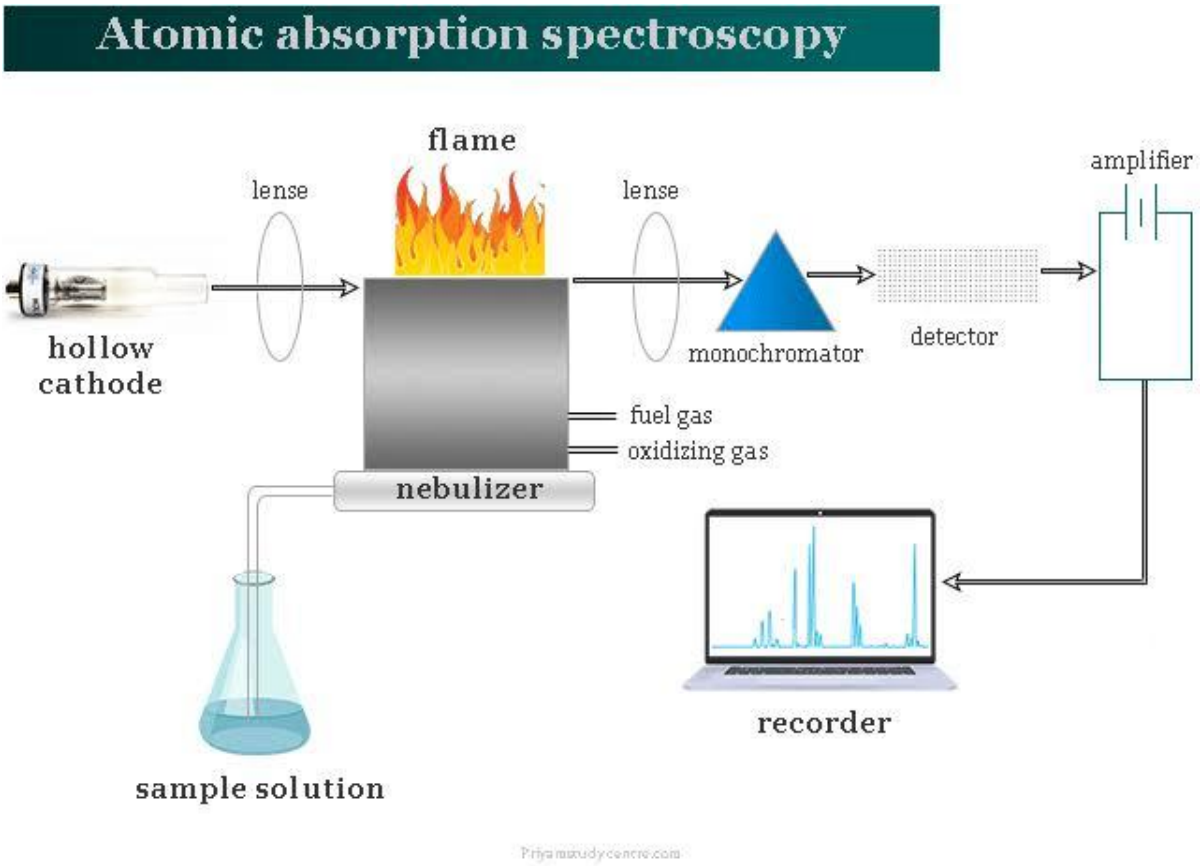
Atomic Absorption Spectrophotometry (AAS) is currently used to identify elements present in a wide variety of substances. For example, AAS is routinely used to determine the concentration of elements in blood, in metal alloys, in soil, in plant and animal tissue, and in food products. The sample for this experiment will be a commercially available multivitamin. Multivitamins contain a wide variety of chemical species including minerals considered to be beneficial to human health.

AAS is an instrumental method of quantitative and qualitative analysis which uses the characteristic absorption spectrum associated with each element. As discussed in lectures, ***absorption*** of electromagnetic energy by atoms causes electrons to be raised to higher energy levels and results in absorption spectra. This occurs during Atomic Absorption (AA) Spectrophotometry. In contrast, energy ***emission*** occurs when electrons fall back to lower energy levels. This process is observed in Atomic Emission Spectrophotometry, which could also be used for elemental analysis.

During AAS analysis, an aqueous sample is sprayed into a flame which supplies the energy to dissociate a sample into ground state atoms. This is known as sample atomization. The aqueous solvent is evaporated. Light with a characteristic wavelength of the analyte (in our case, iron at λ= 372.0 nm) is then shone at the flame and the analyte atoms absorb electromagnetic energy. *The absorbance is directly proportional to the concentration of analyte atoms in the sample.* Qualitative analysis refers to the determining whether an analyte is present or not in a sample. In order to do quantitative analysis (finding the actual amount present), calibration of the AAS using standard solutions containing known amounts of iron is required.

Working Principle Of AAS

AAS method is similar to that of spectrophotometer. The only exception is the replacement sample cell by flame. In AAS monochromatic light for a particular element is produced by a hallow cathod lamp utilizing that element as the cathode.The monochromatic light produced by lamp is beamed through long flame into which is aspirated the solution to be analysed. The heat energy dissociate the molecules and convert the components to atomes. At flame temperature some atoms in the solution are activated,but most of the atoms are remain in the ground state.The ground state atoms of the same element as in the hallow cathode cup absorb their own resonance [riflected] lines.The amount of light absorbed varies directly with their concentration in the flame The transmitted light thatis not absorbed reaches the monochromatror.The monochromator passes only the wavelength close to the resonance lines of the perticular elements to be anlysed then the transmitted light strikes a detector and the decrease in transmitted light is measured.

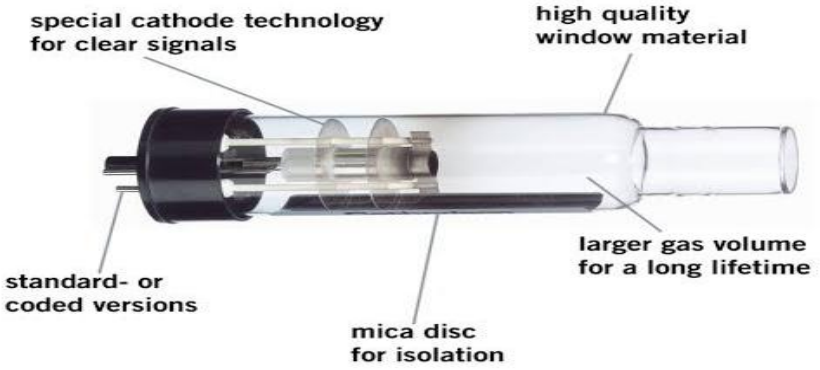


Instrumentation

A typical atomic absorption spectrophotometer consists of four major parts: a light source (lamp), a monochromator, a burner or furnace unit, and a light sensitive detector. Refer to the simplified sketch shown in Fig. 1 for the following discussion.

a. **The light source or lamp:**

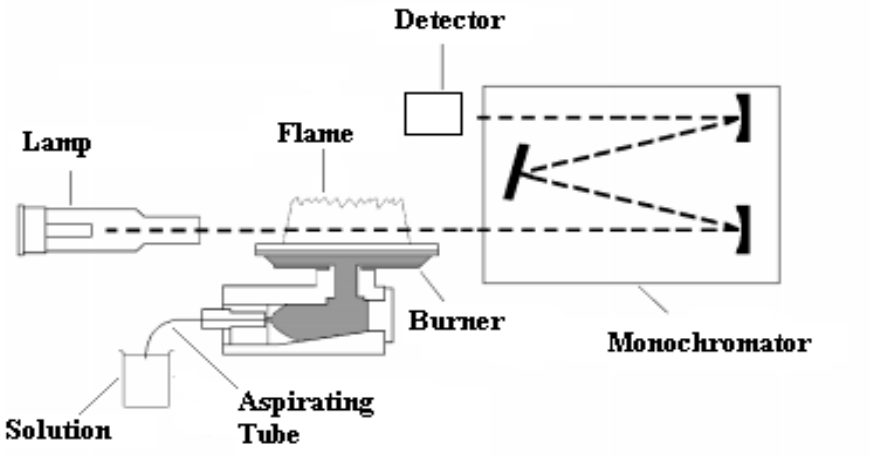
The most popular design is a hollow cathode lamp consisting of an Ar or Ne gas filled tube with a cathode made from the element undergoing analysis (in our case, iron). The hollow cathode lamp thus emits narrow spectral lines at wavelengths characteristic of this element.



b. **The burner or furnace:**

The purpose of the burner or furnace unit is to evaporate the solvent and atomize the sample. This produces analyte atoms <u>in their ground state</u>. The ground state atoms are then capable of **absorbing** the spectral lines emitted by the light source.

Figure 1. Simplified layout of an Atomic Absorption Spectrophotometer

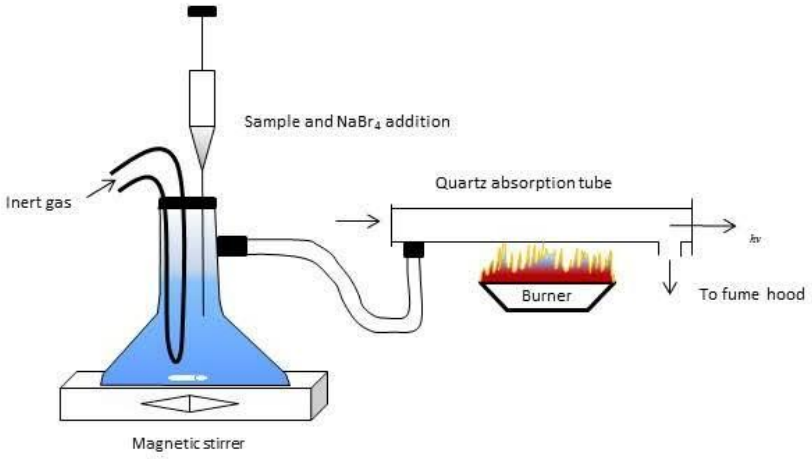


This promotes an electron to a higher energy level and results in the atom being in an excited state.

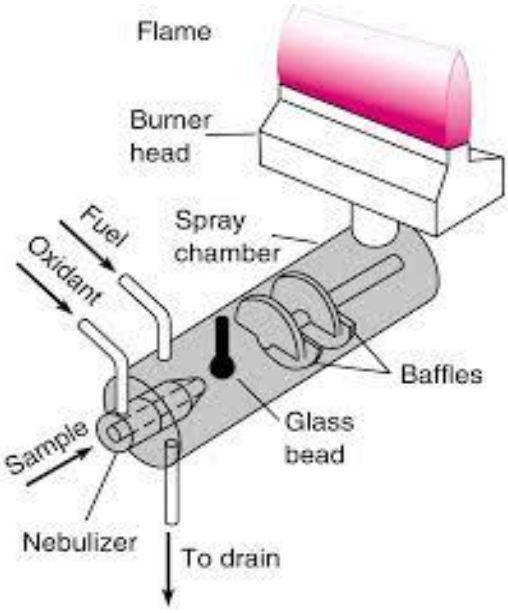
The most common and lower cost AA instruments use a **flame as the method of sample atomization**. In these, the sample undergoing analysis is aspirated (drawn) into the instrument and then sprayed into the flame via a nebulizer. The flame heat supplies the energy to dissociate the sample into atoms.

A variety of such flame burners are available. An air/acetylene mixture is the most common oxidant/fuel used with these burners. When a hotter flame is required, a nitrous oxide/acetylene mixture is used.

A hydride generation and atomization system for AAS

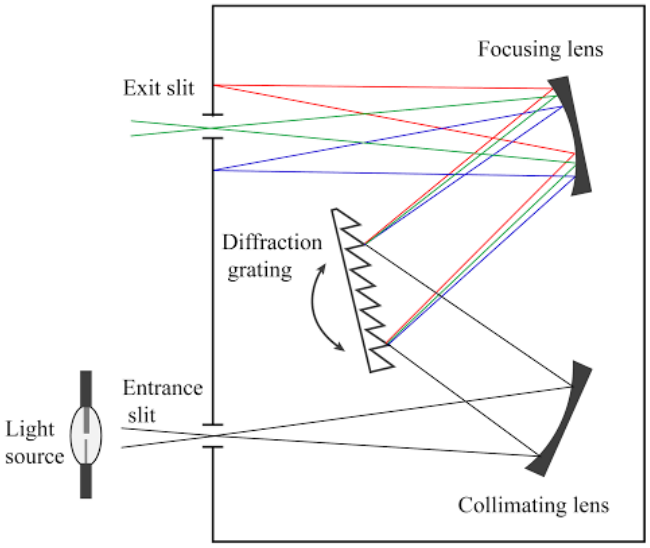


Nebulizer



c. **The monochromator:**

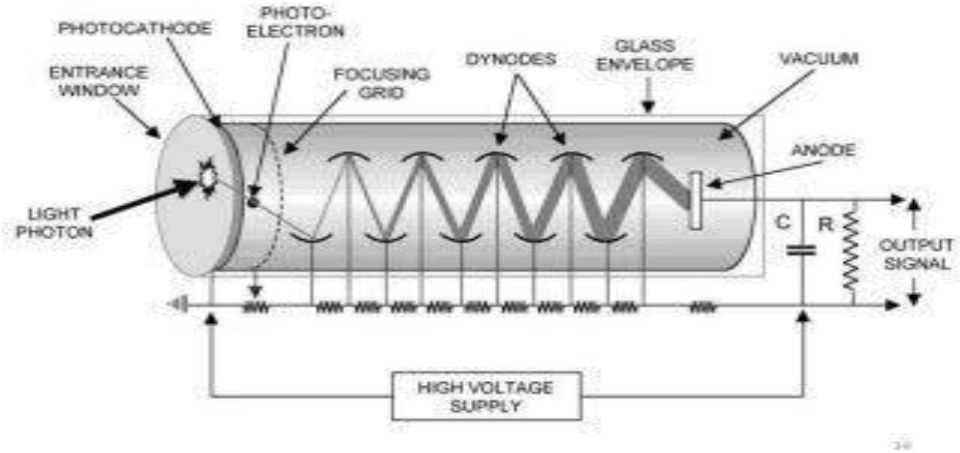
The purpose of the monochromator is to select and filter the spectral lines emerging from the hollow cathode lamp. This is done by using a prism or grating to disperse the spectral lines. The prism or grating is set at such an angle to allow only the wavelength chosen for measurement to pass through the exit slit to the detector. For our analysis, we are selecting a characteristic wavelength from iron's atomic line spectrum.



d. **The detector:**

Any photosensitive device may be used as a detector provided that it is responsive to the characteristic wavelength that is being used. It must also be sensitive enough to measure the change in radiant energy caused by any absorption by the sample in the flame.

The most common detector in AA spectrophotometery is either a phototube or a photomultiplier. The detector is connected to an amplifier and produces a value in terms of absorbance "units".

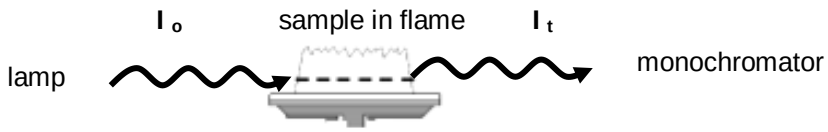


Laboratory Experiment analysis of iron by AAS

Absorbance/Transmittance and the Calibration Curve

From the fundamental laws of photometry, the concentration of an absorbing species can be related to the amount of energy that a species absorbs from a light beam. By comparing the incident beam intensity, I_O, with the transmitted beam intensity, I_t, we can define two parameters:

Transmittance, $T = \frac{I_t}{I_o}$ **Absorbance,** $A = -\log T = \log\left(\frac{I_o}{I_t}\right)$

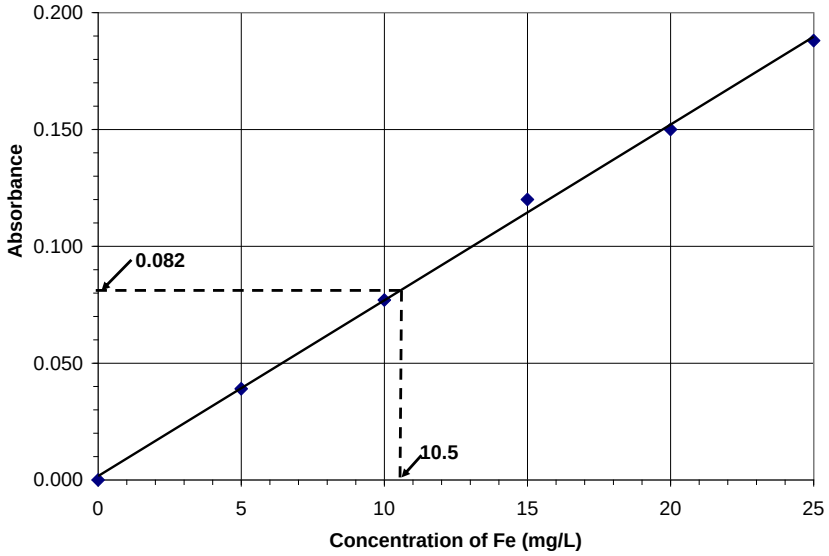


For our purposes here, we merely need to know that **absorbance, A,** is proportional to the **concentration of absorbing atoms in the flame**.

> Thus by observing the **absorbance** value on the readout meter of the AAS, we can determine the atom **concentration** in the sample being aspirated.

It is necessary to first calibrate the instrument for the particular atom or element under analysis. This can be done by running a series of standard solutions through the spectrophotometer. If we construct a graph of absorbance versus concentration, we should obtain a straight line plot (see Figure 2). Such a graph is known as a **calibration curve** and can be used to easily determine the concentration of unknown samples.

Figure 2. Calibration Curve for Iron prepared using a Varian AAS model 55B



Sample Preparation

For the analysis of real samples, the sampling and sample preparation step must be designed to answer the analytical question. In this experiment, the goal is to determine the concentration of iron in a multivitamin tablet. The tablet is a solid sample containing a variety of species with different properties. In order to analyze the iron by AAS, we must first treat the vitamin so that all the iron is released into an aqueous solution. Accurate quantitative analysis depends on ensuring that all of the iron in the tablet ends up in the sample to be analyzed.

Our sample prep will involve two steps:

Dissolving Analyte for AAS Determination:

In some cases, solid samples can simply be dissolved in aqueous solutions. If a solid sample does not dissolve on its own, acid is often used to assist the process. The iron is more soluble in acidic solution so this will aid in releasing the iron into solution more quickly. The addition of heat also increases the speed of the dissolution. Ensuring all the iron ends up in the solution improves the accuracy of the analytical determination.

Filtration:

The multivitamin tablet contains many substances which will not be soluble under the above conditions. These solids will need to be removed from solution by filtration prior to AAS analysis so they do not interfere with the determination.

Experimental Procedure

The following procedure is broken into 4 parts:

- preparing an unknown iron (multivitamin) solution
- preparing a calibration curve for the AA spectrophotometer
- diluting the unknown sample to a concentration range which is compatible with the sensitivity of the AA spectrophotometer
- running the samples through the spectrophotometer

A. Preparation of unknown Fe (multivitamin) solution

1. Obtain a multivitamin tablet from a laboratory instructor. Record the brand name. Record the mass of iron per tablet as indicated on the label.

2. Place the multivitamin tablet in a 150 mL beaker. Add 20 mL of 6M hydrochloric acid, $HCl_{(aq)}$, to the tablet. Swirl the beaker gently. You may let this sit while preparing your standard solutions in Part B. Periodically swirl and note any observations. When Part B is complete come back to Step 3.

3. Heat the 150 mL beaker containing the multivitamin tablet and acid on a hotplate in the fumehood (setting 4) for 10 minutes. Periodically swirl the beaker gently. Note any observations.

4. Prepare a fluted filter paper. Gravity filter the multivitamin solution into a 100 mL volumetric flask (If you are concerned about the potential smell, you may wish to do this step in the fumehood). Rinse the 150 mL beaker with 20 mL of 6M $HCl_{(aq)}$ then pour this through the filter paper. Rinse the 150 mL beaker with 20 mL of deionized water and pour this through the filter paper.

5. Fill the volumetric flask to the 100 mL mark with deionized water.

B. Preparation of Fe calibration standards

1. Obtain approximately 40 mL of the 500 mg/L iron stock solution in a dry 50 mL beaker. This stock solution will be used to prepare the calibration solutions for the spectrophotometer.

2. Using five 100 mL volumetric flasks and a 10 mL Mohr pipet, make up a series of standard solutions containing approximately 1, 2, 3, 4 and 5 mL of your calibrating stock solution. Record to 2 decimal places the exact volume taken. Fill to the 100 mL mark with deionized water.

   It is critical to be accurate in your pipetting and filling to the mark.

C. Dilution of unknown Fe (multivitamin) solution for analysis

1. Obtain 40 mL of the prepared unknown multivitamin solution in a dry beaker (prepared in Part A).

2. Dilute the unknown multivitamin solution so that its concentration will lie within the range of your calibration standards prepared above.

   i.e. dilute exactly 25.00 mL unknown solution with water to make 100 mL. Use a 25 mL volumetric pipette and a 100 mL volumetric flask.

D. Running samples through AA spectrophotometer

Prepare a blank sample by filling an autosampler tube half-way with deionized water (label as tube 1).

Transfer a portion of each of your standards (enough to fill the tube half-way) to the provided autosampler tubes (label in order as tubes 2-6). Record the tube number and actual standard concentration in your databook. Transfer a portion of your unknown solution to an autosampler tube (label as tube 7).

Place your labeled autosampler tubes in the provided rack and give them to your Instructor. They will assign you a group number which will be added to your tube labels. (at this point, lab session will continue when instrument time scheduled)

When your group number is called, go to the AAS station and have your Instructor show you how to use the atomic absorption spectrophotometer.

When you are ready to run your samples, on the AAS software screen make sure you are in the Analysis tab, as indicated at the top of your screen.

Using the mouse, click on the "Select" (highlighter) button at the upper left of the sample labels. Then highlight the cells of samples you wish to run (the number of cells highlighted should correspond to your number of tubes). Click again on the "Select" button. When you are ready to acquire the data, click on the "Start" button.

This will cause the AAS to prepare and zero the instrument, and run your samples in order. The absorbance values will be recorded in each cell. You will also see a live plot of each absorbance being acquired on the right hand side of the screen. Clicking on overlay at the bottom of the plot will allow each to be compared. It takes longer to acquire low concentration samples. Record the absorbance values in your databook once the readings are complete.

You may repeat the process to read your tubes again.

Once you have obtained two readings for each tube, inform your instructor that you are finished

Application of atomic AAS

AAS finds wide application in fields that vary from mining to pharmaceuticals, environmental control and agriculture. Most heavy metals are toxic and should be avoided as far as possible. If you ever had to use an antibiotic, chances are that the quality control process to ensure that the drug is free from the catalysts like palladium or platinum used to make them was performed by an AAS. Similarly, the food, cannabis and health supplement industries make use of AAS to ensure that their products are safe for consumption. In mining, a lot of focus is on the recovery of precious metals like gold from old mine heaps. With the help of AAS, the amount of gold can be quantified to determine whether it would be profitable to extract it.The analysis of drinking water is probably one of the most important applications of AAS, especially in places where the environment is not properly cared for.

- Environmental Science
- Food Technology
- Pharmaceuticals
- Petrochemicals
- Geochemical/ Mining
- Bio-monitoring
- Agriculture
- Nano Materials
- Pathology
- Water Analysis (Ca, Mg, Fe, Si, Al, Ba)
- Food Analysis
- Analysis of Animal feedstuffs (Mn, Fe. Cu, Cr, Se, Zn)
- Analysis of Soils
- Clinical Analysis (Blood Samples, Whole Blood, Plasma, serum, Ca, Mg, Li, Na, K, Fe)
- In Forensic Sciences
- Determination of Trace elements
- Elemental profiles of biological samples
- Trace elements in artificial fibers
- Determination of the mode of poisoning.
- Hair analysis for heavy metal poisons.
- Determination of ammuniation manufactures.
- Discrimination of objects/elements.

Atomic spectroscopy applications by market

Market	Typical applications
Environmental	Water ,Soil, Air
Food	Food safety ,Nutritional labeling
Pharmaceutical	Drug development ,Quality control
petrochemical	Problem refining, Lubricants and Oils
Chemical/ industrial	Quality control /Product testing
Geochemical /mining	Exploration Research
Bio-monitoring	Biological fluids
Agriculture	Soils
Semiconductor	Wafers ,High-purity chemicals
Nuclear energy	Low-level waste process water
Renewable energy	Biofuels ,Solar panels
Nanomaterials	Research

Uses

- Atomic absorption spectroscopy can be used for the quantitative and qualitative determination of metallic elements in biological systems.
- This also helps in the detection of metals as an impurity in alloys and other mixture.
- Atomic absoptionspectroscopy has been utilized for the purificatioin of environmental samples like water and soil.
- Detection of metals in pharmaceutical products and oil products can also be done by this method.

Advantages

- Low cost per analysis.
- High sensitivity (up to ppb detection)
- High accuracy.
- Mostly free from inter-element interference.
- Wide applications across many industries
- Doesn't need metals sepration.
- Smaller quantities of sample (typically 5-50µl)
- Much more efficient atomization
- Provide areducing environment for easily oxidised elements.

Limitations

- Cannot detect non-metals.
- New equipment is quite expensive.
- More geared towards analysis of liquids.
- Sample is destroyed.
- Only solutions can be analysed.
- Less sensitivity compared to graphite furrnance.
- Relatively large samples quantities are required (1-3ml)
- Problems with refractory elements.
- Requires high level of operator skill.

Treatment of Data

1. Prepare a computer-generated calibration curve by plotting Absorbance

   (on the y coordinate) versus Concentration Fe (in units of mg/L, see below).

2. On the calibration curve, indicate how the concentration of your unknown solution was determined and then calculate the total amount of iron in the original multivitamin tablet.

3. Calculate the percent difference between your result and the value provided on the label.

Graphing Results

1. Prepare a computer-generated calibration curve using Microsoft Excel. Refer to the section on Graphing with Excel at the back of the lab manual.

2. Place a descriptive title, date, and your name on the graph.

3. Use the dependent variable (Absorbance) as the y coordinate and the Concentration of iron (mg/L) as the x coordinate. Both coordinates must be labeled showing the units being used (if any).

4. Select appropriate scales for the major axis and the minor axis. For example, major units = 1.00 and minor units = 0.10.

5. Use a new source for Chart Location.

6. If points line up, you can use Excel's trend line to draw the calibration curve; otherwise, you must use a ruler to draw the best fit straight line.

7. Indicate on the graph how you determined the concentration of the diluted multivitamin solution.

8. Landscape your graph (rotate the graph 90^{o} on page) and use most of the page.

9. Change the Plot area to white.

10. Make the major axis grid lines darker than the minor axis grid lines.

Presentation of Results in Data-Book

Multivitamin Brand : Garfield Chewable multivitamin reported mass of iron per tablet: 5mg

Calibration Curve Data:

Concentration stock solution 500.4mg Fe/L

Standard	ML Stock Solution			
Solution	Final Reading	Initial Reading	Total Added	Concentration
1	10.00	9.00	1.00	5.00
2	8.50	6.40	2.10	10.5
3	6.00	3.00	3.00	15.0
4	10.00	6.10	3.90	19.5
5	6.00	1.00	5.00	25.0

Calculations:

1. Calculation of standard solution 1 concentration-
   5.00mg/L
2. Calculation of original vitamin solution concentration
   Calculation of diluted vitamin solution
   10.5mg/L
3. Calculation of mg fe in original vitamin solution
   25.0mgFe/L

Results

Concentration of Fe stock Solution

1. 5.00
2. 10.5
3. 15.0
4. 19.5
5. 25.0

Conclusion

1. One of the most important technique in quantitative analysis.
2. It is based on the absorption of radiation.
3. Measurements could be done at ppb levels.
4. It is widely used method.
5. The preparation of the sample is usually simple and rapid.

INTERNSHIP REPORT ON….

SYNTHESIS AND CHARACTERIZATION OF $YCrO_3$(Yttrium Orthochromite)

Government Holkar* (Model, Autonomous) *Science College Indore (MP)

SESSION 2021-22

UNDER THE GUIDANCE OF…….

***Dr. NETRAM KAURAV SIR** (Asst. Prof. Govt. Holkar Science College Indore)*

SUBMITTED BY….

SOUMYA SHUKLA

MSc (Physics) Final Year

Govt Holkar Science College Indore

*(*1-04-2022 to 15-05-2022)

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I would like to first express my most sincere gratitude to my supervisor **Dr. Netram Kaurav** Sir Assistant Professor, at Govt. Holkar Science college, Indore (M.P.)for his kind support and guidance throughout this project. It is just because of him only that I could bring my project report to this form. I am very grateful and lot of thanks to **Nikita Karma ma'am** (Reaserch Scholer Govt Holkar Science College) and also thanks to **Disha Harinkhede ma'am** last I want to do thanks My classmate my friend to give support in my work .

SOUMYA SHUKLA

M.Sc (Physics)

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CERTIFICATE

This is to certify that the project report entitled "**SYNTHESIS AND CHARECTERIZATION OF Yttrium orthochromite and Fe doped Yttrium orthochromite by solid state and sol gel reaction** " is the result of the work done by Soumya Shukla during APRIL- MAY 2022 as part of partial fulfillment of the M.sc. of Department of Physics, Government Holkar Science College, Indore.

GUIDED BY ….

Dr. Netram kaurav sir

Asst. prof. Govt Holkar

Science college indore

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INTRODUCTION

The $YCrO_3$ is the multiferroics and perovskite type compound.

- **MULTIFERROICE:-** Multiferroics are the materials that simultaneously exhibit more than one type of ordering include magnetic, electrical and elastic order, Magnetic order is conventionally driven exchange interaction between magnetic dipoles originating from unfilled shells of electron orbits.
- **PERVOSKITE COMPOUND :-** A perovskite oxide compound have the general stoichiometry of ABO_3 formula in which A and B are cation is larger than B cation. The potential application of these materials include ferroelectric random access memory, multilayers ceramic capacitors, magnetic field sensor, solid oxide fuel cells (SOFCs), membrane, catalytic convertors etc.

It is very important to improve the multiferroic features of the perovskites for obtaining a wide range of the applications. Their utility can be enhance by partial substitution of A-site or B-site or both side which can improve their properties and increase its application.

Solid oxide fuel cells (SOFCs) is one of the most promising candidates for new generation power system for its high energy conversion efficiency. It produce fewer pollutants and so have environmental advantages but their operating temperature is very high (800° c – 1000° c)

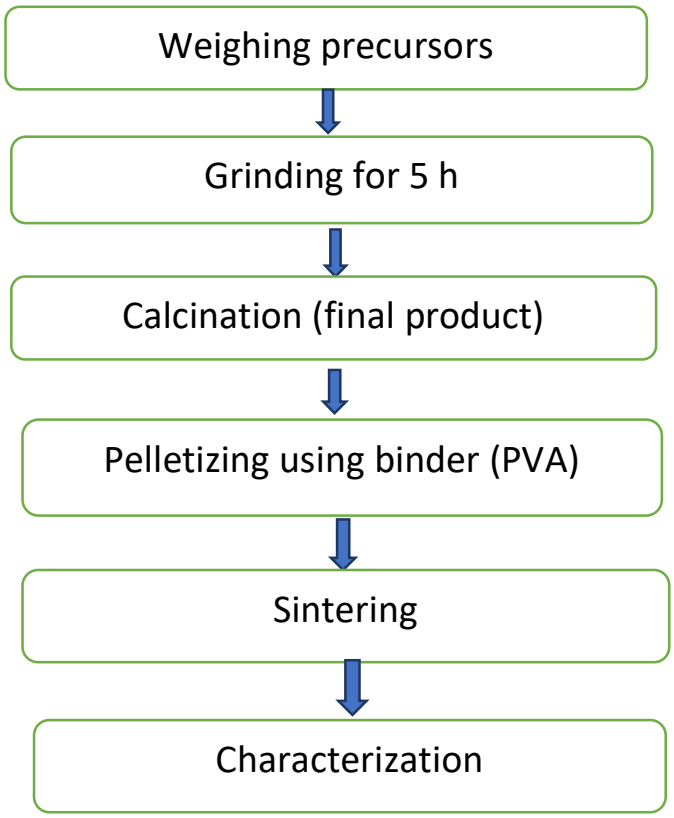
In present work $YCrO_3$ and Fe doped $YCrO_3$ $[YCr_{0.9}Fe_{0.1}0_3]$ polycrystalline sample was prepared by solid state reaction and nanocrystalline sample was prepared by sol gel method and comparing the result of both methods.

- **SOLID STATE REACTION :-** The **solid-state reaction route** is the mostly widely used method for the preparation of polycrystalline solid from a mixture of solid starting materials. Solid do not react together at room temperature over normal time scales and it is necessary to heat them to much higher temperature, often to 1000 to 1500 c, in order for the reaction to occur at an appreciable rate.

->Advantage:- It offers simple steps and high yield production.

->Disadvantage:- It require very high temperature.

- **Steps for solid state reaction**



=>Weighing precursors

=> Grinding

=>Calcination (final product)

=> Pelletization using binder(PVA)

PREPARED SAMPLE

PREPARED PELLETS

- **SOL GEL REACTION :-** The sol-gel process is a more chemical method (wet chemical method) for synthesis of various nanostructures, especially metal nitride nanoparticles. In this method, the molecular precursor (usually metal alkoxide) is dissolved in water or alcohol and converted to gel by heating and stirring by hydrolysis/alcoholysis.

  ->Advantage:- It is a low temperature technique.

  ->Disadvantage:- Rate of reaction can easily be controlled by maintaining temperature.

- **Steps for sol gel reaction**

Weighing precursors

⇩ Hydrolysis

Solution

⇩ Condensation

Gel formation

⇩

Drided gel

⇩

Grinding for 1h

⇩ Calcination

Final product

⇩

Pellatization using binder (PVA)

⇩

Sintering

⇩

characterization

Weighing precursors

Requirements

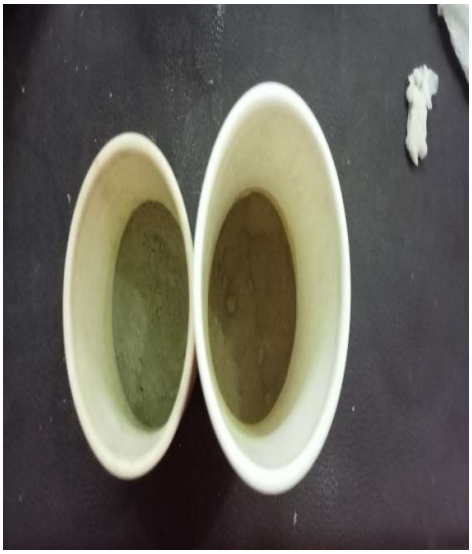
solution

Heating

Sample after heating

Grinding

After grinding power forms



For sintering

After sintering

Pellets

EXPERIMENTAL PROCEDURE AND CALCULATION

❖ EXPERIMENTAL PROCEDURE FOR SOLID STATE REACTION

The polycrystalline sample prepared by solid state reaction method with the stoichiometric quantity of required oxides.

- **For parent compound ($YCrO_3$):-** Y_2O_3(99.9%) ,Cr_2O_3(99.9%)
- **For doped compound ($YCrFeO_3$):-** Y_2O_3(99.9%) ,Cr_2O_3(99.9%)

  And Fe_2O_3(99.9%)

The required quantity of oxides are calculated as follows:-

Element	Atomic weight
Yttrium(Y)	88.905
Chromium(Cr)	51. 996
Oxygen(O)	15.999
Iron(Fe)	55.845

❖ **For 5 gram parent compound($YCrO_3$):-**

- **$Ycro_3$:-** 88.905+51.996+15.999 =188.892 (total amount)

  ->Y_20_3:- 2×88.905+3×15.999=225.807

  1÷2× 225.807÷188.892×5=2.987

  ->Cr_2O_3:- 2×51.99+3×15.999=151.997

  1÷2×151.997÷188.892×5=2.01

Total amount of oxide = 2.987+2.01=**4.997**

❖ **For 5 gram doped compound ($YCr_{0.9}Fe_{0.1}O_3$):-**

❖ **$YCr_{0.9}Fe_{0.1}O_3$:-**88.905+51.992×0.9+55.845×0.1+15.999×5

= 189.277(total amount)

->Y_2O_3:- 2×88.905+3×15.999=225.807

1÷2× 225.807÷188.277×5=2.982

->Cr_2O_3:- 2×51.99+3×15.999=151.997

0.9÷2×151.997÷189.977×5=1.804

->Fe_2O3:- 55.845×2+3×15.999=159.698

0.1÷2×159.689÷189.277×5=0.210

Total amount of oxide = 2.982+1.804+0.210=**4.996**

1)Weighing precursors:- Weighing the required quantity of solid reactant(oxides) that we calculated above to prepare the solid crystalline powder by using weighing machine.

Before weighing the precursor we have to tare the weight of butter paper.

2) Grinding:- After the precursors have been weighed out in the required quantity, in the next step they are grind in grinder for 5-6 h. For manual mixing small amount of some volatile organic liquid- preferably acetone or alcohol is added to mixture to aid homogenization. This forms a paste which is mixed thoroughly. During the process of grinding the organic liquid gradually volatilize and has usually evaporate completely after 10-15 minutes.

Grinding is very necessary step to achieve homogenous mixture of reactants.

3)Sintering (Heat treatment):- Sintering is a process of heating the material in a furnace below is melting point until its particles adhere to each other. When complete grinding is done. Sintered the sample $YCrO_3$ and $YCr_{0.9}Fe_{0.1}O_3$ in the furnace. For this the. sample is kept in the crucible. Crucibles are the container that is used the reaction must be able to withstand high temperature the common crucibles

are silica(1430k),alumina(2200k),zirconia(2300k), manganese(2700k), platinum(2045k) and silver(1235k) are used for the reaction.

In present work alumina crucible is used which having the melting point 2200k. Crucible is placed inside the furnace at 1000°c temperature for 15h. After the sintering the sample is again grind for 1-2h. After the sintering the weight of the compound reduce because during the heating impurities are removed.

The phase purity and, crystalline nature nature and crystalline size of powder sample were analysis by X-ray diffraction (XRD) pattern recorded from X-ray diffractometer in a 2θ range from 20° to 90°.

4) <u>Pelletizing:-</u> For the electrical measurement powder sample were compacted to pallets. Pellets are prepared by mixing 2-3 drops (for 3 gram sample) of organic compound commonly known as Poly-vinyl Alcohol **(PVA)** as a binding medium for the particles of our sample. The pellet is formed by using pelletizer of required diameter under the pressure of **2.5 milli tons per inch.** Pellets are again sintered in furnace at 800°c for 10h.

Binder is prepared by taking 20ml of distilled water mix with approximate 1gram of PVA under the continuous magnetic stirring for 15h at 70°c temperature.

<u>“The experimental process is same for both parent and doped compound.”</u>

❖ EXPERIMENTAL PROCEDURE FOR SOl GEL REACTION

The nanocrystalline sample prepared by solid state reaction method with the stoichmetric quantity of required nitrate.

- **For parent compound ($YCrO_3$):-** $Cr(NO_3)3\times9H_20$ and Y_20_3 (as the nitrate of yttrium was not available so the oxide of yttrium was mixed with some quantity of nitric acid to convert oxide into nitrate)
- **For doped compound ($YCrFeO_3$):-** Y_20_3 , $Cr(NO_3)3\times9H_20$ and $Fe(NO_3)3\times9H_20$

The required quantity of nitrate are calculate as follows:-

Element	Atomic weight
Yttrium(Y)	88.905
Chromium(Cr)	51.999
Iron (Fe)	55.845
Nitrogen(N)	14.006
Hydrogen(H)	1.007
Oxygen(O)	15.999

❖ For 5 gram parent compound($YCrO_3$):-

->Formula weight

1)Y_2O_3 = 2×88.905+3×15.999=225.807

2)$Cr(NO_3)3\times9H_2O$
=51.996+3[14.0067+3(15.999)]+9[2(1.0079)+15.999]
=400.147 gram/mol

-> Refine weight

1) 225.807×1=Y225.807
2) 400.147×1=400.147

->Molecular weight

5=(225.807+400.147)x

5=625.9546 x

X=0.007987799

->Quantity estimation

1) **Y_2O_3 =** 225.807×0.007987799 =1.803700

2) **$Cr(NO_3)3\times9H_2O$ =** 400.1476×0.007987799= 3.196238

TOTAL = 4.99

->Calculation of citric acid

Citric acid = 2.5×(no. of cation)×molecular weight of citric acid
=2.5×8×192.1232×0.007987799
=30.6928300

- **For 5 gram doped compound($YCrFe0_3$):-**

1)$Cr(NO_3)3\times9H_2O$

=51.845+3[14.0067+3(15.999)]+9[2(1.0079)+15.999]

=400.147 gram/mol

- **2)$Fe(NO_3)3\times9H_20$**

=55.845+3[14.0067+3(15.999)]+9[2(1.0079)+15.999]
=403.996 gram/mol

-> Formula weight

1) **Y_2O_3 =** 225.807
2) **$Cr(NO_3)3\times9H_2O$ =** 400.147
3) **$Fe(NO_3)3\times9H_20$ =** 403.996

->Refined weight

1) 225.807×1=225.807

2) 403.996×0.1=40.399

3) 400.147×0.9=360.132

->Molecular weight

5=(225.807+40.3399+360.132)x

5=626.3394

X=5÷626.339

X=0.00798289

->Quantity estimation

1) **Y_2O_3 =** 225.807×0.00798289 =1.80259244
2) **$Cr(NO_3)3\times9H_2O$ =** 360.132×0.00798289 = 2.87490052
3) **$Fe(NO_3)3\times9H_20$ =** 40.399×0.00798689= 0.322505562

TOTAL= 4.999

->Calculation of citric acid

Citric acid = 2.5×(no. of cation)×molecular weight of citric acid

=2.5×11×192.1232×0.00798289

=42.1767052 gram

❖ Experimental procedure for sol gel reaction

The pure and Fe doped $YCr0_3$ nanoparticles are prepared by sol-gel method. All the precursors are 99.9% pure. The nitrate of metal ions, such as chromium nitrate nonahydrate [$Cr(NO_3)_3\times9H_2O$] and Iron(lll) nitrate nonahydrate[$Fe(NO_3)_3\times9H_2O$] and a oxide[Y_2O_3] are used as a precursor material. The stoichiometric amount of precursor are weighting first after weighing the precursor are dissolve in 100ml distilled with continuous stirring. Then place the beaker on electric oven at 80° c temperature for 2h. when the solution start boiling we add 2ml ethylene glycol and 5 pellet of sodium hydroxide one by one. After 2h solution evaporate and a gel is form than after 5-10

min the solution get dry precursor powder. Leave this power for 5-6h to cool down after cooling the powder is grinded in grinder for 1-2h. At last the grinded powder is sintered in furnace for 1h at 800°c temperature.

After the sintering the weight of the compound reduce because during the heating impurities are removed.

The phase purity and, crystalline nature nature and crystalline size of powder sample were analysis by X-ray diffraction (XRD) pattern recorded from X-ray diffractometer in a 2θ range from 20° to 90°.

->Pelletizing:- For the electrical measurement powder sample were compacted to pallets. Pellets are prepared by mixing 2-3 drops(for 3 gram sample) of organic compound commonly known as Poly-vinyl Alcohol **(PVA)** as a binding medium for the particles of our sample. The pellet is formed by using pelletizer of required diameter under the pressure of **2.5 milli tons per inch.** Pellets are again sintered in furnace at 800°c for 10h.

❖ INSTRUMENTS USED FOR CHARACTERIZATION

- **XRD Machine**

X-Ray Diffraction is a rapid analytical technique primarily used for phase identification of crystalline materials. It can provide information on unit cell dimensions.

->Principle

Based on the constructive interference of monochromatic x-rays and a crystalline sample in which the crystalline structure causes a beam of incident x-rays to diffract into many specific directions.

->Concept

The concept of XRD can be explained as follows:

->X-rays

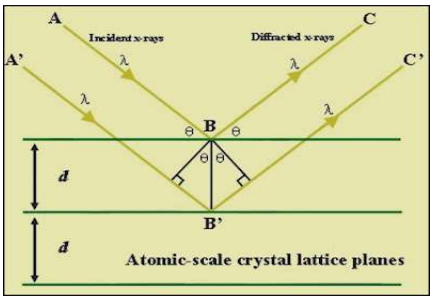
X-rays are the form of high energy electromagnetic radiation. These have a wavelength ranging from 10picometers to 10nanometers.
X-rays have much higher energy and much shorter wavelengths than UV light.

->X-Ray Production

The x-rays are generated by a cathode ray tube, filtered to produce monochromatic radiation, collimated to concentrate and directed toward the sample.
Accelerating electrons with high voltages are allowed to collide with a metal target.
The X-rays are produced when the electrons are suddenly decelerated upon collision with the metal target, and these x-rays are commonly called "Bremsstrahlung or Breaking Radiation".
If the bombarding electrons have sufficient energy, they can knock an electron out of an inner shell of the target metal atoms.
Then the electrons from the higher states drop down to fill the vacancy, emitting x-ray photons with precise energies determined by the electron energy levels.
These rays are called characteristic x-rays.

->Bragg's Law

It explains the relationship between an x-ray light shooting into, and it is reflected off from the crystal surface.
The law states that when an x-ray is an incident onto a crystal surface, with an angle of incidence θ, it will reflect with the same angle of scattering θ.
When the path difference (d) is a whole number (n), of wavelength (λ), constructive interference will occur.



Bragg's Law is given by:

$$n\lambda = 2d \sin\theta$$

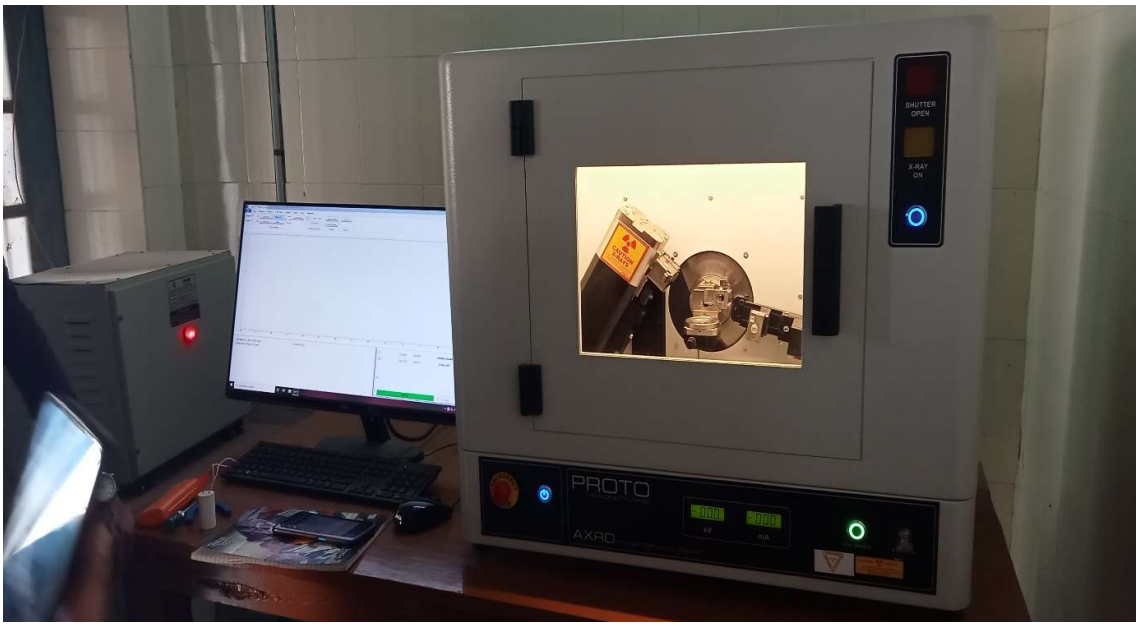
Where,

λ = wavelength of the x-ray.
d = spacing of the crystal layers(path difference).
θ = incident angle.
n = integer.

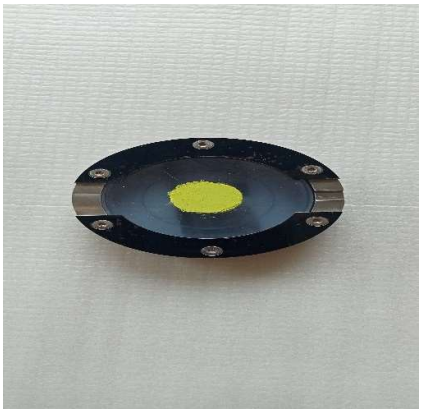
- **Procedure to operate x-rd machine**

Step01):- Switch on the power button after switch on the CPU.
Step02):-Press the power button of the hardware, press x-ray enable.
Step03):-Click on the software XRDwinPD which is open in computer desktop.
Step04):-After that we get popup box of use password,click OK.
Step05):-we get another box of initialization
Step06):-Now click on x-ray tube and select the warm up time, the warmup time depends on that after what time we operate the machine.
Daily-7min , 1week- 15 min, 15 days or more – 45 days
Step07):- During the warmup clean the sample holder using PVA set the sample in sample holder with the help of glass slit.
Step08):- After the warmup open the x-rd door and put the sample in machine than go to scan tab and write the value of start bragg angle 2θ=20° stop bragg angle 2θ=90°.
Step09):- Set the dual sec – 1.2 sec.

Step10):- Select the divergence 0.5.
Step11):-Select the spin for power sample (on) and for thin film 0(off).
Step12):-Than go to scan choose folder and give the file name (sample name).
Step13):-Than go to new file, our experiment starts.



X-RAY DIFFRACTION MACHINE



SAMPLE HOLDER

- **DIELECTRIC SETUP**

A material is classified as “dielectric” if it has the ability to store energy when an external electric field is applied. If a DC voltage source is placed across a parallel plate capacitor,more charge is store when a dielectric material is between the plates than If no material (a vacuum) is between the plates. The dielectric material increases the storages capacity of capacitor by neutralizing charges at the electrodes, which ordinarily would contribute to external field. The constant. If a DC voltage source V is placed across a parallel plate capacitor, more charge is stored when a dielectric material is between the plates when if no material (a vacuum) is between the plates.

- **Process to operate dielectric set up**

Step01):- Before doing the measurements keep both the clips(black and red) in open position.

Step02):-In module interface select ADJ->Select cable->1m

Step03):-select ->open -> All->exit ->execute

Step04):-Now keep both the clips(red and black) in shot position

Step05):-select ->short->All->EXIT->execute

Step06):-Now open the LCR Meter sample application properties software in laptop

Step07):-Interface RS232C->select LCR->click yes

Step08):-Select parameters->click ok

Step09):-Go to set ->AC set->speed->slow2

Then DC set->speed->slow2->click OK

Step10):-Put the pallet in sample holder, the pallet is painted silver in upper and lower surface to make it conducting.

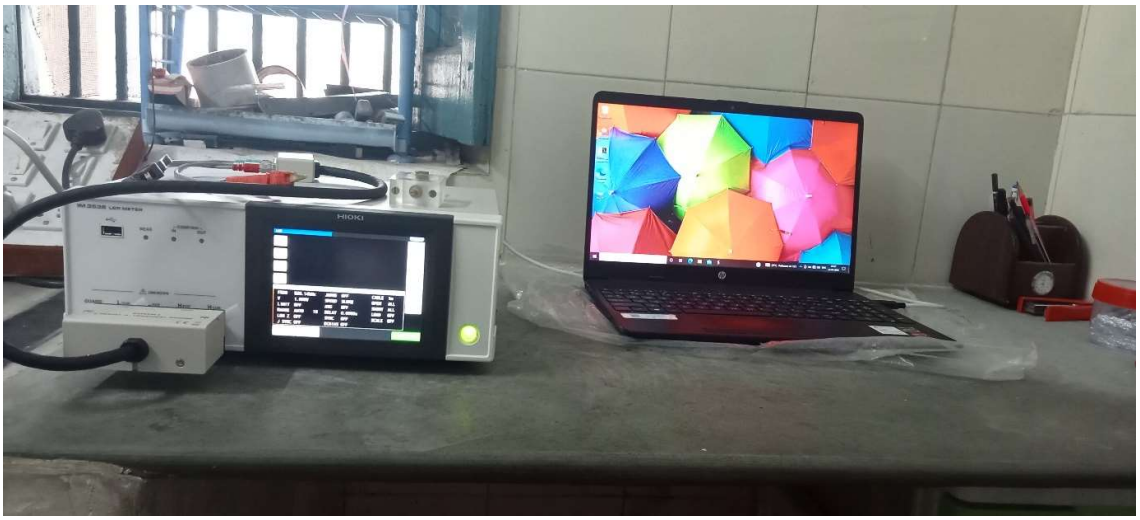
Step11):-Check the conductivity by using multimeter.

Step12):-Attach the clip at the end of the sample holder.

Step13):-Go to measure**->**sweep measurement->auto setup ->set start and stop frequency->select data count ->select scale log->cliclk OK

Step14):-Select output TEXT FILE in(.csv)format.

Step15):- Click on start measuring.



DIELECTRIC SETUP

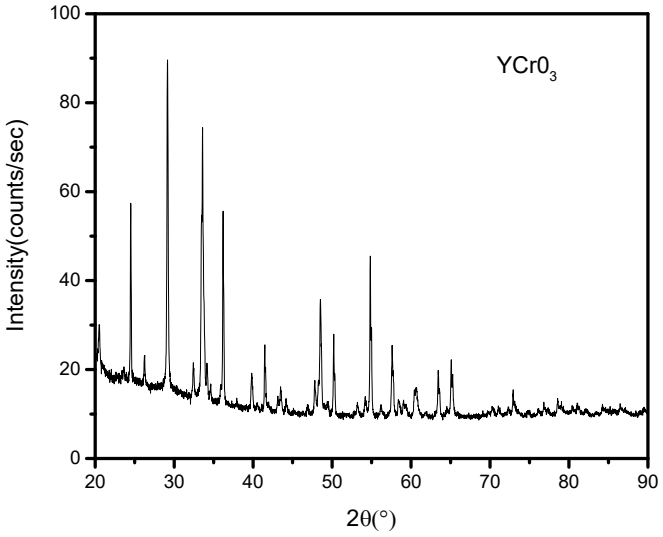
❖ CHARACTERIZATION

• XRD ANALYSIS

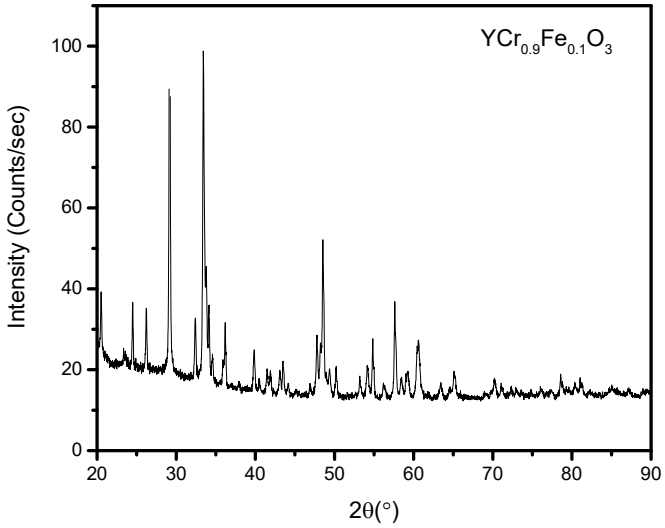
The XRD analysis was employed in order to investigate the nature of powder sample , crystalline size(nm), and interplanar spacing .

XRD data was collected in angular range of 20° to 90°. The collected XRD was plotted using origin 16 software.

The powder X-ray diffraction pattern(XRD) of $YCr0_3$ and $YCr_{0.9}Fe_{0.1}O_3$ using solid state reaction are shown in below graphs.

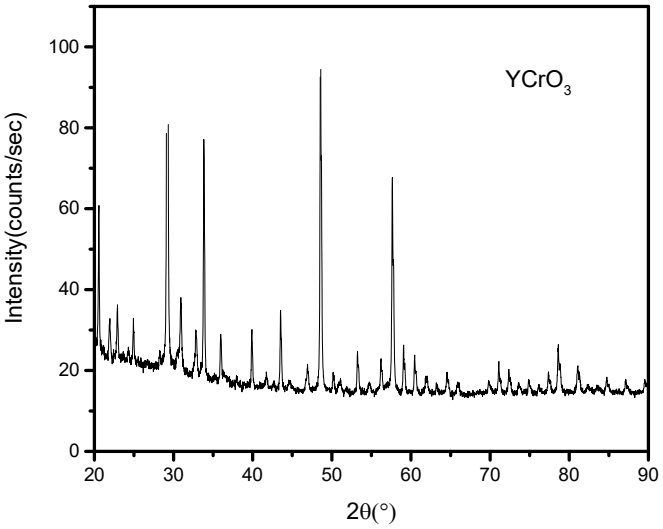


Graph 01:- XRD analysis of $YCrO_3$

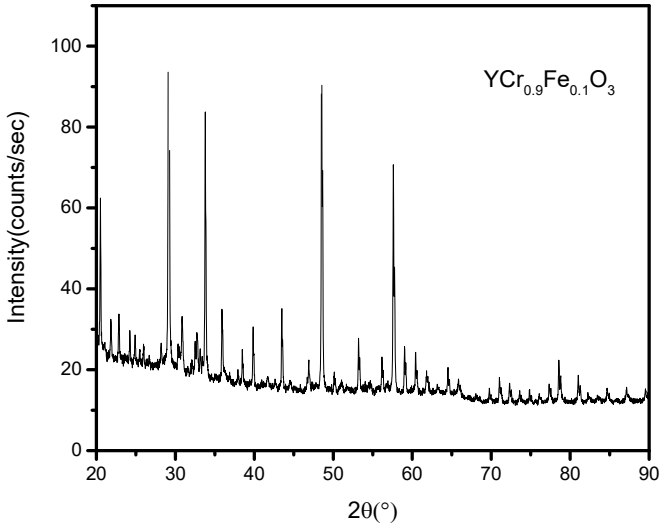


Graph-02:- XRD analysis of $YCr_{0.9}Fe_{0.1}O_3$

The powder X-ray diffraction pattern (XRD) of $YCr0_3$ and $YCr_{0.9}Fe_{0.1}O_3$ using sol gel reaction are shown in below graphs.



Graph03:- XRD analysis of $YCrO_3$ using sol gel method



Graph04:- XRD analysis of $YCr_{0.9}Fe_{0.1}O_3$ using sol gel method

The XRD pattern show that the sample are well crystalline in nature. All the prominent peaks in graph are indexed to various hkl planes showing the formation of $YCrO_3$ and fe doped $YCrO_3$ by both the methods.

The average crystalline size of the nano particles are calculated with the help of **Debye Scherrer** formula.

$$D = k\lambda / \beta \cos\theta$$

Where, D=crystalline size in(nm)

K=0.9(Scherrer constant)

λ=1.5406nm(wavelength of X-ray source)

β= FWHM (Radian)

θ =Peak position (Radian)

The crystalline size is found to be

Solid state- **$YCr0_3$ = 45 nm**

$YCr_{0.9}Fe_{0.1}O_3$= 52 nm

Sol gel- - **$YCr0_3$ = 38 nm**

$YCr_{0.9}Fe_{0.1}O_3$= 40 nm

The interplanar spacing calculated using Bragg equation.

$$n\lambda = 2d \sin\theta$$

$$d = n\lambda/2\sin\theta$$

where, $\lambda = 1.5406\ \text{Å}$ (wavelenght of incident X-ray)

θ =peak position (Radian)

n=1(order of diffraction)

d=interplaner spacing or d-spacing

The interplaner spacing is found to be

Solid state- **$YCr0_3$ = 35 Å nm**

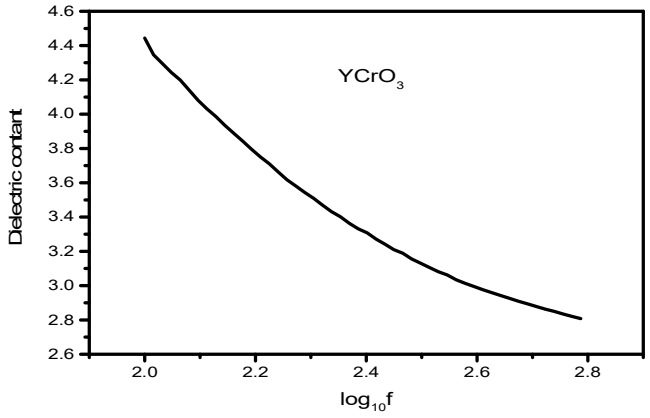
$YCr_{0.9}Fe_{0.1}O_3$= 40 Å nm

Sol gel- - **$YCr0_3$ = 30 Å nm**

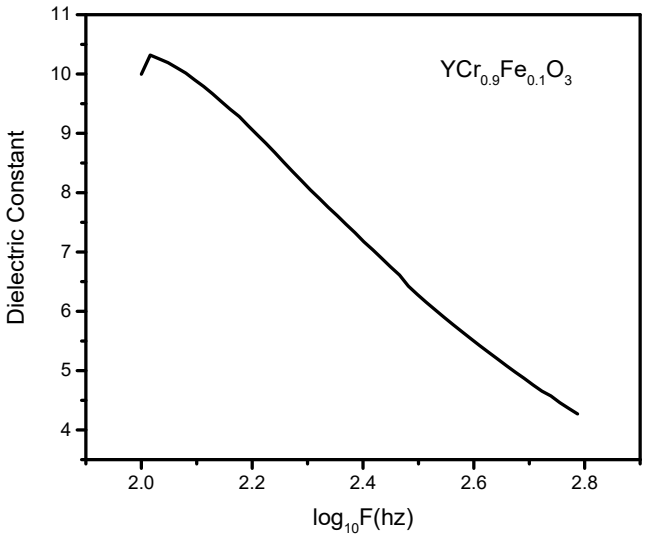
$YCr_{0.9}Fe_{0.1}O_3$= 32 Å nm

❖DIELECTRIC ANALYSIS

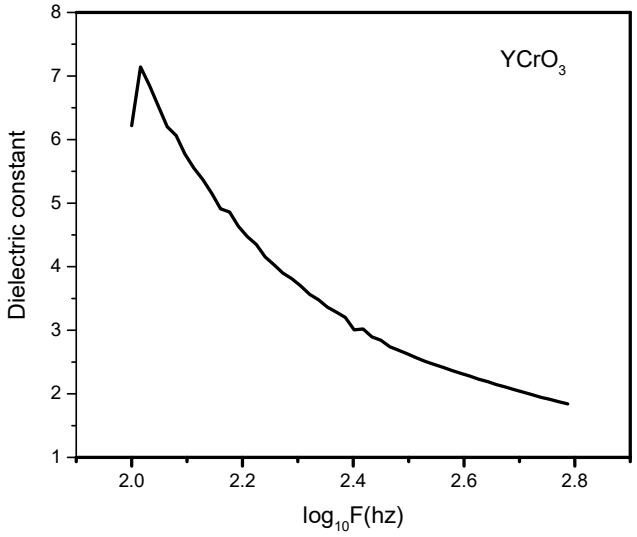
- **Dielectric contant vs frequency graph**



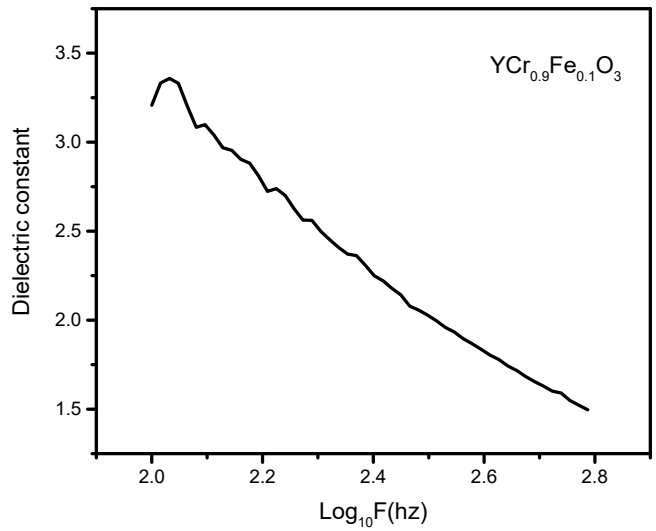
Graph-01:- solid state reaction($YCrO_3$)



Graph-02 :- Solid state reaction($YCr_{0.9}Fe_{0.1}O_3$)



Graph-03 :- Sol Gel Reaction($YCrO_3$)



Graph-04:- Sol Gel Reaction($YCr_{0.9}Fe_{0.1}O_3$)

The dielectric constant decreased rapidly with the increase in frequency. This decrease is due to the reduction of space charge polarization effect.

However at low frequency the dielectric constant is high . this is due to the presence of space charge polarization at the grain boundary which generate a potential barrier .

❖ CONCLUSION :-

From the above study it is concluded that due to the more homogenous and lower Particle size sample id prepare by sol gel method with respect to the conventional method (solid state method). Also the crystalline nature is increases.

By the doping we can see that the particle size is increase in both the methods.

Our sample show strong frequency dependent of dielectric constant.

Since the material has poor electrical conductivity and get the ability to store electric charge due to the phenomenon of dielectric polarization.

With the FE doping the conductivity increases.

❖ APPLICATION

- Interconnectors in solid oxide fuel cells(SOFS).
- High temperature electrodes.
- Catalytic converters.
- Sensors

❖ REFERENCE

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Govt. Holkar Science College Indore(M.P.)

Session- 2021-2022

An Internship Report On Primary School Teaching

Submitted To-

Dr. Unnati Bhayare

&

Dr. Rashmi Awad

Submitted By-

Monika Kayal

M.Sc. IVth sem [Statistics]

Enrollment no. - DS1713395

Declaration

I here by would like to declare that the internship report entitled "Primary School Teaching" is my own work under the guidence & supervision of "Dr. Unnati Bhayare" Head of Department of Statistics & "Dr. Rashmi Awad" Professor Department of Statistics.

This internship report represents entirely my own original work, except for the matter gathered from scholarly writing and it's guidence sought from supervisors which I duly acknowledge. I also declared that this work is not submitted elsewhere.

Acknowledgement

It is high time for me to express my deepest gratitude to "Sribal Public H. S. School" for giving me chance to complete my internship and having an unbelievable practical learning experience. It was indeed a pleasure to be part of such organization.

Also would like to express gratitude to "Dr. Unnati Bhayare" Head of Statistics department & "Dr. Rashmi Awad" Professor Statistics department and also "Yash Yadav sir" for their guidance and without their support I would not be able to complete a huge task of preparing this internship report within scheduled time.

Internship report is on essential part of M.Sc. program as one can gather knowledge by observing and doing the daily work at a organization.

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- What makes an ideal teacher
- Qualities of an ideal teacher
- Challenges of teaching
- A self evaluation of my teaching
- What I have learnt from this journey
- Conclusion
- References

Abstract

This report is based on the experience that I gathered during my internship at "Sribal Public H. S. School". I had high expectation for bringing out the best from the students and always tried to motivate the students. There were mix of different kinds of students. I tried to establish a good teacher-student relationship & understand each student. I always tried to maintain professionalism and a good relationship with colleagues.

This report is all about reflective practice, qualities of good and effective teacher, task-based teaching, selecting best method for teaching and some challenges & obstacles that I had during my internship and how did I overcome those ensuring a good and safe learning environment. Here, I talked about what I learnt from this journey and how I can use this experience in my future teaching.

Introduction

My first experience of teaching started at "Sribal Public H. S. School". I choose to do internship at a school where I have the opportunity to practice teaching. I have learned many new things during this journey, and I also tried my best to adjust with the new environment.

This journey of teaching has improved my communication skills, Patience, Confidence and intreast in learning new things. This journey was the best way to utilise the skills & knowledge that I have learned during my Post graduate study at "Govt. Holkar Science College", Indore (M.P.)

Luckily I got support of students and teachers of school which really had great impact on my internship journey.

An Ideal Teacher

An ideal teacher is a teacher that devotes themselves to teaching and building the career of their students. Students respect ideal teachers a lot, many students grow up to become successful and are still thankful to the teachers who motivated them to become better. They possess very good qualities like kindness, good knowledge about their subject, nice teaching style, motivating, helping, understanding, and many more.

To become a good teacher two elements are necessary: enthusiasm or the subject and a genuine interest in the personal, as well as professional well-being of the students. Good teachers who are actually committed to their students, take care of them strongly, and constantly support their students and prepare their students for facing their future confidently.

What Makes An Ideal Teacher

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Qualities Of
An Ideal Teacher

Teaching is the profession which is not for everyone it takes courage compassion and a ton of patience. Teaching needs the special kind of person to handle this awesome responsibility and following are the qualities of outstanding teacher.

1. Patience:- To be a Teacher, the most important thing is to have patience because this is the profession where you have to give time to make coordination with the students and where your strength increases gradually

2. Authority:- Always appreciate and respect the effort and make positive examples of your Students by directing, praise at those who demonstrate this virtue.

3. Excellent communication skills:- If a teacher's communication skills are good they can convey knowledge with better skill and results.

4. superior Listening Skills :- Great teachers listen hard and then use what they hear to improve the communication.

5. Deep knowledge and passion for the subject matter:- There is a saying that a teacher is only as good at what they know. If a teacher lacks knowledge in a subject that dearth of understanding is passed along to the students.

6. The ability to develop a strong relationship with students:- In order to create successful learning environment, great teachers need to be able to build caring relationship with their students.

Challenges Of Teaching

After parents, teachers have the most important role in a student life. They are the one who mould the character of their students and contribute to raising educated, Sane and responsible citizens of our country this makes teachers jobs valuable and significant as they have the opportunity to impact the lives of students and the future of the country. But at the same time this makes the teachers job challenging and full of responsibility. They come across many obstacles, hurdles and challenges.

- Following are the challenges faced by a teacher:-

1. Student's Behaviour:- Every student come from different strata of society and has a different family background therefore some students may exhibit troubled behaviour.

2. Heavy paperwork:- Reports, Ledgers, exam paper, test paper, assignment, project, certificate scoreboards, attendance sheet and a number of such other documentation is needed to be maintained by the teacher. It is a tiresome and long drawn out process.

3. Class size :- A number of students in the class can range anywhere between 40 to 80 students. Most of the time it is lost disciplining the class instead of teaching.

4. Health and Stress:- Hectic work may take a toll on their both physical as well as mental health. Teachers many times have to miss their lunch and bathroom breaks and are stressed with the amount of work that they have been assigned.

5. collaboration:- Teachers need to establish proper communication among themselves, students and parents to ensure a smooth functioning of a school.

A Self-evaluation Of My Teaching

An ideal teacher is a teacher that devo I always tried to have my expectation high and tried to make changes when necessary. It was a big challenge, but without such challenges they could not get the opportunity to try something new. I often tried to come up with new ways of learning that the students may find interesting. I made amendments in such a way that it could catch the level of the students and they could get inspired and motivated. I always tried to teach the students that failure does not matter. When they are trying something new, their try is the qctual success.

All these inspired them a lot and they appreciated these new ways of learnings. Hence, I think I was very much able to set the goal of high expectation inspiring and motivating the students.

I made the students understand the value of improvement and being competitive. I always motivated the students to learn more and more and find every possible ways to progress. There were some students who were meritorious and bright but they did not have enough motivation and enthusiasm. They even never tried to become better. I took the challenges of making them curious and enthusiastic. Some of the students changed and tried to make progress.

There were some students who talked unnecessarily & spoiled the environment of the class. For these kinds of students more efforts were given with more strictness which consumed more time and created problems for the whole class. Many students were not careful of what they wrote. So it was required to do something which could make them more attentive towards studies. For that I always looked at them while they work so that they become conscious and work without wasting time.

What I Have Learnt From This Journey

This journey was a big opportunity for me as I could learn many vital things needed in a professional life. First and foremost thing I learnt is being professional which includes many other aspects. I learnt how to go with the time management and work accordingly. And most importantly I learnt how to teach so many children at a time in a professional manner. I also learnt professional behavior in case of working with the colleagues and other stuffs of the school. I learn how to apply for job. This gave me the opportunity to understand this profession by having the experience of teaching. By doing the internship & study together I learnt how to manage work and study together. This taught me coordination of working with study. This was basically a practical experience of what I studied from all the courses I have done in my university. So this helped me to know how to actually work being a teacher. Overall it was a great learning experience for me.

Conclusion

Teachers act like a bridge for students for conveying education and it totally depends on the teachers how they perform this role. This is all I learnt from my experience being an intern teacher and I always tried to make progress and work accordingly so that my ways of teaching can keep a footprint in the student's life which may flourish further.

Students are the vital priorities for the teachers and it is required to deliver education with appropriate knowledge and skill of the teachers. Students have to be made up in such a way that their capabilities know no bounds. It is the teacher's contributions that influence the student's life. At the end I must say it was a difficult but very useful journey from where I learnt to think and act differently.

References

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- Educational leadership: Journal of the department of supervision & curriculum development

GOVT. HOLKAR SCIENCE COLLEGE INDORE

2021-22

Internship Project

Topic :- Plant tissue culture

Under Guidence of :- Ms. Jayshree sukhwani ma'am (Environmental & science (Training, consultancy of plant tissue culture and environment technology))

submitted to:-
Dr. Ravindra pal
sir
(Department of
zoology)

Submitted by:-
Deepika maru
M.sc. zoology
4th sem.

परियोजना कार्य का शीर्षक

Title of the project :

Plant tissue culture (Ocimum tenuiflorum)

Name of the class & section

M.S.c Zoology

4th semester

Name of the College

Govt. Holkar Science College Indore (M.P.)

Signature (student)

Deepika

Name (student)

Deepka Maru

Student Roll. No.

Enrollment No. 2037 18 S4015076

Signature (guide)

Name of the Guide

Dr. Govindra pal sir

ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my teacher Ravindra sir/ma'am as well as our Principal/ Rekha Agarwal who gave me the golden opportunity to do this wonderful project on the topic 'Plant tissue culture'.

This project helped me a lot in gaining adequate knowledge about the topic. I have completed this project after proper analysis and research and I came to know about so many new things.

I am really thankful to all of my friends, co-partners and guide .who have devoted their precious time in completing my project. Secondly, I would also like to thank my parents or guardians who helped me a lot in finishing this project within the prescribed time.

I am making this project project not only for marks but also to increase my knowledge and intellect development.

Thanks again to all who helped me.

■ विद्यार्थी के घोषणा–पत्र का फार्मेट (Format for Declaration of the student)

विद्यार्थी का घोषणा–पत्र

मैं ......Deepika Maru...... (विद्यार्थी का नाम) आत्मज/आत्मजा श्री/श्रीमती ......Bhagirath ji maru, Fulkunwar (अभिभावक/पालक का नाम) घोषित करता/करती हूँ कि संलग्न परियोजना कार्य मेरे द्वारा स्वयं पूर्ण किया गया है एवं मौलिक है। उक्त परियोजना कार्य मैंने प्रो./डॉ. ..Rajendra pal sir.. विभाग ..Zoology.. .... के मार्गदर्शन में पूर्ण किया है।

दिनांक : ....

स्थान : ...Indore

विद्यार्थी के हस्ताक्षर : ...Deepika...

नाम : ...Deepika Maru

कक्षा : ...M.Sc Zoology 4th sem.

अनुक्रमांक : ...201825 / DS2015076

पता : ...Nanak nagar near Bhalasan (Indore)

दूरभाष : ...7987722235

Declaration of the Student

I ....Deepika Maru son/daughter of ...Bhagirath maru.. certify that the project report entitled .... prepared by me is my personal and an authentic work under the guidance of ....Rajendra Pal sir............ (Zoology....)...... *(Name of Guide with Department).*

Date : ....

Place : ..Indore...

Signature of the Student: ..Deepika....

Name: ......Deepika Maru..........

Class: ...M.Sc Zoology.....4th sem.

Roll Number: ....201825..................

Address: .....Nanak nagar.........
..........Indore..............................

Contact Number: 7987722235

- **सर्वेक्षित संस्था के प्रमाण–पत्र का फार्मेट** (Format of the Certificate of the surveyed Institution)

सर्वेक्षित संस्था का प्रमाण–पत्र

प्रमाणित किया जाता है कि श्री/श्रीमती/कु. ....Deepika Maru.... *(विद्यार्थी का नाम)* ने अपने परियोजना कार्य को पूर्ण करने हेतु इस कार्यालय/संस्था में उपस्थित हुए। परियोजना कार्य के दौरान इनका कार्य एवं व्यवहार संतोषजनक रहा।

Environmental & Science Institute
(training, consultancy of plant tissue culture & environment technology)

हस्ताक्षर : .....

नाम : Miss. Jayshri

पद : Director

कार्यालय/संस्था : EVNT Indore

स्थान : Indore
दिनांक : 30/4/2022

Certificate of the Surveyed Institution

This is to certify that Mr./Ms. .....Deepika Maru..... *(Name of the student)* has visited our office/Institution for his/her project work. During the project work his/her work and behaviour was satisfactory.

Environmental & Science Institute
(training, consultancy of plant tissue culture & environment technology)

Signature: .....

Name: .....Miss. Jayshri

Designation: ...Director.....

Office/Institution: ..EVNT...Indore

Date: ..30/4/2022..

Place: ...Indore..

परियोजना कार्य की विस्तृत रूपरेखा का प्रारूप (*)
Proforma (*) for the detailed synopsis of the Project-Work

(Applicable only to the first & second semester of UG & PG classes)

1. परियोजना कार्य का शीर्षक : Plant tissue culture
(Title of the Project-Work)

2. पाठ्यक्रम **(Course)** का चयन करने के पीछे आपका क्या उददेश्य है ?

For improving my knowledge about Agriculture field.

3. रोज़गार/स्वरोज़गार, उच्च–शिक्षा, नौकरी इत्यादि क्षेत्रों में रोज़गार की संभावनाओं को खोजने की दिशा में आपके द्वारा किये गये प्रयासों का किसी एक विकल्प पर विस्तृत विवरण।

विकल्प से संबंधित निम्न आधारो पर बिन्दुवार विवरण :

(i) विकल्प का नाम : Plant tissue culture

(ii) विकल्प निम्नलिखित क्षेत्रों में किससे संबंधित है ?

(क) शासकीय/अर्द्धशासकीय
(ख) निजी
(ग) स्वरोजगार
(घ) सहकारी/गैर सरकारी संगठन

(iii) विकल्प का चयन करने में आपको किससे प्रेरणा मिली ?

Jayshree mam.
Site: environment and science technology (google site)

(iv) विकल्प के लिये न्यूनतम अहर्ताएँ :

शैक्षणिक : Graduate (B.Sc. Biotechnology)
Maru Science College Indore

तकनीकी : Seed technology, plantation, cryopreservation.

अनुभव : Attend Seminars, work in College Laboratories, Doing internship

(v) विकल्प के लिये अतिरिक्त/उच्च शिक्षा की आवश्यकताएँ :

M.Sc (Zoology) Holkar Science College

(vi) विकल्प के लिये प्रतियोगी परीक्षा/ट्रैनिग इत्यादि से संबंधित जानकारी :

—

(vii) विकल्प से संबंधित जानकारियाँ अर्जित करने के लिये आपके द्वारा सर्वेक्षित (विजिट की गयी) सरकारी/गैर–सरकारी/निजी संस्थाओं का नाम एवं पता :

1. Institute name :- environment and science technology
2. Address :- 195, 6 Lotus garden colony
3. tejajinagar Indore
4.

(viii) सर्वेक्षित (विजिट की गयी संस्थाओं से प्राप्त जानकारी/किये गये कार्यो का तिथिवार विवरण :

क्रमांक	दिनांक	संस्था का नाम	सम्पर्क किये गये व्यक्तियों का –		कार्य/प्राप्त की गयी जानकारी का संक्षिप्त विवरण
			नाम	दूरभाष	
1.	17/4	Environment and S. tech	–	–	Plant explant cutting
2.	18/4		–	–	Learn washing
3.	19/4	—"—	–	–	Learn media preparation
4.	20/4	—"—	–	–	Learn handling
5.	21/4	—"—	–	–	Learn plant tissue culture

(ix) विद्यार्थी द्वारा उपरोक्त विकल्प से संबंधित जानकारियाँ एकत्रित करने में किये गये विशेष प्रयासों का विस्तृत ब्यौरा (संदर्भ–सूची के साथ) :

First of all, I look for some special types of plants so that plant tissue culture can be done, then I collect various types of fruit for preparation of natural media. then I have done my experiment.

(x) उपरोक्त विकल्प क्षेत्र में भविष्य की चुनौतियाँ एवं संभावित उपाय :

There is no challenge in using natural substances, But plant tissue culture done on food items from unnatural may can spoil health in future, so stay away from unnatural way.

(xi) परियोजना अध्ययन के दौरान विद्यार्थी ने सैद्धान्तिक कक्षा अध्यापन एवं उसकी व्यावहारिक उपयोगिता के मध्य क्या अंतर पाया :

There is a little bit difference, Theoretical teaching increased knowledge but the same practical knowledge connects with reality.

(xii) उपर्युक्त बिंदु (xi) के संदर्भ में सैद्धांतिक अध्यापन से अन्य अपेक्षाएं :

.....

.....

विशेष टीप :

(अ) उपरोक्तानुसार वर्णित प्रारूप में आवश्यकतानुसार लिखने का स्थान (Writing space) बढ़ाया जा सकता है।

(ब) द्वितीय–सेमेस्टर में विद्यार्थी द्वारा किसी अन्य विकल्प के लिये उपरोक्तानुसार वर्णित प्रारूप में परियोजना कार्य का प्रतिवेदन (प्रोजेक्ट रिपोर्ट) प्रस्तुत किया जावेगा।

(स) द्वितीय–सेमेस्टर की प्रोजक्ट रिपोर्ट में निम्नानुसार तीन अतिरिक्त बिन्दु उपरोक्त प्रारूप में जोड़े जावेगें :

(xiii) प्रथम एवं द्वितीय सेमेस्टर में लिये गये विकल्पों का तुलनात्मक अध्ययन :

.....

.....

(xiv) विद्यार्थी द्वारा भविष्य की संभावनाओं एवं स्वयं की अभिरूचि को ध्यान में रखते हुए चयनित विकल्प का नाम :

Plant tissue culture

(xv) उपरोक्त विकल्प चयन करने का विस्तृत कारण :

I want to being progressive in Agricultural field.

.....

(*) *यह प्रारूप (Wordfile) उच्च शिक्षा विभाग की वेबसाइट www.mpgov.in/higher education से डाउनलोड किया जा सकता है।*

स्नातक षष्ठम एवं स्नातकोत्तर चतुर्थ सेमेस्टर
कार्यस्थल प्रशिक्षण प्रतिवेदन का प्रारूप

1. विद्यार्थि का नाम – Deepika Maury कक्षा- M.Sc. Zoology 4th sem.
2. पिता का नाम - Bhagirath ji maury
3. महाविद्यालय का नाम - Govt. Tilkar science College Indore
4. विद्यार्थी का पता एवं दूरभाष क्रमांक -
   (निवास एवं मोबाइल नंबर) - Nanak nagar near Bhalaram Indore, Mo.No. 7987722235
5. शिक्षक निर्देशक का नाम - Rajendra pal Sir
6. कार्यस्थल प्रशिक्षण संस्था का नाम/पता एवं दूरभाष क्रमांक - Environmental and science foundation / 7509990842
7. सर्वेक्षित (विजिट की गयी संस्थाओं से प्राप्त जानकारी किये गये कार्यो का तिथिवार विवरण -

क्रमांक	दिनांक	संस्था का नाम	सम्पर्क किये गये व्यक्तियों का		कार्य/प्राप्त की गयी जानकारी का संक्षिप्त विवरण
			नाम	दूरभाष	
1	17/4/22	environmental & science fou.	Jayshree mam	7509990842	Leafy explant cutting
2	18/4/22	—11—	Jayshree mam	7509990842	Learn media preparation
3.	19/4/22	—11—	Jayshree mam	7509990842	Learn plant tissue culture

8. प्रगति विवरण-
   (अ) प्रशिक्षण के दौरान सौंपा गया कार्य- explant cutting, media preparation
   (ब) पूर्ण किया गया कार्य - plant tissue culture
9. संस्था द्वारा निर्धारित प्रतिनिधि/संस्था प्रमुख द्वारा विद्यार्थी के संबंध में आकलन
   (अ) समय की पाबंदी- Present on time
   (ब) वेशभूषा एवं व्यवहार - excelent
   (स) संस्था के नियमों का पालन- Yes, she's doing
   (द) आवंटित कार्य के प्रति निष्ठा - Yes
   (इ) संवाद/संप्रेषण क्षमता- excellent
   (ई) व्यक्तित्व में किस प्रकार के सुधार की आवश्यकता है तथा विद्यार्थी द्वारा इसके लिये किये गये प्रयास सुधार की प्रगति - No need to improvement
   (उ) आवंटित कार्य के प्रति जिज्ञासा/सीखने की क्षमता/किये गये कार्य की प्रगति - excelent
10. मैं यह प्रमाणित करता हूँ कि विद्यार्थी.....Deepika Maury.....(पूरा नाम) द्वारा मेरी संस्था मेरे संपर्क में न्यूनतम 60 घंटे की उपस्थिति दी है।

Environmental & Science Institute
(training, consultancy of plant tissue culture & environment technology)

हस्ताक्षर
संस्थाप्रमुख/प्रतिनिधि

स्नातक षष्ठम एवं स्नातकोत्तर चतुर्थ सेमेस्टर

महाविद्यालय का नाम : शासकीय होलकर विज्ञान महाविद्यालय,इन्दौर (म.प्र.)
छात्र छात्रा का नाम : Deepika Rawat
कक्षा एवं विषय : M.Sc. Zoology 4th Sem.
कार्यानुभव की विधा : Plant tissue culture
प्रशिक्षण संस्था का नाम : Environmental and Science Technology
निर्देशक प्रशिक्षक का नाम : Tanushree Verma
निर्देशक प्राध्यापक का नाम : Ravindra Pal sir

कार्यानुभव प्रशिक्षण दैनिक उपस्थिति

क्र.	दिनांक	छात्र/छात्रा के हस्ताक्षर	प्रशिक्षण के हस्ताक्षर	क्र. दिनांक	क्र. दिनांक	छात्र/छात्रा के हस्ताक्षर	प्रशिक्षण के हस्ताक्षर
1	17/4/22	Deepika		20			
2	18/4	Deepika		21			
3	19/4	Deepika		22			
4	20/4	Deepika		23			
5	21/4	Deepika		24			
6	22/4	Deepika		25			
7	23/4	Deepika		26			
8	24/4	Deepika		27			
9	25/4	Deepika		28			
10	26/4	Deepika		29			
11	27/4	Deepika		30			
12	28/4	Deepika		31			
13	29/4	Deepika		32			
14	30/4	Deepika		33			
15	1/5	Deepika		34			
16				35			
17				36			
18				37			
19				38			

Environmental & Science Institute
(training, consultancy of plant tissue culture & environment technology)

Synopsis

1) Introduction

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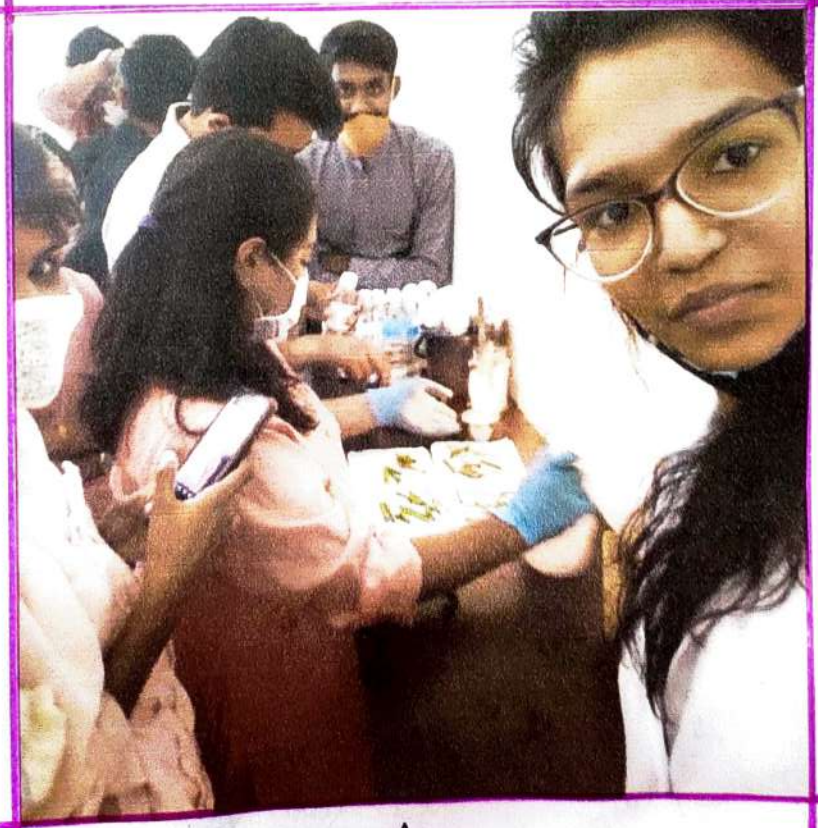
plant tissue culture
(Ocimum tenuiflorum or Basil)

Lab work



our team

I. INTRODUCTION

1.1 PLANT TISSUE CULTURE

Introduction: - Plant tissue culture is the most promising technique of plant biotechnology. Tissue Culture via Micro propagation is evolving on an economical scale as an alternatives method to the vegetative propagation of plants. It has a vast application in research, agronomical, industrial field as well as commercial level. Plant tissue culture is an in-vitro aseptic technique that involves growing plant cells, tissues, organs, seeds, or whole plants under controlled nutritional and environmental conditions often to cell multiplication, regeneration, or clones of the plant. It is also referred to as" **in-vitro, axenic or sterile culture"**

GOTTLIEB HABERLANDT is excusably recognized as the**" Father of Plant Tissue Culture" (1902)**. He also established the concept of totipotency The principle of plant tissue culture depends upon:-

1. Totipotency: - It relies on the fact that any plant cells have the ability to regenerate into a whole plant.

2. Plasticity:-It is the capacity of plants to alter their metabolism; growth and development to best suit their environment.

Plant tissue culture is widely used to develop clones of a plant in a process known as Micro propagation. This technique is being broadly employed for large-scale plant multiplication, mass propagation, diseases elimination, and the synthesis of secondary metabolites. Further, it currently provides a tremendous opportunity in the area of plant genetic improvement, somatic hybridization, germplasm storage, and cell suspension culture.**Tissue culture designs three fundamental process of plant regeneration: -**

i.Micropropagation via augmented accretion or multiplication of axillary buds.
ii.Organogenesis (The process of differentiation that leads to the creation of plant organs like roots, shoots, flowers, or other plant organs)
iii.Somatic embryogenesis (It is the artificial process where a plant or embryo is derived from a single somatic cell and has a bipolar structure.)

1.2. APPLICATION OF PLANT TISSUE CULTURE: -

P.T.C has been used in almost all the fields of Biosciences, Industrial and Agronomical field, and Crop improvement, so on.

A) Micro propagation along with generating disease-free plants or improved plant production and quickly multiplication of endangered species or genotype such as aromatic and medicinal plants.
B) Production of Phyto-Pharmaceuticals and Secondary metabolites. E.g. Caffeine from Coffea arabica or Nicotine from Nicotiana rustica
C) Development of Synthetic seed and Germplasm conservation, Somaclonal metabolites, moreover genetic transformation of sorts of species
D) Production of economical valuable chemicals by plant tissue culture which is not possible by other chemical methods.

E) Plant improvement by the production of somaclonal and gametoclonal variants and study of plant decays and their elimination.
F) Cross pollinated crops such as coconut, eucalyptus, oil palm, etc resist true-to-type plants via seed. Tissue culture can be utilized to control this crisis and produced genetic uniformity in cross-pollinated crops.
G) Seed culture can be used to propagate orchids on a large scale and Embryo culture can be utilized to generate inter-specific or inter-generic hybrids, as well as overcome embryo abortion or post-fertilization obstacles and shortened breeding cycle. Ovary culture is effective for analyzing the physiology of fruit development or progress.

1.3. HISTORICAL PROGRESS OF PLANT TISSUE CULTURE:-

The history of plant tissue culture embark with the concept of cell theory by Schleiden (Plants in 1838) and Schwann (Animals in 1839) which established that all the living things were made up of cell and cells is the basic structural and functional unit of life, Furthermore, cell arises from pre-existing cells. Founded on this theory, a German plant physiologist, Gottlieb Haberlandt (1902) formulated the conceptual foundation for p.t.c on his single cell culture or differentiation studies. He worked with palisade cells, pith cells, stamen hairs, or stomatal guard cells cultured in a simple organic enriched with sucrose under sterile condition but this experiment was an entire failure due the cells failed to divide but managed to survive for assorted weeks. He failed to comprehend the meristematic cells of the plant body are heterotrophic and the dedifferentiation of cells into meristematic state needs the presence of plant growth regulators.

Haberlandt was justifiably designated as the "FATHER OF PLANT TISSUE CULTURE", based on his worked and he also established the concept of totipotency. Furthermore, he implied that the process of culturing isolated plant cells in a nutrient solution approves the scrutiny of vital issues using a novel experimental strategy.
Later, several types of research evolved in p.t.c and among the most significant findings are illustrated as follows in table 1:-

S.No.	Name of Scientists and Year	Discoveries
1.	Hanning (1904)	He cultured embryos from several species of cruciferous.
2.	Kolte & Robbins (1922)	He successfully cultured of root & stems tips in vitro and established meristematic tissue concept.
3.	Fritz Went (1926)	He discovered first plant growth regulator-(IAA).
4.	White (1934-37)	Successful cultured & introduced vitamin B as growth Supplement media in tomato root tips.
5.	Gautheret, White & Nobecourt 1939)	Established of continuously proliferation of callus culture.
6.	Van Overbeek (1941)	Use of coconut milk for cell division in Datura.
7.	Ernest ball (1946)	Regenerated whole plants of Lupinus by shoot tip culture.
8.	Muir et al (1954)	Developed plant from single cell in suspension culture.
9.	Miller et al (1955)	Discovery kinetin as cell division hormone.
10.	Miller & Skoog (1957)	Concept of hormonal control of organ formation by changing the ratio of auxin: cytokinin.

11.	Reinert & Steward(1959)	Regenerated somatic embryo from callus clumps of carrot by cell suspension culture and generate whole plant from Somatic embryo and also proved the concept of totipotency.
12.	E.Cocking (1960)	First to isolate protoplast by enzymatic degradation of Cell wall.
13.	Bergmann (1960)	Filtered of cell suspension and isolated single cells by plating.
14.	Murashige and Skoog (1962)	Developed a culture medium with desired salt concentration. It is known as MS nutrient medium.
15.	Guha & Maheshwari (1964)	Production of first haploid plant of Datura from anther culture.
16.	Power et al (1970)	First achievement of protoplast fusion.

Table 1.1 Represent scientist and their landmark discoveries in plant tissue culture

1.4. MICROPROPAGATION: -

Micro propagation is the process of multiplying stock plant material to produce a large no. of genetically cloned cultivars with short texture & faster production, to reduce callus production and obtain stronger roots, making the acclimatization step easier as well as preserve genetic uniformity of cultivar. The resulting clones are true to the type of the selected genotype .Explants can be used to produce 100s to 1000s of plants in a continuous process over a relatively short period & space under controlled conditions. Any segment of the plants such as a leaf, apical buds, shoot or flower, etc is k/n as explants.

Features of Micro propagation :-

a) Clonal mass reproduction and Disease free plants can produce.
b) Seedless-like plants (bananas) can also be developed.
c) Multiplication stages can be recycled to develop an endless no. of clones.
d) Sexually sterile species like aneuploids, triploids which cannot be perpetuated by seeds.

Stages of Micro propagation:-

S.No.	Micro propagation generally involves five stages:-
1.Stage 0	Preparative stages.
2. Stage I	Initiation of culture.
3. Stage II	Multiplication of shoot and rapid somatic embryogenesis.
4. Stage III	Rooting and Acclimatization.
5. Stage IV	Transplantation

Table 1.2 Shows the stages of Micro propagation

1. Stage 0: Preparative: - In the preparative stages, selection and maintenance of mother plants should be thrived for three months under sterile environment to furnish quality explants & eliminate contamination for better establishment of aseptic culture in stage I.

2. Stage I: Initiation of Culture: - In this stage, selection of explants with surface sterilization or reduce the browning issue of some species and provide sterile explants. Then, the establishment of a culture or transfer explants in a suitable nutrient medium The quality of explants relies on the techniques of in-vitro propagation. For clonal propagation, nodal section, apical or axillary buds are best .

3. Stage II: Multiplication stage: - This is the most critical stage as that is where the majority of micro propagation defects occur . It occurs in a defined culture medium with shoot simulating hormones and proliferation or multiplication of shoots as well as abrupt somatic embryo formation from the explants. It involves three phases :-

a) Through callusing b) Adventitious bud formation c) Enhanced axillary branching

4. Stage III: Rooting and Acclimatization stage: - To stimulate rooting and the speedy growth of robust root growth by transferring regenerated shoots or somatic embryos to a rooting medium. Then, follow acclimatizing step, in-vitro plantlets are hardened into greenhouse or mist chamber under desirable and aseptic conditions. After hardening, plantlets are ready for planting in the field

5.**Stage IV: Transplantation:** - Lastly, plantlets are establishing in soil, potting mixture, or open field. A variety of potting mixtures and their combination are used for transplantation such as peat, vermiculite, prelate, coco peat, sand, well compost mixture, etc . In some species, Stage III is skipped & un-rooted stage II shoots are directly planted in the potting mixture.

Merits and Demerits of Micro propagation

S.No	MERITS	DEMERITS
1.	Clonal mass propagation.	Expensive laboratory and expertise needed.
2.	Introduction of new cultivars & Disease-free plants produce.	Chance of somaclonal variation.
3.	It can be stored for a long duration by cryopreservation.	Plants neither autotrophic & some cases Poor rooting or acclimatization occurs.
4.	The breeding cycle reduces and storage germplasm.	In adult woody plants, easily not regenerated or propagated.
5.	Vegetative propagation of sterile hybrid employed as parent plants for seed production. e.g. Cabbage	Protocols are not optimized for all species.

1.5. STERILIZATION: -

Sterilization is a process used for elimination of any contamination or microbial agents and to maintain an aseptic environment during the in-vitro culture of plants cells or tissues. In Tissue Culture Laboratory includes different kinds of materials like vessels, instruments, medium; culture room, etc., used in culture work must be freed from microbes to achieved success in plant tissue culture.

There are the following approaches used for sterilization such as and their application can be shown in fig.2

a) Dry heat treatment
b) Autoclaving
c) Filter sterilization
d) Surface sterilization
e) Wiping with 70% ethanol
f) Fumigation

Table 1.3 Represent sterilization and their application

S.No.	STERILIZATION	APPLICATION
1.	DRY HEAT STERILIZATION	i. It's the most effective method, entails disruption of enzymes or other cell constitute but barely thermo-stable products are utilized & dry heat should be 160-180 0C up to 2-4 hrs. ii. It includes Flaming, Red heat & Hot Air ovens. iii. E.g. glassware, metallic instruments, media and reagents, etc.
2.	STEAM STERILIZATION (AUTOCLAVING)	i. It's most efficient or feasible method & sterilized steam under pressure up to 121-134 0C at 15 PSI for 20 to 40 min. ii. E.g. Media, Culture vessel, glassware or Plastic wares, contaminated cultures.
3.	FILTRATION STERILIZATION	i. Fail to kills but discards germs. It is employed to both clarify and sterilize liquids & gases. It can prohibit the passage of either viable or non-viable particles. ii. HEPA filters can remove up to 99.97% of particles > 0.3 micrometers in diameter & used for chemical, hormones, vitamins solution.
4.	SURFACE STERILISATION	It can be achieved using different disinfectant or chemical reagents like NaOCl, Hgcl2, C2H4O, O3, Antibiotics, etc.
5.	WIPING WITH 70% ETHANOL	The surface of laminar airflow cabinet or other area sterilized by wiping them with 70% alcohol.
6.	FUMIGATION	Its gaseous sterilization is achieved by using ethylene oxide, formaldehyde, etc act as biocidal agents.

1.6. CULTURE MEDIUM: -

The composition of medium for the in-vitro culture is the vast significant aspect in the thriving culture of plant cells. Explants or organs will only grow in-vitro on a suitable artificial nutrient medium and provide support or nutrition for growth and proper development of the cultured tissues is known as a **culture medium.** There are two types of media : - Natural media (A media contains natural or chemical undefined composition) and Synthetic media (A media contain chemical or synthetic defined components).

MAJOR TYPES OF MEDIA:-

S.No.	MEDIUM	USES
1.	WHITE'S MEDIUM	i. By white (1963) & the earliest plant tissue culture media. ii. It is used for root, ovule, or callus culture and consists of a lower and higher salt concentration of MgSO4.
2.	MS MEDIUM	i. By Murashige and Skoog (1962) .It is the most widely used medium for all types of culture. ii. It is used for organogenesis; plant regeneration. It contains desired salt concentration.
3.	B5 MEDIUM	i. By Gamborg et al. (1968). ii. It is used for cell suspension, callus culture, and modified form used for protoplast culture & contains a higher amount of ammonia and nitrate ions.
4.	N6 MEDIUM	By the Chu for cereal anther culture and Nitsch & Nitsch (1969) used for anther culture and contains low salt concentration.
5.	WPM MEDIUM	By Lloyd & McCown (1981). It's known as a modified woody plant medium and used for tree species and contains very low salt concentration.

Table 1.4 Shows Major Type of Media

Composition of media: - It is mainly dependent upon –The particular species of the plant and type of explants used for culture such as tissue, organs, cells, etc. A standard basal or culture medium is generally composed of a well-balanced composition of nutrients such as inorganic nutrients, organic supplement, carbon or energy source, Other media factors, and Solidifying agent.

1. Inorganic Nutrients: - It plays an essential role in the growth and development, nutrition of in-vitro plants. It consists of macronutrients and micronutrients. A macronutrient is required in a larger quantity than 0.5Mm/l and includes six major nutrients such as nitrogen, potassium, phosphorus, calcium, magnesium, and sulfur which are essential for plant growth and morphogenesis. Micronutrients are needed in lesser quantity than 0.5Mm/l and consist of boron, copper, iron,

manganese, cobalt, zinc, nickel, iodide, so on which are crucial for growth tissue and lacking microelements exhibits deficiency like pigmentation, chlorosis, absence of vessels, etc. The elements and their functions show in the table 1.5

2. Carbon or Energy Source: - Cultured tissues in culture medium absence autotrophic potential and require an external source of energy (13). Sucrose is the favorable carbon source in culture media because it is an affordable source and acts as a good osmotic stabilizer. Sucrose is partial hydrolysis into glucose & fructose during autoclaving. Aside from sucrose, other carbohydrates such as maltose, glucose, sorbitol, raffinose, lactose, starch, and galactose are rarely utilized.

ELEMENT	FUNCTION
1. Nitrogen	Its plays a vital role in growth and differentiation and also a component of proteins, a nucleic acid.
2. Phosphorus	Crucial in photosynthesis & vital in meristematic tissue.
3. Potassium	Required for cell division& assists in the synthesis of carbohydrate, protein and chlorophyll pathways.
4. Calcium	Assists in cell wall synthesis & root or leaf growth.
5. Magnesium	Enzyme co-factors of Chlorophyll, photosynthetic cycle.
6. Sulfur	Nodules formation & chlorophyll synthesis.
7. Iron	Essential for cell division, respiration & chlorophyll.
8. Manganese	Assists in Cell elongation, photosynthesis, respiration, Growth hormones & enzymes control
9. Boron	Regulate cell elongation or division & lignin biosynthesis.
10. Copper, Zinc, and Molybdenum	Enzyme cofactor, chlorophyll biosynthesis, nitrate reductase.

Table 1.5 Represent elements and their function in plant growth

3. Organic Supplements: -

Vitamins- Vitamins are required by plants as a catalyst in various metabolic processes and optimal for cell growth. The most often used such as thiamine (vitamin B1), nicotinic acid (B3), pyridoxine (B6), B5, biotin ,ascorbic acid, riboflavin, vitamin E & Inositol or Myo-inositol

Amino acids: - It is essential to stimulate cell growth and substitution of augmentation of nitrogen supply which is usually uptake for protein synthesis .it consists of glycine, arginine, cysteine, glutamine, and tyrosine, so on. Glycine is the most commonly used amino acid

Other Organic Supplements:-It includes organic extracts like coconut milk, yeast & malt extract, banana juice and antibiotics, activated charcoal, etc. Activated charcoal (PPVP, Ascorbic or citric acid, polyphenol) is used as a detoxifying agent and removed browning or inhibitory compound present in the culture
medium

4. Plant growth regulators: - It is a synthetic compound that exhibits hormonal activity which influences growth, differentiation, or organogenesis of culture tissue on a culture medium. There are four major PGRs used in tissue culture such as auxins, cytokinin, gibberellins, ABA

Auxins: - It promotes cell division & differentiation, elongation and stimulates rooting. It can also initiate shoots & internodes, apical dominance, induce somatic embryogenesis, etc. The frequently used auxins are IAA, IBA, NAA, 2, 4-D. IAA is a naturally occurring compound and the rest is synthetic compound and dissolved in either ethanol or NaOH or KOH.

Cytokinins: - It stimulates cell division, induces shoot proliferation or differentiation of adventitious or axillary shoots, and also has the capacity to alter apical dominance. Kinetin, Zeatin, BA, BAP, 2ip, etc are the most frequently used cytokinins. BAP is an extensive preferably employed cytokinin because shows higher shoot development and dissolved in dilute HCl or NaOH /KOH

Auxin-Cytokinin Interaction: - Generally, the ratio of these two hormones determine plant development and determination:-

1) ⬆ Auxin ⬇ Cytokinin = Root Development
2) ⬆ Cytokinin ⬇ Auxin = Shoot Development
3) Auxin = Cytokinin = Callus Development

Gibberellins and Abscisic acid:- Both are slightly used PGRs where Gibberellins are used for elongation of internodes & meristem or callus growth, elongate dwarfed plantlets, so on and dissolved in cold water. ABA is either stimulates or inhibits callus formation based on the variety but only effective in embryo culture or somatic embryogenesis.

5. Solidifying Agents: - gelling or solidifying agents are used for preparing semisolid or solid T.C media (13). Agar is the preferred solidifying agent because it is inert and obtained from seaweed (red algae-Gelidium, Gracilaria). The optimum concentration of agar employed from 0.5-1.0 % to solidify the medium. Higher conc. of agar hardens the medium and hinders the diffusion of nutrients into tissues. Other gelling agent-Gelatin, silica gel, etc are used as a substitute for agar.

6. pH: - It has an impact on ions absorption and also solidification of gelling agent . The optimum pH for culture medium is 5.6-5.8 suitable for in-vitro growth of explants . At pH above 7 & below 4.5, stop growth and development in culture and below 5 will not gel properly and pH above 6 may be too hard .

1.7. Factors influence of P.T.C:-

1) Genotype or variety of plant material
2) The selection of explants
3) Medium – nutrients, growth regulators, and other additives
4) Culture environment: - temperature, relative humidity, and light

II. MICROPROPAGATION OF TULSI (Ocimum tenuiflorum or sanctum)

2.1. INTRODUCTION: -

Ocimum tenuiflorum belongs to the family Lamiaceae. It is renowned by 390 different names and commonly known as **"O. sanctum, Holy Basil, or Tulsi"**. It is an aromatic, herbaceous, annual, or perennial shrub and an edible herb up to 30-60cm tall that grows in a low bush . It has been used for decades for culinary and medicinal purposes. The genus Ocimum comprises above 150 varieties of species widespread in the temperate and semi-tropical regions of the Asian continent. Moreover, O.sanctum is a vastly important species in the genus. India is the world's leading producer of restorative plants. There is an enormous need for these plants to expand for therapeutic or revitalize purposes. Tulsi is native to India and particularly renowned for its spiritual or therapeutic uses in Ayurveda, Siddha, and Unani, as well as Greek, Roman, and other traditional systems. Tulsi is revered and regarded by Indians as a sacred herb. Tulsi (O.sanctum) is recognized in Ayurveda as the **"Mother Medicine of Nature"**, the **"Unrivalled Sole"**, further regarded as the **"Panacea of Life"** and thought to endorse lifespan. It is also known as the **"Queen of Herbs"** due to its robust adaptogen, attractive flesh color, aroma, astringent flavor, essential oils, and well-balanced nutritional makeup of minerals, Phyto-constituents, and several health-promoting metabolites and pharmacological activities. The entire part of the plants has beneficial value and cures various health ailments. Later, it has evolved as a supplementary essential crop worldwide due to its superficial nutritional and therapeutic importance. Ocimum sanctum (Tulsi) consists of three variants, including Sri or Rama Tulsi (Green leaves), Krishna Tulsi (Dark Green to Purple leaves), and Vana Tulsi (Green leaves but the plant grows in the wild).Furthermore, Rama and Krishna Holy Basil possess comparable correspondingly photochemical and medicinal properties.

TAXONOMICAL CLASSIFICATION:

KINGDOM	PLANTAE
DIVISION	Magnoliophyta
PHYLUM	Spermatophyta
SUB PHYLUM	Angiospermae
CLASS	Dicotyledonae
ORDER	Lamiales
FAMILY	Lamiaceae
GENUS	Ocimum
SPECIES	O.tenuiflorum
BINOMIAL NAMES	Ocimum tenuiflorum, O.sanctum
COMMON NAMES	Sacred Basil, Holy Basil(English), Tulsi(Hindi), Thai Tulsi(Thai), Tulasi, etc.

2.2. ORIGIN, DISTRIBUTION, AND CULTIVARS:

Origin: - The term Ocimum means "aromatic" and tenuiflorum means "slender or small flower". It's primarily of Asian origin and is regarded as indigenous to India, along with parts of northeasterly Africa, Hainan Island, as well as Taiwan. It has been used for culinary and therapeutic purposes for over a century. In India, tulsi are idolized and grown in pots in forts and temples to purify the spirit or body. Depending on its location, it is called by unique names such as tulsi, Tulasi, Kala tulsi, Talasi, Vanda, and so on. Later, it was renamed O.sanctum due to the holy stature of the plant. It was later introduced in Bella Espinosa (1881), Puerto Rico (1855), and Cuba (1909), where it was identified as O.americanum as well as O.sanctum. It was introduced in Northeast Brazil (1970), Columbia, and Mexico (1936). Afterward, it is cultivated globally due to its miracle properties.

Distributions: - The genus Ocimum sanctum is primarily found in tropical and semi-tropical regions of the Southeaster Asian area. In India, ranging from Andaman and Nicobar islands to the Himalayan region at an elevation of up to 1600-1800 meters height above sea level. It is extensively cultivated and distributed worldwide including Nepal, Malaysia, Iran, Egypt, Sri Lanka & Thailand, Morocco, France, Hungary furthermore as some parts of Central & South America, Africa, the Oceania region, and therefore the Arab countries .

Cultivars: - The genus Ocimum consists of approx. 60 to 150 unique varieties of species worldwide. Its foremost widely used and cultivated varieties and can be classified into two groups: Holy Basil (O.sanctum) And Mediterranean Basil (O.basilicum).

A). Holy Basil (O.sanctum):- In India, it's popularly called Tulsi and is the most venerated houseplant where it is attributed to Ayurveda along with the Hindu religion because of the goddess of prosperity, wellbeing, and vitality. It is the powerful therapeutic and nutritional value and is additional known by different names as Rama & Krishna (Sanskrit), Tulsi (Marathi), Trittavu (Malayalam), Holy basil (English), etc. There are four species popular of Holy basil: **O.Sanctum** (Rama Tulsi), ***O. Gratissimum*** (Vana Tulsi), **and O.tenuiflorum** (Krishna or Amrita Tulsi).

B). Mediterranean Basil (O.basilicum):- It is a vastly favored and consumed a variety of basil which is employed in several kinds of culinary cuisine; furthermore it's also cultivated globally like Asia, America, Africa, and Europe. It is also renowned as Sweet basil or commonly named such as "King of Herbs", Royal Herb, and so on. There is various sorts of Mediterranean basil: - **O.basilicum** (Sweet or Purple basil), **O.tyrsiflora** (Thai basil), **O.citriodorum** (Lemon basil), **O.cinnamon** (Vietnamese basil), O.americanum (American basil), **O.kilimandscharicum** (African blue basil), **O.angustifolium** & **burchellianum** Benth. , **O. camphor** and so forth.

2.3. BOTANICAL DESCRIPTION:-

O.sanctum grown to a height of 30 -70cm on a fragrant bushy shrub, erect, much-bifurcate with red or purple sub-quadrilateral branches with softly hairs stem. It prefers rich loam and alkaline to moderately acidic soil along with a high humid and temperate climate. Leaves are green to greenish-brown with a strong scent and fragrant texture, 2-5 cm long & 1-3cm wide, simple & opposite arrangement, ovoid, elliptical, acute or denate & serrate margins, thin but fleshy, both surfaces on pubescent and tiny gland-dotted with long slender, hairy petiole up to 2.5cm. Flowers are tiny white- purplish in prolonged

raceme about 15-20cm forming verticillate floret, stamen elongate bracteoles with 3mm diameter broadly ovated & slight calyx tube, bilabiate corolla up to 4mm and upper pair with a small bear appendages at the base. Fruits or nut lets are small, reddish-yellow in color, broadly ellipsoid or sub-globosely up to 1.26mm, and also aromatic odor and sharp. The plant is bitter and pungent. The average weight, shape, color, texture height, fragrance, leaf color of the Ocimum may vary depending on the varieties.

2.4. NUTRITIONAL, CHEMICAL COMPOSITION, AND PHYTOCONSTITUENTS ACTIVITY:-

O.sanctum is considered to be extremely nutritive as well as therapeutic value. In other words, it has evolved into a super food or multifunctional as compared to other herbs. It is comprised of nutrients such as vitamins, mineral salts, carbohydrates, protein, fibers, folate, as well as various phytoconstituents or bioactive compounds. In particular, a wide range of major secondary metabolites and a good amount of volatile or essential oils that helps in numerous ways. The Holy Basil (tulsi) is a highly beneficial and healing herb due to its high level of vitamin A, vitamin K, as well as an abundance of vitamin C, vitamin B1, B2, B3 (Thiamine, Riboflavin, Niacin), and B5 (Pantothenic acid), B6, folate (B9), and minerals such as Phosphorus, Potassium, Manganese, Calcium, Magnesium, Copper, Iron, Sodium, and Zinc, along with strong antioxidant properties. Alkaloids, Flavonoids, Tannins, Terpenes, Glycosides, Saponins and Phenolic compounds are major secondary metabolites found in holy basil. It has also shown different biological or Pharmacological properties, including Antioxidants, Anti Allergic, Anti Inflammatory, Anti-diabetic, Anti-ulcers, Anti-microbial, Anti-fertility, Anti-stress, Antipyretic, Anti-coagulant, Anti-cancer, Antispasmodic, Anti-viral, Expectorant, Hepatoprotective, Immunomodulatory effect, Mosquito-repellent, Neuroprotective, Radioprotective, Cardiovascular protective effects, and so on.
To illustrate, the secondary metabolites play a significant role, such as **phenolic compounds** (Apigenin, Rosmarinic acid, and Cirsimarithin) and their derivatives act as anti-oxidant & anti-inflammatory, cardio-protective and anti-stress, anti-ulcer, anti-viral activity, etc. **Flavonoids** act as protection against radiation-induced chromosomal damage in human blood lymphocytes. **Antioxidants** help to prevent cell damage that can lead to cancerous conditions.

Phytochemical Constituents:- The entire parts of the plant (O.sanctum), like leaves, roots, seeds, contain different kinds of phytochemicals and essential oils, also contain numerous bioactive and therapeutic values(1). The leaves contain different kinds of essential or (0.7%) volatile oil comprising about 71% eugenol, and 20% methyl eugenol, Benzaldehyde, Camphor, Carvacrol, D-Limonene, Eucalyptol, Eugenol, Furaldehyde, Germacrene, Oleic acid, Phytol, and sesquiterpene, hydrocarbon caryophyllene α-(thujene,nonane , octane) , α & β-(pinene ,toluene, lactate,ethylbenzene, iedol, cadiene), α-(terpeneol ,humulene ,murolene ,cubebene, guaiene) & β-(elemene,caryophyllene ,bourbonene) , α & β (selinene, borneol,11alamine ,elemol), and linalool so on. The O.sanctum extract of leaves and aerial parts yields aesculin, apigenin-7-O-glucuronide, Acid(galuteolin,circireol,caffeic,procatechuic, chlorgenic, or gallic acid), galuteolin,luteolin-7-O glucuronide , molludistin ,stigmasterol,vitexin , vallinin, and luteolin, Urosolic acid , along with some phenolic compounds (cirsilineol, circimaritin isothymusin, apigenin and rosameric acid ,eugenol)as well as flavonoids (orientin and vicenin). It also yields fixed oil from seeds which consist of fatty acid (17.82%), hexourenic acid, Linolenic acid(66.1%), Oleic acid(9%), palmitric acid

(6.9%), stearic acid and sitosterol. The fixed oil content of seeds varies depending on their geographical origin (8). It also contains aromatic compounds (eugenol, methyl chavicol). For instance, **volatile oil (Eugenol)** has antimicrobial, anticancer, anti-inflammatory, anti-diabetic, cardio protective, hypolipidemic, or hepatoprotective properties. **Carvacrol** has antioxidant, anti-insecticidal, anticancer, and antibacterial properties. **Ursolic acid** is an antitumor, antimicrobial, antiviral, anti-inflammatory, antiulcer, antihyperlipidemic, and hepatoprotective agent. **Linalool** is antibacterial, antiviral, antifungal, and anticancer properties. **Caryophyllene** functions as an anticancer and antioxidant agent.

2.5. HEALTH BENEFIT:-

As matter of fact, apart from leaves, other parts of the tulsi have numerous medicinal and pharmacological properties. Tulsi's fruits stem & roots have diuretic, stimulant, and stomachic as well as carminative, expectorant, diaphoretic, febrifuge properties, smooth-muscle relaxant, so on (20). Tulsi is considered a tonic for the entire body. In the same way, it prevents numerous health problems like respiratory ailments (flu, SARS, bronchitis, cold, etc), gastric & coetaneous disorder, asthma, hepatitis, dysentery skin disorder, fatigue, genito-urinary ailments, and also prevent cancer and diabetes. It also aids in the reduction of glucose level and circulatory strain & eye disorder, mosquito-repellent, etc. Holy Basil (Tulsi) has tremendous health benefits due to its high nutritional value. Extracts and decoction of the leaves, along with other medicinal herbs, and regular consumption have been shown to improve numerous health ailments. It is available in many forms of herbal tea, dried powder or fresh leaves, liquid form, etc.

To illustrate,

1. Anti-viral: - Basil leaves have germicidal or disinfectant properties, as well as anti-viral properties, and are an essential additive of coughs syrups or expectorants. It can cure any sort of fever, malaria, or even dengue or viral infections. It assists to secreted mucus in respiratory ailments and bronchial asthma, arising in the upkeep of clear and healthy respiratory passages.
A stewing of the leaves with different medicinal condiments (ginger, honey, clove, and so on) also cures viral rhinitis, pharyngitis, and even influenza.

2. Antiseptic and Pain Relief Properties: - Basil leaves have antiseptic and wound–healing properties as well as boosts collagen strength or epithelization. It functions as a COX-2 inhibitor and some of the compounds help to lower inflammatory and neurological pain while also have no side effects as well as give smooth pain relief. They are also used to treat ulcers, cuts, and wounds as well as to alleviate pain caused by measles, chickenpox, or smallpox. Applying a mixture of tulsi leaves juice and coconut oil on an insect bite or sting relieves pain and flushes out the poison.

3. Anti-diabetics:- Basil leaves are rich in antioxidants and vital nutrients, which aid in lowering blood sugar levels due to an abrupt or intense drop. It stimulates biochemical processes of insulin secretion as well as lowering serum levels of cortisol and glucose. It also possesses anti-per oxidative properties. A blend of tulsi and neem is suggested for diabetic persons to reduce blood sugar levels.

4. Treat Renal Disorder: - It acts as a diuretic and detoxifying property. It also has kidney-strengthening effects. Consuming basil leaves with honey for six months enables flushing out kidney stones via the urinary tract as well as reducing uric acid levels, which is the primary cause of kidney stones. It can treats liver disorders and also diminish cadmium levels in the body as well as

protecting the body from pre-existing cadmium toxicity and reverse accumulation but also prohibiting toxin-induced liver damage.

5. Anti-oxidant:- Basil leaves appear to be high in antioxidants. It contains eugenol, cirsilineol, isothymucin, apigenin, rosmarinic acid, and flavonoids, which have potent antioxidant activity and prevent chromosomes or cell structures from oxidation, as well as inhibiting cell ageing or death and protecting against radiation damage.

6. Cardiovascular Disease: - It has cardio-protective activity and retains against myocardial agents, and its essential oil (Urosolic acid) shows 13-17 % protection in the heart & liver microsomes. Basil is immensely helpful to heart patients and can help to lower blood cholesterol levels. It contains vitamin C as well as other anti-oxidants such as Eugenol, that also oxidants such as eugenol, that also safe the heart from fatal free radicals.

7. Anti-cancer:- Tulsi is anti-carcinogenic agent and has a way of curing certain types of cancer like breast cancer and also prevents the expansion of oral cancer provoked by tobacco. It inhibits the blood vessel that nourishes tumors. Tulsi should never be utilized as an alone cancer medication (3, 12).

8. Boost Immunity: - Tulsi is moreover beneficial in boosting the immune system because it contains immunity booster constitution, adaptogens, and anti-oxidants properties.

9. Aids Digestion: - Basil leaves have digestive properties and can assist with constipation, acidity, and flatulence. It relieves bloating, vomiting, and even appetite or weight loss; moreover resists laziness by replenishing your stamina level and promoting the formation of new blood cells.

10. Eye-Disorder: - Basil leaves act as relaxants and aid in the treatment of eye disorders such as sore eyes, night blindness, conjunctivitis, and other eye problems. It also soothes the eyes and minimizes the fine lines due to stress. Chewing a few basil leaves can help to cure eye disease caused by free radicals, such as vision loss, cataracts, and glaucoma.

11. Reduce Dental Disorder: - It is an ideal mouth freshener and oral disinfectant that kills 99% of germs or bacteria in the mouth. It also aids in the relief of tooth pain, a decrease gum disorder, also prevent other dental problems, as well as the protection against gum inflammation or ulcers. It also works to prevent bad breath and pyorrhea. It can also be helpful in the cessation of smoking.

12. Reduce Anxiety: - Tulsi is abundant in anti-oxidants, which serve to optimize different processes of the body and soothe the nervous system as well as also relieve stress.

13. Radio-protective effect: - It has radio-protective activity, and Flavonoid (orientin & vicenin) provide notable radiation protection.

14. Anti-microbial: - It possesses anti-microbial properties and essential oil (Linoleic acid) also acts as effective antibacterial activity. Further, it can prevent a variety of microbial infections and also protect from any microbes or bacteria.

15. Beneficial for Skin and Hair: - Basil leaves have antibacterial, antibiotic, and antifungal properties. Tulsi face packs are well-known for removing acne, scar marks, blackhead, as well as for blood by eliminating toxins. It also enhances facial skin, making it emerge younger or fresher, and

balances out skin tones. It tends to give the glow and clear dark spots from the face. Basil leaves are often used to cure and lessen skin infections and irritation.
It also relies on as a rejuvenator and also stimulating hair growth by boosting circulation in the scalp as well as aids in the reduction of hair loss, itchiness, dandruff, dry scalp, and then fend off grey or brittle hair or eliciting healthy hair.

2.6. TISSUE CULTURE AND MICRO PROPAGATION: -
Ocimum sanctum is cross-pollinated in nature. However, there are few obstacles that rise to vegetative propagation of the species as poor seed viability and germination of seedling progeny as well as genotypes that are not true to type (. As a result, to reduce these obstacles or enormous economical production which is necessary to propagate the selected clone to obtain a high progeny uniformity, we adopt an alternative method for propagation i.e. plant tissue culture via micropropagation rather than the traditional vegetative propagation method.
To brief, many in-vitro studies have been favorable renew O. tenuiflorum from different explants like a leaf, roots, Auxiliary buds /nodal segments, etc.As matter of fact, P.T.C has been successfully adapting to the propagation of genetically cultivar clonal planting material on a large scale, a short period, cost-effective and pest- free along with preserving their genetic uniform.

III. REVIEW OF LITERATURE

Haberlandt visualized the idea of plant tissue culture and laid the foundation for the culture of plant cells, tissue, organs. Commercial production of plants through P.T.C via micro propagation has several advantages over the traditional methods of propagation through seed, cuttings, grafting, and air-layering, among others. It is rapid propagation processes can result in the production of plants that is free of any viruses and pathogens. This chapter discusses previous research done by various researchers in the field of Plant Tissue Culture and In-vitro techniques of plant regeneration and propagation from explants of Ocimum tenuiflorum (Tulsi).

1. Gupta et al. (2002) assessed that comprehensive description of O. tenuiflorum is a medicinal herb. The outcome reveals that it possesses wide varieties of chemical constituents and pharmacological activities as well as the huge therapeutic application which improves and aid various ailments and furnish health benefits.

2. Mondal et al. (2009) have explored the pharmacological properties of O.sanctum by conducting various trials in an animal models or in-vitro studies. The finding shows that entire parts of tulsi consist several therapeutic agents, volatile oil, phytoconstituents such as alkaloid, glycosides, sponines, and tannins as well as numerous pharmacological properties like antimicrobial, adaptogenic, antidiabetic, cardio & hepatoprotective, anti-inflammatory, and immunomodulatory effect, so on. The study further suggests the investigation of neuroprotective activities and neurological disorders like Parkinson's and Alzheimer's disease.

3. Amarah (2016) emphasized extensive assessment of O.sanctum and its application and considered tulsi is a miracle herb.

IV. METHODOLOGY

4.1. Collection of Explants: -

The plant material should be vigorous, disease-free and actively growing. Explants used in this study were nodal sections and leaves.

4.2. Preparation of Media:-

It is helpful to formulate all concentrated stock solutions to avoid any error or save time during an experiment and should be stored in a freeze for a limited period at 4-20 oC as well as promptly monitored for any contamination or precipitation of components, further note down the date or time respectively to proper monitored and none of the store for more than 15 days. It is advised to keep media at 25oC for 4 days, before use for good results. Agar and sucrose were freshly added at the time of media preparation. Nutrient media used for this study was full MS medium.

(I) Procedure of stock solution:-Preparation of stock solution based on the Murashige & Skoog medium. A stock solution is a concentrated composition of the solution which is used in P.T.C media. The composition of macro & micro-nutrient, iron, vitamins and cytokinin, agar, sucrose is given in table 4.1

i. Macronutrient stocks: - weigh & mix all the macronutrients sequentially in 800ml of DDH2O, except CaCl2 which should dissolve singly to avert precipitation then, make up the final volume to 1000ml by adding distilled water. Then, filtered and stored at freeze. Before utilizing a macronutrient stock for medium preparation, constantly check for precipitation.

ii. Micronutrient stock: - It is better to dissolve all micro salts individually before being added to the stock solution. Take 800 ml DDH2O, weigh & mix each salt by magnetic stirring till fully dissolved. Then, make up the final volume to 1000ml by adding distilled water. Then, filtered and stored at freeze (-20C).

iii. Iron Stock: - It is better to use fresh stock. Weigh & add EDTA disodium in 80ml boiling DDH2O after completely mixed, then add ferrous sulfate while stirring by magnetic stirrer for 1 hrs. This will result in a clear light yellow solution, then make up to the final volume of 100ml. filter & store for minimum of 4 months at freeze 4C but kept in an amber bottle or covered with an aluminum foil.

iv. Vitamin Stock:-Weigh & pour 50ml of DDH2O in 100ml beaker then, completely dissolve all the vitamins in sequentially then make up the final volume by adding D/W and store at 0-40C. Vitamin stock is highly prone to microbial contamination, therefore constantly check the stock before using & discard it after 30days.

v. Cytokinins and Auxins their preparation:-BAP and Kinetin along with IAA were used. A stock solution containing 10 mg and dissolved in 1N HCl and 70% ethanol adds a few ml of DDH2O and make up the final volume to 100ml. Weigh 10 mg IAA and dissolve in 1N NaOH or 70% ethanol then make up the final volume.

Stock solution No.	Components	Standard Medium concentration (mg/l)	Concentration of stock solution (g/l)	Volume of stock solution taken for liter medium (ml)
1.Stock A-Macronutrients (20X)	NH_4NO_3 KNO_3 $CaCl_2.2H_2O$ $MgSO_4.7H_2O$ KH_2PO_4	1650.00 1900.00 440.00 370.00 170.00	33.00 38.00 8.80 7.40 3.40	50
2.Stock B-Micronutrients (100X)	$MnSO_4.2H_2O$ $ZnSO_4.4H_2O$ H_3BO_3 KI $NaMoO_4.2H_2O$ $CoCl_2.6H_2O$ $CuSO_4.5H_2O$	22.30 8.60 6.20 0.83 0.25 0.025 0.025	2230 860 620 83 25 2.5 2.5	5
3.Stock C-Iron EDTA (20X)	Na_2EDTA $FeSO_4.7H_2O$	37.35 27.85	672 556	5
4. Stock D-Vitamin (100X)	Nicotinic acid Pyridoxine. HCl Thiamine. HCl Glycine Myo-inositol	0.5 0.5 0.1 2.0 100	5 5 1 20 1	5
5. PGRs Sucrose Agar	As per needed 3%(30 g/L) 8% (8g/L)	Freshly added in the culture media		

Table 4.1-Composition of MS media

II. Procedure of M.S media:-The Murashige and Skoog (MS, 1962) nutrient media is the topmost conventional medium used for all types of culture, organogenesis, callus induction, as well as

micropropagation and plant regeneration. The complete procedure for MS media as shown in fig.4.2

4.3 Combination of Stock Solution for Initiation of Shoots in C.M:-

1. Full MS media + 1mg BAP + 30 g sucrose + 8 g Agar
2. Full MS media + 1mg BAP + 0.5 mg Kinetin + 30 g sucrose + 8 g Agar
3. Full MS media + 1mg BAP + 1 mg IAA + 30 g sucrose + 8 g Agar

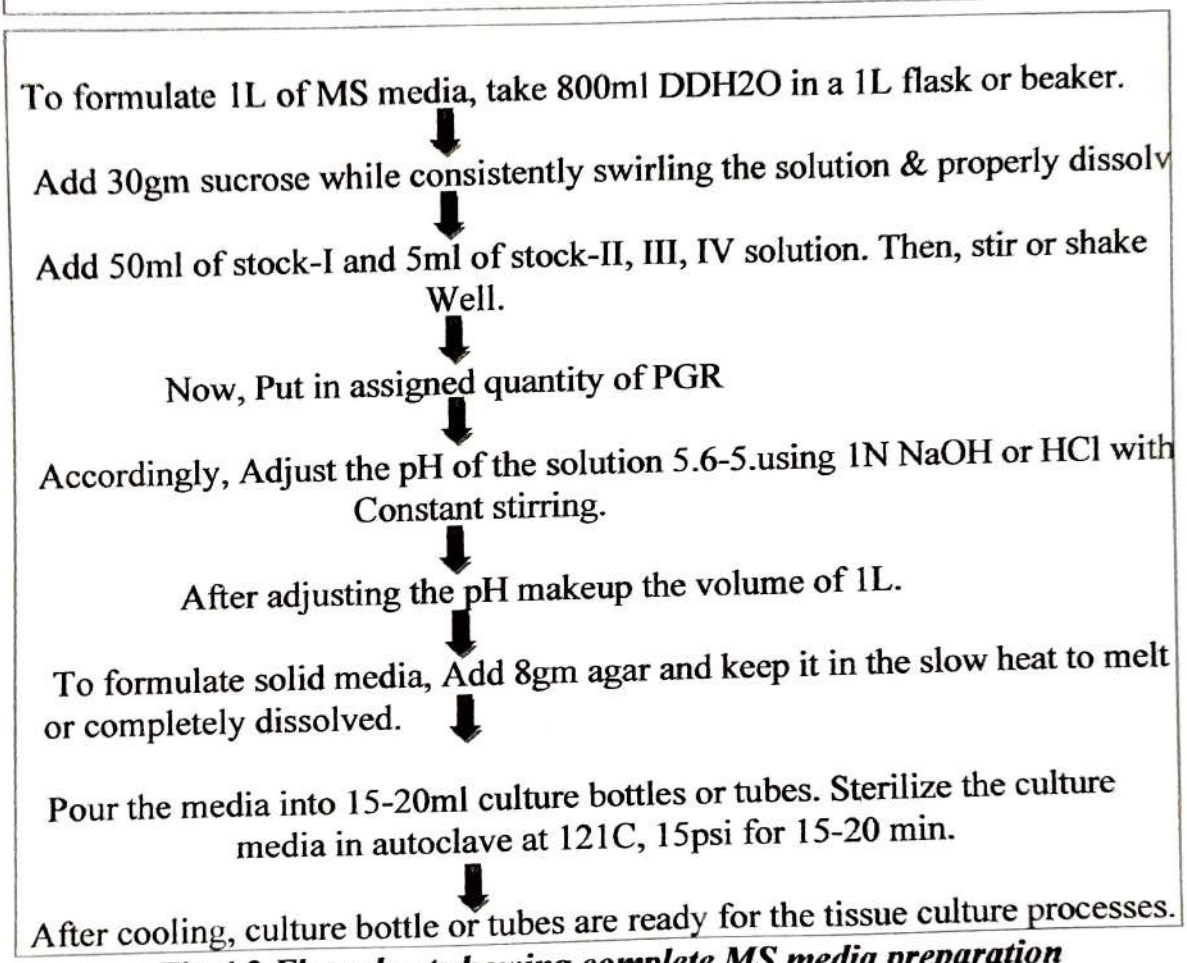


Fig.4.2 Flow chart showing complete MS media preparation

4.4. Surface Sterilization of Explants:-

Surface sterilization is a procedure to eliminate any microbial contamination of explants before culturing on the in-vitro culture. To disinfect, explants various sterilizing agents are used but at the same time not cause any adverse damage to the plant material. Some of the reagents used for surface sterilization of explants are shown below:-

Disinfectant	Concentration	Duration
Bavistin	1-3%	20-30 min
Mercuric chloride	0.1-0.2%	5-10 min

4.5. Inoculation of Explants: - O.tenuiflorum nodes were inoculated in the LAF. Put all the materials and tools like culture bottles, media, Petri plates, forceps, etc were used for inoculation in the LAF chamber and expose to UV light for 30 min. Afterward, the surface of the LAF chamber and working hands must be firstly sterilized with 70% alcohol. The procedure of surface sterilization and inoculation of O.tenuiflorum nodes as shown in fig 4.3

Surface Sterilization of Explants

Excised explants (nodal or bud) from selected plant. Then, immediately immerged in distilled water to avoid the entrance of air bubble or microbes.

↓

Wash under running tap water (50-60 min).

↓

Explants are treated with detergent by adding 2 drops of liquid detergent in 100ml of d/w (10-15 min).

↓

Explants are rinsed thrice with d/w to remove excess detergent.

↓

To avoid bacterial & fungal contamination, explants are treated with Bavistin (1-3%) in 100ml d/w for (20-30 min).

↓

Rinse with d/w thrice or more until all the excess of disinfectant are remove.

Washing and Inoculation of Explants In Laminar Air Flow

Surface sterilization the explants are treated with (0.1-0.2%) of mercuric chloride in 100ml d/w for (5-10 min).

↓

Explants are rinsed thrice with sterile d/w to remove excess disinfectant.

↓

Put the explants in petri-plates and dry. Properly cut the both end of explants to remove dead cells

↓

Inoculate the explants in front of flame on sterilized media bottles.

↓

Now cover the test tube along with cap by ceiling tape & labeled with the name of the explants and date of inoculation.

↓

Finally, put culture bottles in culture room under the proper light and temperature.

Fig.4.3 Flowchart representation for surface sterilization and inoculation of explants

4.6 Culture room:-

The culture bottles were incubated in the culture room at optimum condition 25-27oC temperature under 3000 lux of light intensity with a photoperiod of 16 hour light alternating with 8-hour darkness and 40% relative humidity and it is timely monitored.

V. RESULT

In this study, using different concentrations and combinations of cytokinins and auxins such as BAP and Kinetin, IAA to observed shoot proliferation or induction from nodal segment or section of O.tenuiflorum. As a consequence, shoot induction was noticed after 10-15 days on 10 June 2021 in BAP and BI concentration and proper shoot elongation showed on 15 June 2021 in BI concentration as shown in table 5.1

Table 5.1 Outcomes of several combinations of cytokinins & auxins on shoot induction of O.tenuiflorum

DATE	PGRs CONCENTRATION (mg/L)		
	B BAP = 1mg	**BK** BAP= 1mg Kinetin = 0.5mg	**BI** BAP =1mg IAA = 1mg
17/4/22	**INOCULATION**		
22/4/22	Shoot induction observed	No shoot induction observed	Shoot induction observed without contamination
27/4/22	Shoot elongation was stunted	–	Better shoot elongation was observed and no contamination occurred
1/5/22	Shoot elongation stunted	–	Upright shoot growth and multiplication started.

Fig 5.2. Inoculation of nodal section and leaves

↓

Fig 5.3. Initiation of the shoot after 15 days inoculated

↓

Fig 5.4 Development of leaves after 4 month.

↓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YOU TOO CAN DO PLANT TISSUE CULTURE

VI. CONCLUSION

In brief, the existing study illustrates the productive protocol for successful in-vitro micro propagation of O.tenuiflorum explants (nodal section or leaves) using different combination & concentration of PGRs and MS media. Furthermore, successfully achieved surface sterilization of explants by using a lesser chemical reagent.

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