A PROJECT REPORT

ON

"FINANCIAL STATEMENT ANALYSIS OF TATA MOTORS LTD"

Project Report submitted to

BURDWAN UNIVERSITY

In partial fulfillment of the requirement for the award of the degree of

BACHELOR OF BUSINESS ADMINISTRATION

Submitted by

TARASANKAR JANA

Reg. No. – 202005000793
Roll No. - 201540920029

Under the supervision of

Dr. ARNAB KUMAR SAMANTA

DEPARTMENT OF BACHELOR OF BUSINESS ADMINISTRATION

NETAJI MAHAVIDYALAYA

JUNE 2021

Website : www.netajimahavidyalaya.org Mob.- 9434049012

NETAJI MAHAVIDYALAYA

AFFILIATED TO THE UNIVERSITY OF BURDWAN

ESTD - 1948

ARAMBAGH • HOOGHLY • WEST BENGAL • PIN CODE - 712601

ACCREDITED (2ND CYCLE) BY NAAC

Ref. No. **Aram / NM / Office /** ..... Date .....

CERTIFICATE

This is to certify that **Mr. TARASANKAR JANA** bearing the Roll No:- 201540920029 Reg. No. :-202005000793 of 2020-21 is a bonafide student of Bachelor of Business Administration course of NETAJI MAHAVIDYALAYA ; Arambagh 2020 - 23 batch, affiliated to the University of Burdwan, Burdwan. Project report on " **FINANCIAL STATEMENT ANALYSIS OF TATA MOTORS Ltd.** " Is prepared by him/her under the guidance of **Dr. ARNAB KUMAR SAMANTA** in partial fulfillment of the requirements for the award of the degree of Bachelor of Business Administration. The University of Burdwan.

Wish him/her all success in his/her future endeavors.

Arnab Kumar Samanta 14/8/23

Signature of the Supervisor

Arnab Kumar Samanta 14/8/23

Signature of HOD

E-mail : netajimahavidyalaya@rediffmail.com and netajimahavidyal...

CONTENTS

ACKNOWLEDGEMENT

First of all thanks to God, for giving me and my friends the strength and will to complete this task just in time. Even though we faced a lot of difficulties while trying to complete this task, the group still managed to complete it and we are glad about it.

A special thanks to **Dr. Arnab Kumar Samanta,** for being such a good guidance to us while we were doing this task. He had given us an appropriate example and knowledge in order to make us understand more about this topic. He spends his time to explain the execution of this idea in all the way.

Also, a great thanks to my family and friends who tried their best to give their support either by giving me a lot of encouragement to keep up with this task or by supporting us financially and pay all the cost required to complete this task.

TARASANKAR JANA

DECLARATION

I, **TARASANKAR JANA**, hereby declare that the project work entitled **"FINANCIAL STATEMENT ANALYSIS OF TATA MOTORS LTD."** is a record of independent and bonafide project work carried out by me under the supervision and guidance of **Dr. Arnab Kumar Samanta**, HOD of department of Bachelor of Business Administration of Netaji Mahavidyalaya, Arambagh.

The information and data given in the report is authentic to the best of my knowledge. The report has not been previously submitted for the award of any Degree, Diploma, Associateship or other similar title of any other university or institute.

Place: Arambagh

TASANKAR JANA

Date:

THE UNIVERSITY OF BURDWAN

NETAJI MAHAVIDYALAYA

B.A/B.SC SEMESTER VI GEOGRAPHY HONOURS CBCS EXAMINATION - 2023

PAPER – CC 14 DISASTER MANAGEMENT (PRACTICAL)

TITLE

A THEORETICAL CASE STUDY OF IMPACT ASSESMENT AND MANAGEMENT OF FLOOD WITH SPECIAL REFERENCE TO SAOYAI MOUZA, PASCHIM MEDINIPUR 2023

ACKNOWLEDGEMENT

At the outset, I convey my deep sense to my respected Dr. Mili Acharya and Prof. Debasish Das, department of Geography Netaji Mahavidyalaya, under whose guidance and willful co-operative I have completed my field report flood in SAOYAI mouza area and it' s surroundings.

I also acknowledge the help and co-operation, extended by Dr. Ekbal Hossain, Prof. Sintu Mondal and Dr. Dipankar Jana and other respected department non-teaching-staff, officials, local PANCHAYET OFFICE.

Very grateful thanks to my sincere SAOYAI MOUZA' S people for their helps and co-operation to fulfill my field report.

At the end, I would like to thank my classmates for their constant encouragement, endeavor, patience and sacrifice for the completion of this report.

Date:

Signature of the Student

CONTENTS

17. Festival

CHAPTER: 4 AGRICULTURE AND LANDUSE

1. Cropping pattern
2. Agriculture and size of land holding
3. Irrigation
4. Livestock
5. Land use

CHAPTER: 5 DISASTER

1. Definition
2. Disaster management
3. Flood
4. Different types of flood
5. Causes of flood
6. Effected of flood
7. Impact of flood
8. Flood prone areas in Paschim Medinipur
9. Flood of SAOYAI mouza in GHATAL
    - Water logging
    - The height of water level during flood
    - Flood relief program
10. Impact of flood in SAOYAI mouza
    - Settlement
    - Health
    - Agriculture
    - Economic condition
    - Other problem
11. Flood effected areas of SAOYAI mouza
12. Management of flood
13. Mouza map
14. Photo gallery of survey
15. Conclusion
16. Bibliography

CHAPTER-1

INTRODUCTION:

In earth system most of the environmental hazards such as volcanic activity, earthquake, cyclone, landslide, flood, drought etc, are affects the human habitation and their livelihood system over a large -areas causing loss of lives and properties. Therefore, natural hazards are potentially dangerous of human causing injury, loss life and disrupting social and economic condition. Flood is one of them of all environmental hazards. Generally high -level water that overflows the natural bank along any portion of a system is called flood. In fact, flood is an attribute of physical environment and thus is a component of hydrological cycle of a drainage basin. Flooding is a normal part of river behavior. Thus, floods are commonly associated with a stream or river.

West Bengal is one of the most flood prone state in India. It is located in lower Gangetic Delta. The river GANGA and its tributaries are mainly responsible for the flood in West Bengal. Other than this DAMODAR -river and its tributaries also caused flood. Floods leads to disruption in communication, loss of life and property of the inhabitants and also it hamper the day to day life in means of communication, drinking water problem, problem of diseases etc. It has a very bad effect on agriculture also. Keeping in view about all these problems our current study focuses on the flood and its related issues and prevention and mitigation of SAOYAI of PASCHIM MEDINIPUR district, WEST BENGAL.

AIMS & OBJECTIVES:

Aims and objectives of the field study of an area are:-

1. To identify the cause of effects of the annual natural hazard, flood in the village. To an overall geographical knowledge about the area under study.
2. To provide support for the public authorities and government institutions for these flood mitigation efforts including planning and action coordination.
3. To inform the public on the risk exposure to this devastating flood and how they can prepare, respond, recover and mitigate the impact of such events.

4. To analysis the impact of flood on the social aspect of victims and flood prone areas.

The objectives of this study are people's perception of flood risks in the SAOYAI mouza area and its surroundings and their attitudes and perception about flood prevention and flood management. The overall objectives are to provide a pro-active and personalized citizen-centric public service application that will encourage citizens' involvement and will harness the collaborative power of ICT network (network of people, knowledge and sensors) to raise awareness on flood risks and enable collective risk mitigation solutions and response actions.

•The general objectives are:

1.To empower local communities to directly participates in the design of emergency services dealing with mitigation actions for floods.

2.To find out the main cause of flood and it' s effect on the eco-geo-environmental conditions.

3.To harness the power of new technologies, such as social media, and mobile technology to increase the efficiency of public awareness and education regarding floods risks, effects and impact.

4.To encourage the development and implementation of long-term, cost-effective and environmentally sound migration actions related to floods through an ICT-enabled cooperation and collaboration of all stockholders: government, private sector, NGOs and other civil society organizations as well as citizens.

•The specific objectives:

1.To make use of the best available data in order to identify the location and potential impact that natural hazards as floods can have on people, property and natural environment.

2.To improve the systems of warning and emergency communication.

3.To provide support for the public authorities and government institutions hazard mitigation efforts, including planning and action coordination.

4.To improve the public on the risk exposure to natural hazard and how they can get pre-pared, respond, recover and mitigate the impacts of such events.

METHODOLOGY:

The methodology is categorized into two types of data base that fulfill the aims and objectives of the study. The two types of data base are -

1. PRIMARY DATA (interaction with the people, our observations)
2. SECONDARY DATA (books, internet, mouza map)

- Procurement of mouza map from government office.
- Collection of secondary data climatological characteristics.
- Pre –field lecture by professors.
- Making questionnaires on physical of socio-cultural and economic aspects.
- Dividing the students into twelve groups, professors send them through different part of the mouza.
- Door to door survey has been taken based on the questionnaires.
- Perception survey of individual on group of the villagers to know the cause of flood in the village. They face during flood and the way they cope up with these natural hazards.
- Tabulation of data collected from the field.
- Preparing a map and diagrams.

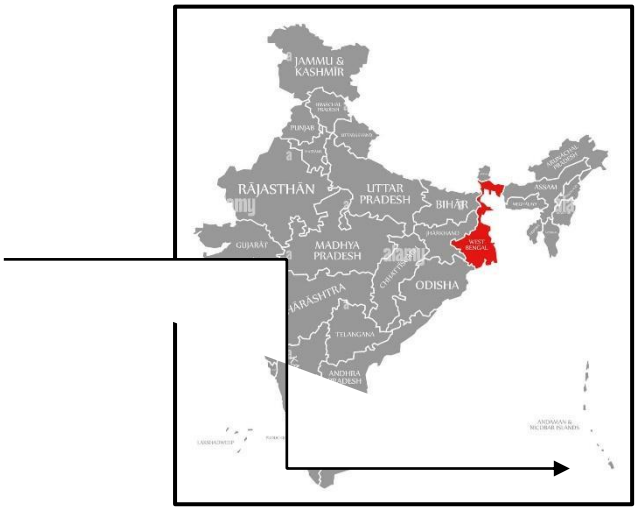
STUDAY AREA:

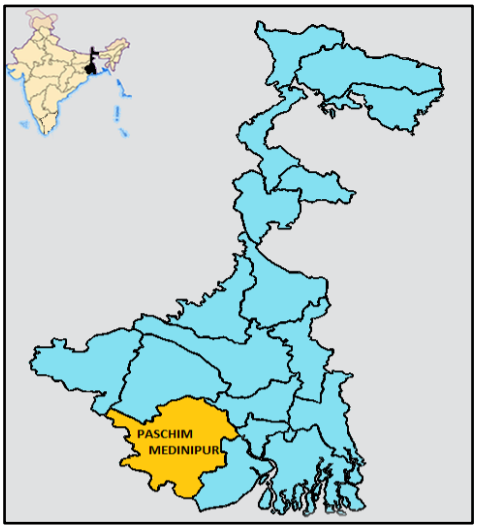
The area under study is named as ‘SAOYAI’ mouza situation in GHATAL Block of the in PASCHIM MEDINIPUR District, West Bengal state in India. ‘SAOYAI’ is situated 38.7 km away from sub-district headquarter GHATAL. MEDINIPUR is the district headquater of SAOYAI village. As per 2009 stats, SULTANPUR is the GRAM PANCHAYAT of SAOYAI village. SAOYAI MOUZA is surrounded by JHUMJHUMI river in PASCHIM

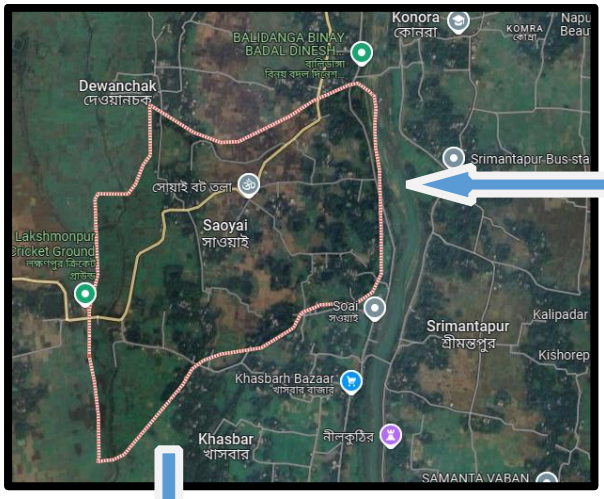
MEDINIPUR. Village code of SAOYAI is 337645 and pin-code is 721212. It's latitude 22.76º & longitude 87.72º. SAOYAI is located 20.3 km from ARAMBAGH.

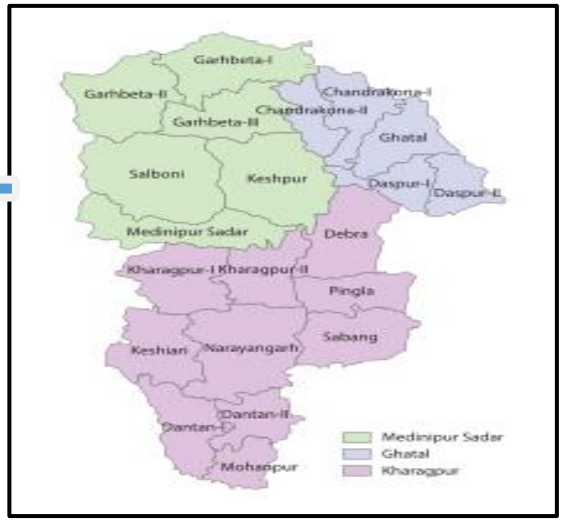
KHARAR is nearest town to SAOYAI for all major economic activities, which is approximately 12km away.

LOCATION MAP









STUDY AREA

CHAPTER-2

PHYSICAL ASPECT

1. INTRIDUCTION:

'SAOYAI' MOUZA is characterized by a number of physical as well as socio economy aspects. The physical aspect play profound impact on the various socio cultural and economic aspects like population, settlement, occupational pattern, land use etc. The physical aspect of the environment like geology, relief, climate, drainage, soil and natural vegetation are to be discussed in the following paragraphs.

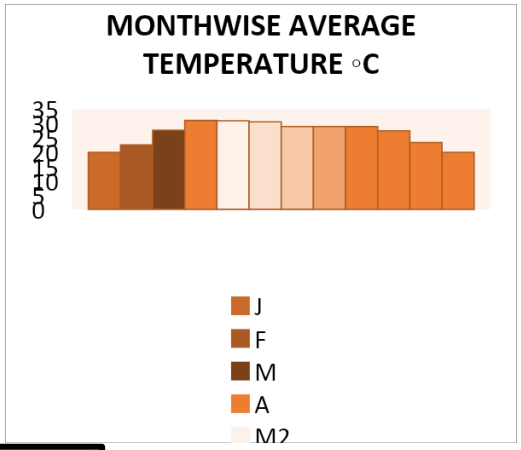
2. PHYSIOGRAPHY:

The height of the vast area of SAOYAI is 5-15m.Geologically the crust is made by alluvium soil with little phosphate and potash composition. Some area is covered by clayey soil which is poor permeable to water, causing water stagnation. Most of the area is covered by sediments of JHUMJHUMI River and its tributaries. The study area comes under the sub-tropical warm and humid climate with monsoonal heavy rainfall. DWARAKESWAR are the important river in this area.

3. CLIMATE:

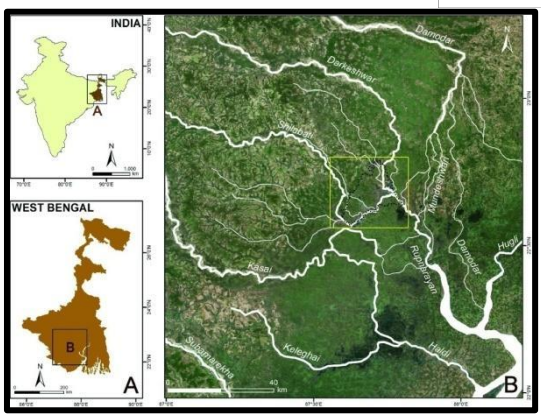
The SAOYAI lies on 13m above sea level. The climate is tropical in SAOYAI. The climate here is classified as Aw by the KOPPEN. The temperature here averages 30.52degree c. Precipitation here is about 1323mm. The driest month is December. There is 2 mm. of precipitation in December. The gretest amount of precipitation occurs in September, with an average of 296 mm. With an average of 31.0degree c. April to June is the warmest month. The lowest average temperatures in the year occur in January, when it is around 19.9degree c. the precipitation varies 294mm between the driest month and the wettest month. the variation in temperatures throughout the year is 11.1degree c. The average temperature is 30 which

slightly decreases with the advent of rainfall in middle of June. From May to November the relative humidity is high.



4. RELIEF and DRAINAGE:

The drainage determines the degree and intensity of land use. Water is essential for proper land utilization. The drainage network determines the land use partterns. JHUMJHUMI river is a major river in the eastern part of the SAOYAI MOUZA . The river flow from south eastern side of this



village. The general slope of the village is from north to south . Average elevations of this village is 15 m. River JHUMJHUMI is the main river of this village. There are a few ponds also in this flood prone area.

5. GEOLOGY:

The underline rocks structure of SAOYAI MOUZA is not very complex because the whole area is a product of deposition of alluvial sediments. The area is composed of newer alluvial of recent Quarternery Geological age. It is a part of DWARAKESWAR delta and is composed sediment deposited their only few km away from this area, the underline geological structure is leterite of Tertiary age.

6. SOIL:

The soil of the village in generally alluvium soil with little phosphate and potash composition. As the flood water retains for long time every year, some area is covered by clayey soil. Most of the area is covered by sediments of JHUMJHUMI River and its tributaries.

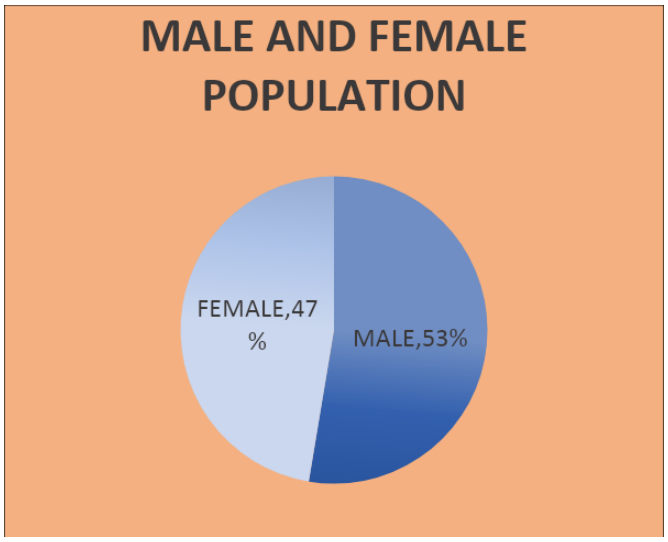
CHAPTER-3

1. POPULATION

The Village has total population of 399 and 0000 households (2024). Out of them only 85households have been surveyed. The survey shows there are 399 total populations which comprises of 52.63% male and 47.37% female and the sex ratio of the village is 111.10%.

TABLE:-1 TOTAL POPULATION

TOTAL POPULATION		%
MALE	210	52.63
FEMALE	189	47.37
TOTAL	399	



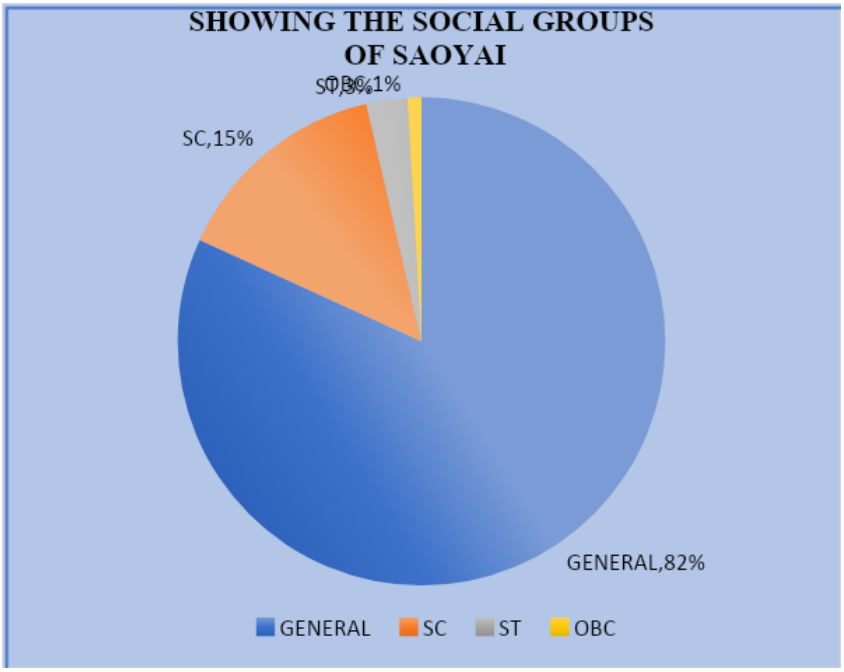
2. SOCIAL GROUP

The village is entirely a Hindu village. The village SAOYAI is dominated by General caste(81.82%)Scheduled Caste (14.55%) and Scheduled Tribe (2.73%)

population There are Scheduled Tribe (2.73%) and (0.91%)OBC Caste people in the village. However, people of different social groups have a good relation.

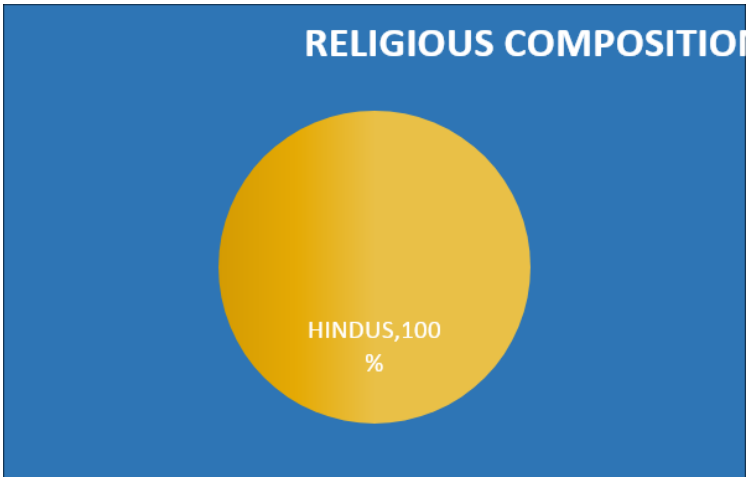
TABLE:- 2 SOCIAL GROUPS

SOCIAL GROUP	NO. OF HOUSE HOLDS	%
GENERAL	90	81.82
SC	16	14.55
ST	3	2.73
OBC	1	0.91
TOTAL	110	



3.RELIGION

RELIGION		%
HINDUS	110	100
OTHER	0	
TOTAL	110	



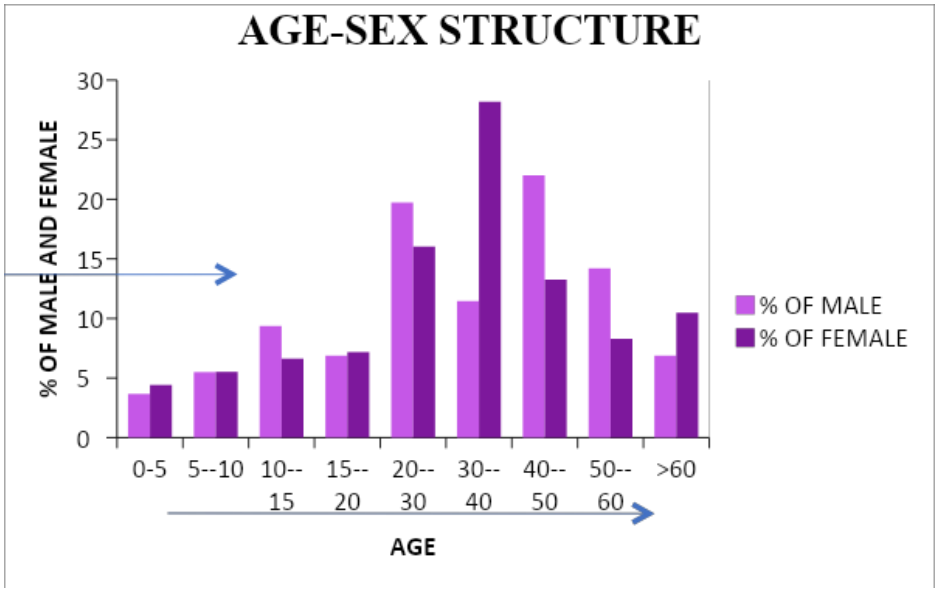
4. AGE SEX STRUCTURE

Age sex pyramid is a graphical illustration of the distribution of a population by age group and sex; it typically takes the shape of a pyramid when the population is growing. In the SAOYAI MOUZA, total surveyed population is 399,with 52.63% males and 47.37% females population .At the age group of Below 5 years there are 3.67% males and 4.42% females ,at the age group of 5-10 years there are 5.5% males and 5.52% females population and at the age group of 10-15 years there are 9.36% males and 663% females population, at the age group of 15-20 years there are 6.88% males and 7.18% females population, at the age group of 20-30 years there are 19.72% males and 16.02% females population, at the age group of 30-40 years there are 000011.47% males and 28.18% females population, at the age group of 40-50 years there are22.02% males and 13.25% females population, at the age group of 50-60 years there are 14.22% males and 8.29% females population, at the age group of Above 60 there are 6.88% males and% females 10.49% population. Maximum population concentration is observed at middle age group, 20-30 years and 30-40 years age group.

TABLE:- 3 AGE-SEX STRUCTURE

AGE - SEX STRUCTURE				
AGE	MALE	FEMALE	% OF MALE	% OF FEMALE
0-5	8	8	3.67	4.42
5--10	12	10	5.5	5.52
10--15	21	12	9.36	6.63
15--20	15	13	6.88	7.18
20--30	43	29	19.72	16.02
30--40	25	51	11.47	28.18

40--50	48	24	22.02	13.25
50--60	31	15	14.22	8.29
>60	15	19	6.88	10.49
TOTAL	218	181		



5. LITERACY AND EDUCATIONAL STATUS

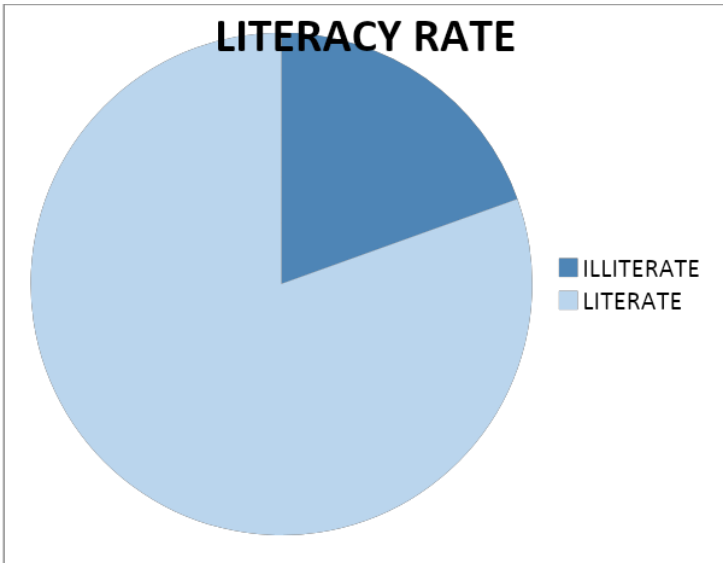
Though the village is dominated by OBC population, about 80.49 % people are literate and 19.50% people are illiterate there. Here male – female disparity in literacy is not very prominent. The level of education is more or less same in both the male and female population. Among female 44.18% have HS level and 41.02% have UG and PG level of education. Maximum concentration is found is secondary level of education (V-X) both for male (55.81%) and female (44.18%) population.

- PRIMARY SCHOOLJUNIOR HIGH SCHOOL

LITERACY RATE

TABLE :- 4 LITERACY RATE

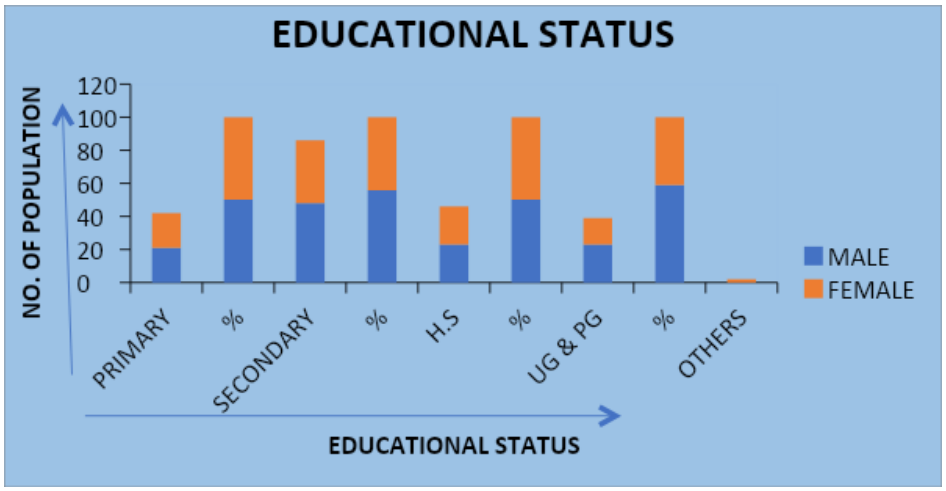
ILLITERATE		%	LITERATE	%	TOTAL	
MALE	29	36.71	183	56.13	ILLITERATE	19.5
FEMALE	50	63.29	143	43.87	LITERATE	80.49
TOTAL	79	100	326	100		



LEVEL OF EDUCATION

TABLE:- 5 LEVEL OF EDUCATION

EDUCATIONAL STATUS										
SEX	PRIMARY	%	SECONDARY	%	H.S	%	UG & PG	%	OTHERS	%
MALE	21	50	48	55.81	23	50	23	58.97	0	0
FEMALE	21	50	38	44.18	23	50	16	41.02	2	100
TOTAL	42	100	86	99.99	46	100	39	99.99	2	100

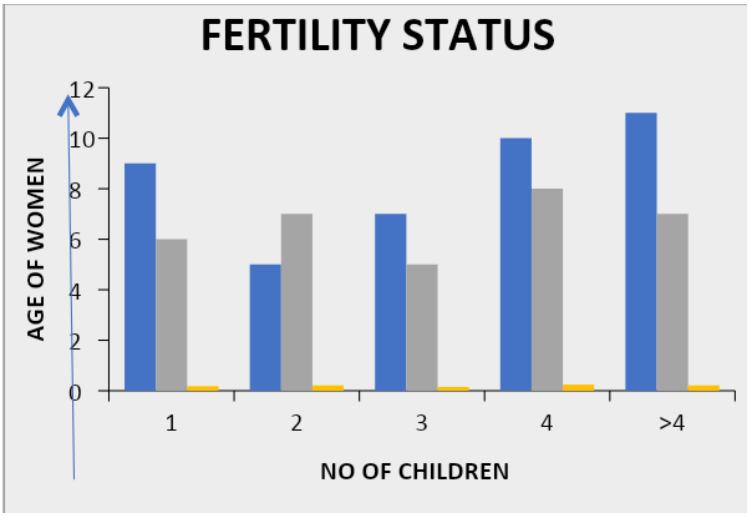


6. FERTILITY STATUS

This village shows that women follow family planning programme as most of the women have 1 or 2 children. Both <40 years aged women and >40 years aged women have less member of children. Only 16.67% women of < 40 years age group have three or more children. It is 15.15% for >40 years aged women.

TABLE:-6 FERTILITY STATUS

FERTILITY STATUS				
NO OF CHILDREN	AGE OF WOMEN			
	< 40 YEARS		> 40 YEARS	
1	9	21.43%	6	18.18%
2	5	11.90%	7	21.21%
3	7	16.67%	5	15.15%
4	10	23.81	8	24.24%
>4	11	26.19%	7	21.21%

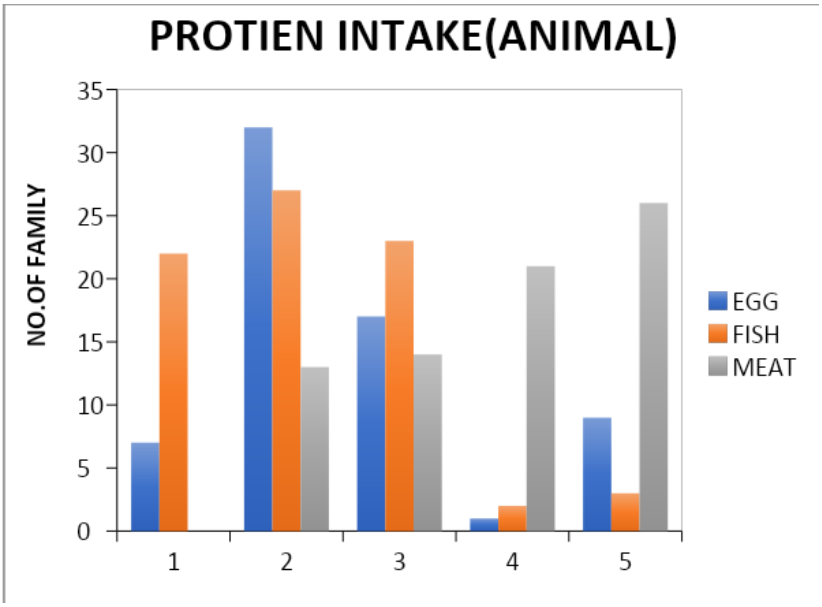


7. PROTEIN INTAKE

In the village fish, meat and egg are taken by the people. About 28.32% people take egg and fish at least once in a week or in regular basis. Some affluent people about 3.50% take meat once in a week. But in rest of the houses meat intake is only once in a month. So the villagers have a habit of taking regular animal protein.

TABLE:- 7 PROTEIN INTAKE

PROTIEN INTAKE			
PROTIEN INTAKE BY HOUSE HOLDS	EGG	FISH	MEAT
DAY	7	22	0
TWICE A WEEK	32	27	13
ONCE A WEEK	17	23	14
TWICE A MONTH	1	2	21
ONCE A MONTH	9	3	26

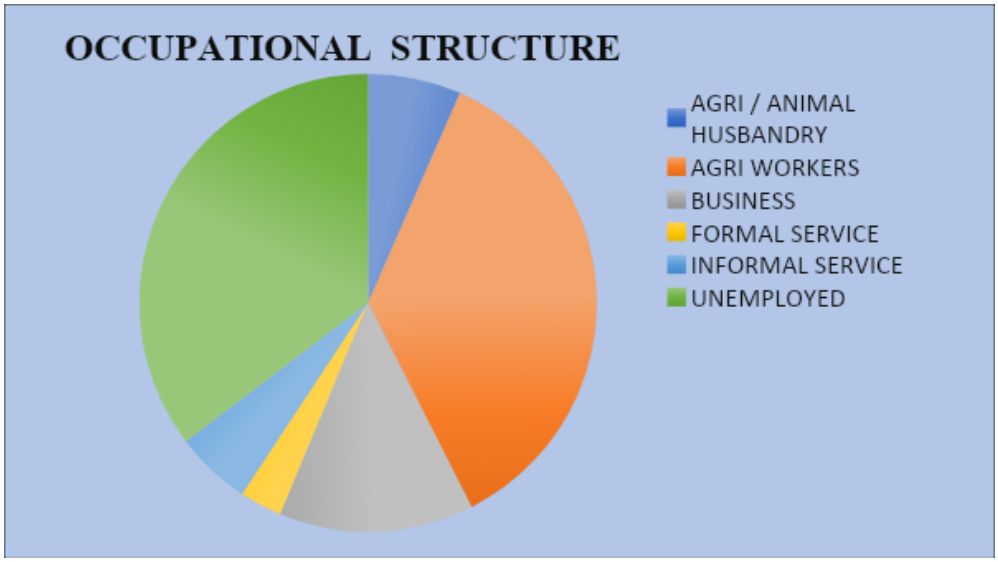


8. OCCUPATIONAL STRUCTURE

The occupational structure shows a combination of primary and tertiary economic activities and absence of secondary economic activities in the village. In agriculture and animal husbandry together 41.98% wokers of the village are engaged. cultivators comprise only 6.59% and agriculture workers comprise 35.93% of the total workers. Similarly, workers in formal and informal service sector together comprise 2.99% and 5.39% strength. In informal service sector daily wage laboures van – rickshaw puller, toto drivers are common. Small scale businessman like owner of tea stall, groceries, stationary shops, fertilizer shops, hardware shops are also found in this village.

TABLE:-8 OCCUPATIONAL STRUCTURE

OCCUPATIONAL STRUCTURE	No of Persons	%
AGRI / ANIMAL HUSBANDRY	11	6.59
AGRI WORKERS	60	35.93
BUSINESS	23	13.77
FORMAL SERVICE	5	2.99
INFORMAL SERVICE	9	5.39
UNEMPLOYED	59	35.33
TOTAL	167	100

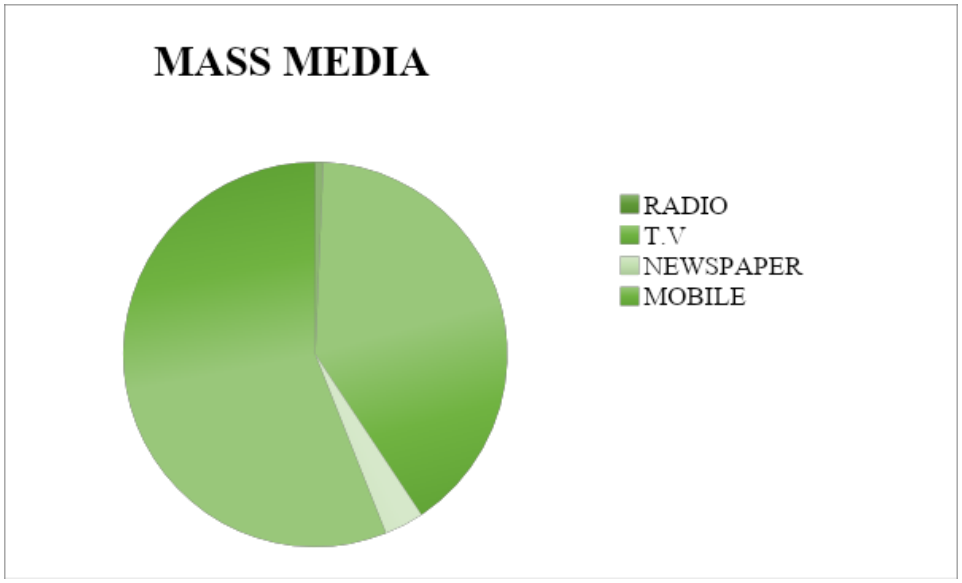


9. MASS MEDIA

Both television and mobile are common mass media in this village. About 96% households enjoy TV and mobile are very common source of mass media and daliy entertainment. Only a few households have only TV or only Mobile and a few have TV, Mobile and Newspaper together. About 3.33% households are in contact with newspaper as a source of mass media .So ,entire village has some kind of mass media attachment. But100% houses are exposed to television, newspaper or mobile with internet, all these three sources of mass media.

TABLE:-9 MASS MEDIA

MASS MEDIA		
NAME	NUMBER	%
RADIO	1	0.67
T.V	60	40
NEWSPAPER	5	3.33
MOBILE	84	56
TOTAL	150	100

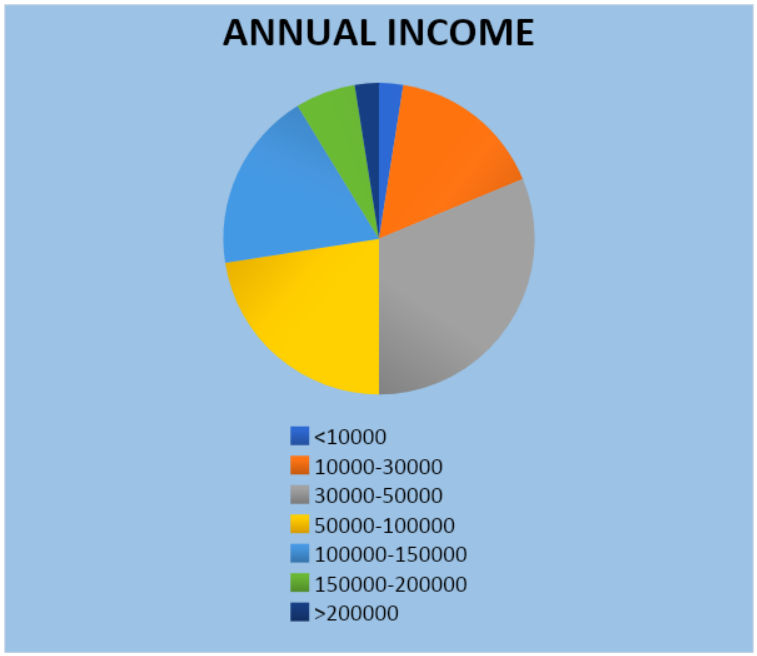


10. ANNUAL INCOME

In this village only 51.28% households experience <30,000 annual income. About 32.05% households have 30,000-50,000 annual income, 23.08% households have 50,000-1,00,000 annual income 19%households have 1,00,000-15,0000 annual income ,6% households have 1,50,000-2,00,000 annual income and remaining 2.56% households have >2,00,000annual incomes. Therefore, annual income is high in a few houses where service holders are formal.Only, cultivators, agricultural laborers and landless people working in non-formal service sector have low income.

TABLE:- 10 ANNUAL INCOME

	ANNUAL INCOME						
<10000	10000-30000	30000-50000	50000-100000	100000-150000	150000-200000	>200000	TOTAL
2	13	25	18	15	5	2	78
2.56%	16.67%	32.05%	23.08%	19%	6%	2.56%	100.00%



11. SETTLEMENT TYPE

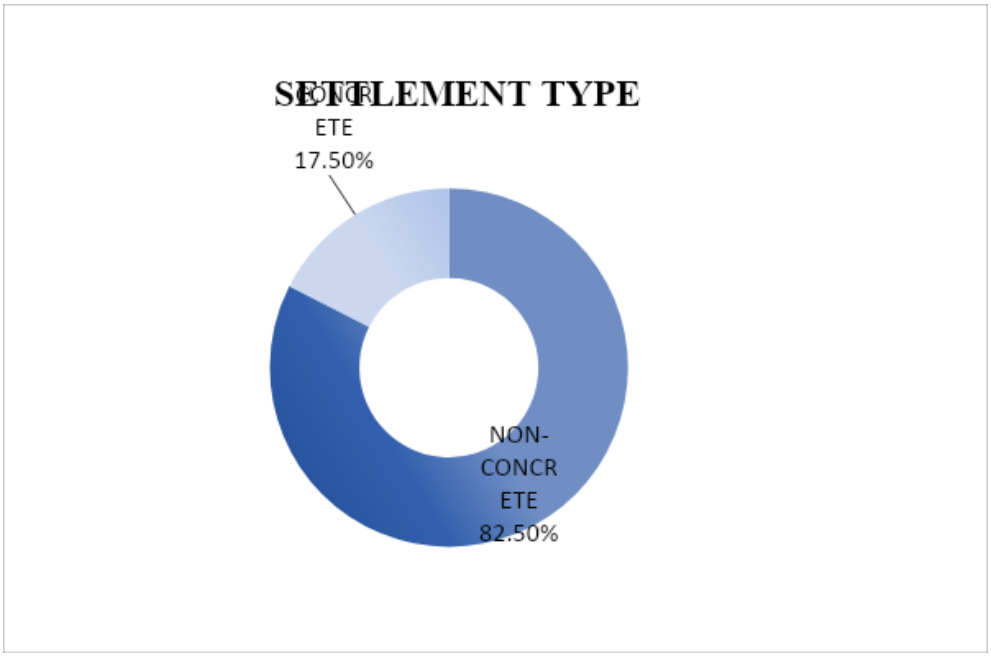
Though the village is dominated by Schedule Caste and General population, some wealthy people live here. The survey shows that there are 82.50% of concrete houses and 17.50% non- concrete houses in this village. Among the non – concrete house, some house have brick walls and brick floor, and the rest of the houses have mud wall. Again, among non – concrete houses have asbestos roof, tiles and tin roof. The settlement type shows a co-existence of both poor and affluent families in the in the village. The village is served by sewerage system with concrete drains. Tubewell and taps are uses as common sources of drinking water. Ponds are used for other domestic uses. There is a many temple in this village, like Shiva temple, Durga temple, Kali temple and an annual festival occurs around this temple.

❖ CONCRETE HOUSE

NON-CONCRETE HOUSE

TABLE:-11 SETTLEMENT TYPE

SETTLEMENT TYPE		
CONCRETE	NON-CONCRITE	TOTAL
66	14	80
82.50%	17.50%	100.00 %

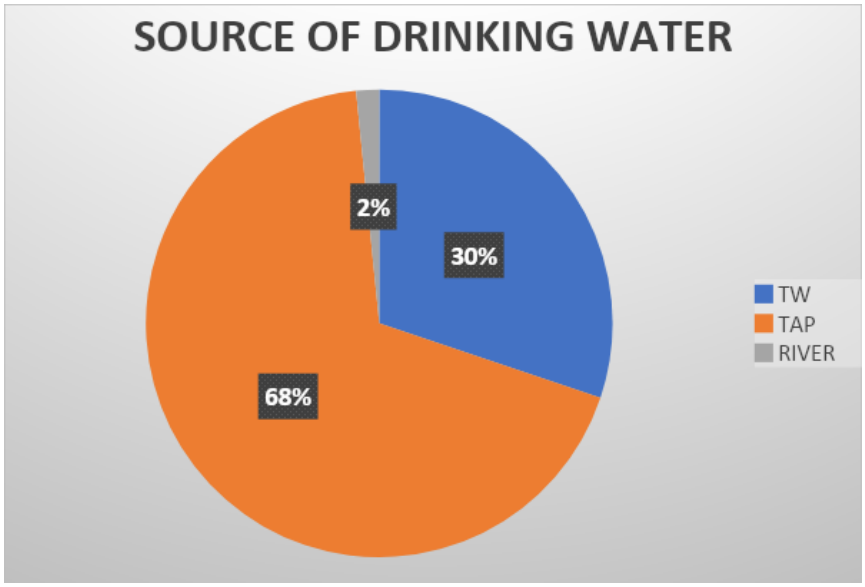


12. SOURCE OF DRINKING WATER:

❖ SOURCE OF DRINKING WATER

TABLE:- 12

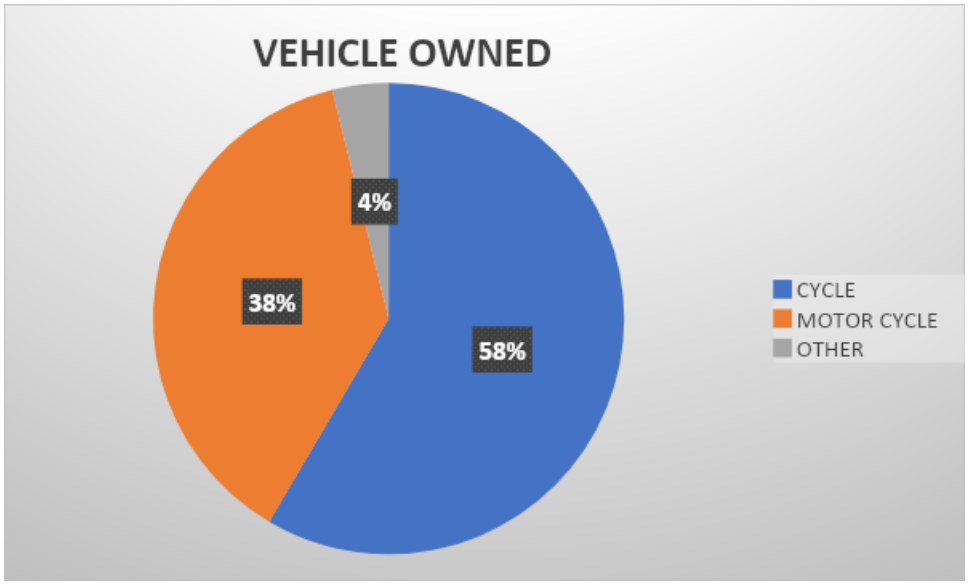
SOURCE OF DRINKING WATER			
TW	TAP	RIVER	TOTAL
19	43	1	63
30.16%	68.25%	1.59%	100.00%



13. TRANSPORT

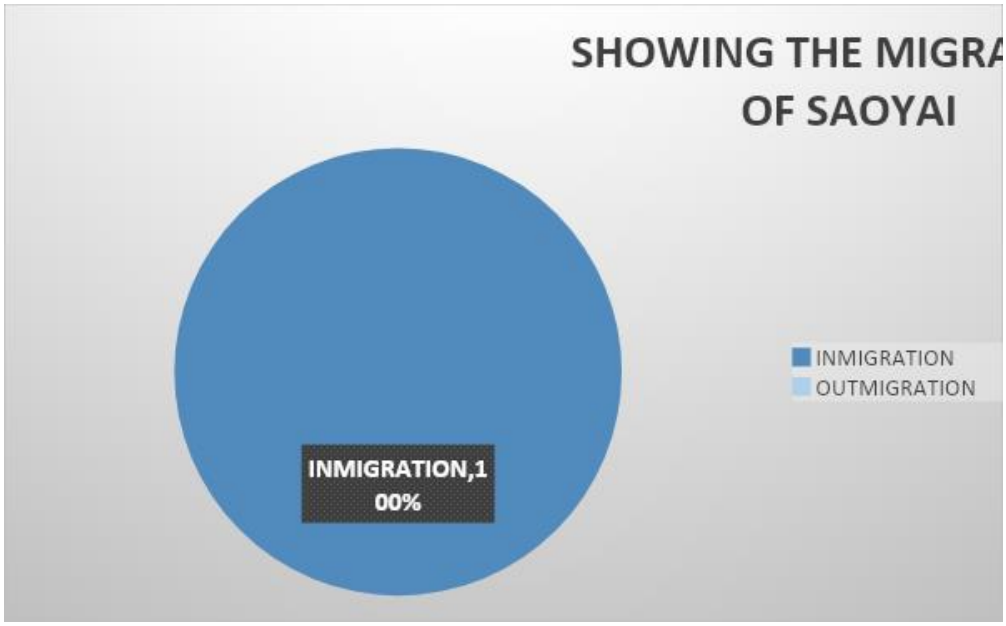
TABLE:-13

VEHICLE OWNED			
CYCLE	MOTOR CYCLE	OTHER	TOTAL
76	49	5	130
58.46%	37.69%	3.85%	100.00%



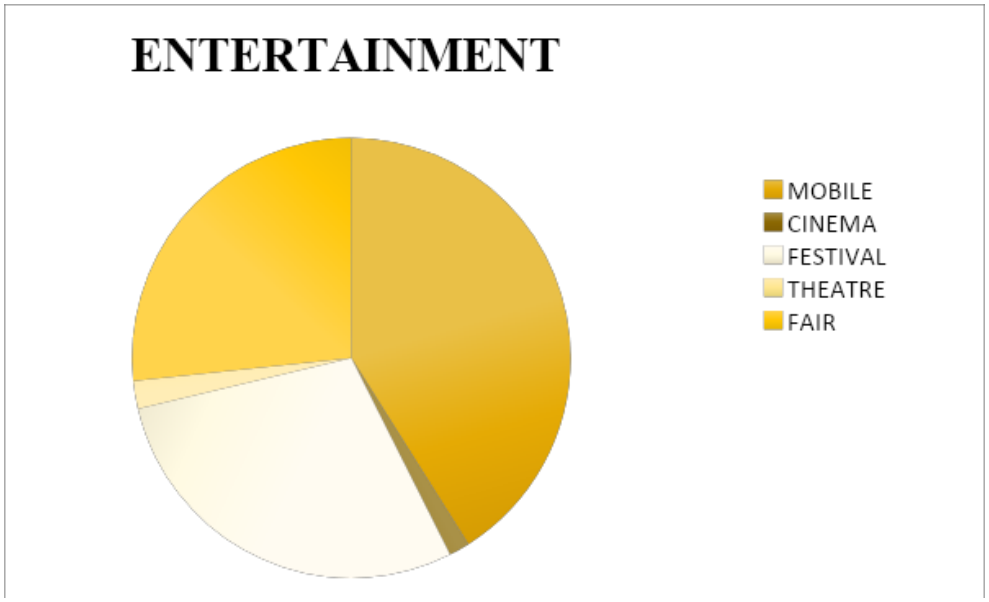
14. MIGRATION

MIGRATION		
INMIGRATION	OUTMIGRATION	TOTAL
72	0	72
100.00%	0.00%	

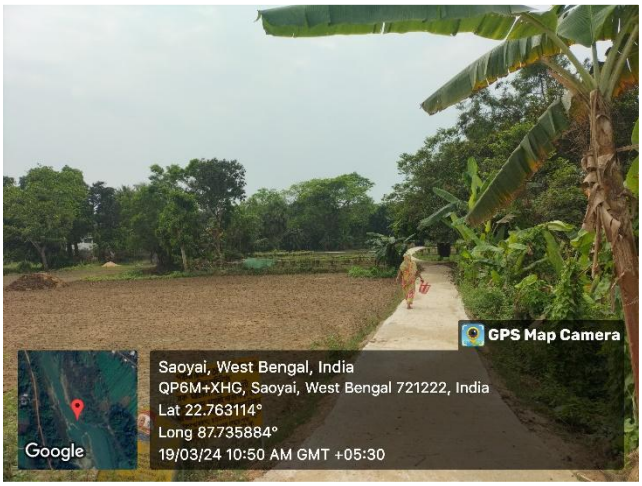


15. ENTERTAINMENT:

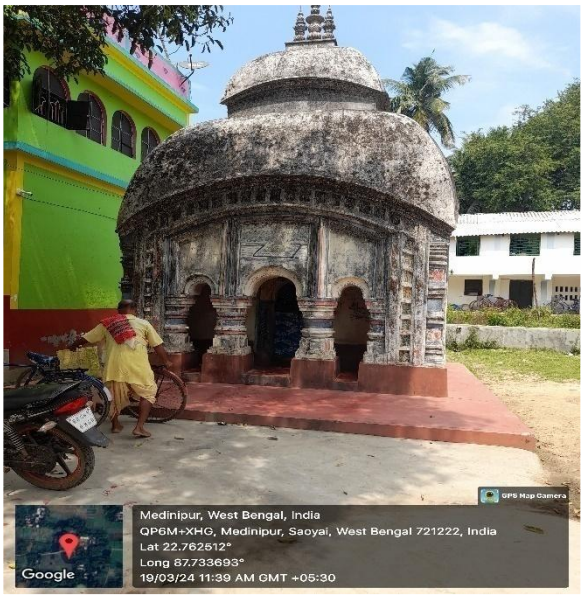
ENTERTAINMENT					
MOBILE	CINEMA	FESTIVAL	THEATRE	FAIR	TOTAL
80	3	56	4	52	195
41.03%	1.54%	28.71%	2.05%	26.67 %	100.00 %



16.COMMUNICATION MODE:



17.FESTIVAL:



CHAPTER-4

AGRICULTURE AND LANDUSE

1. CROPPING PATTERN

Being located in SAOYAI mouza is also an agricultural village. Soil is fine loamy sand to sand to silty clay loam soil. It, is found on the terraced farming of rice and for the crops cultivation of patato, oil seed, vegetables, jute.

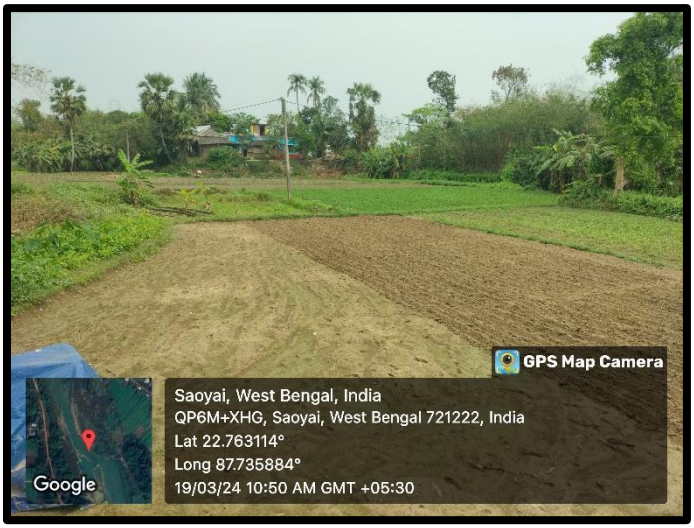
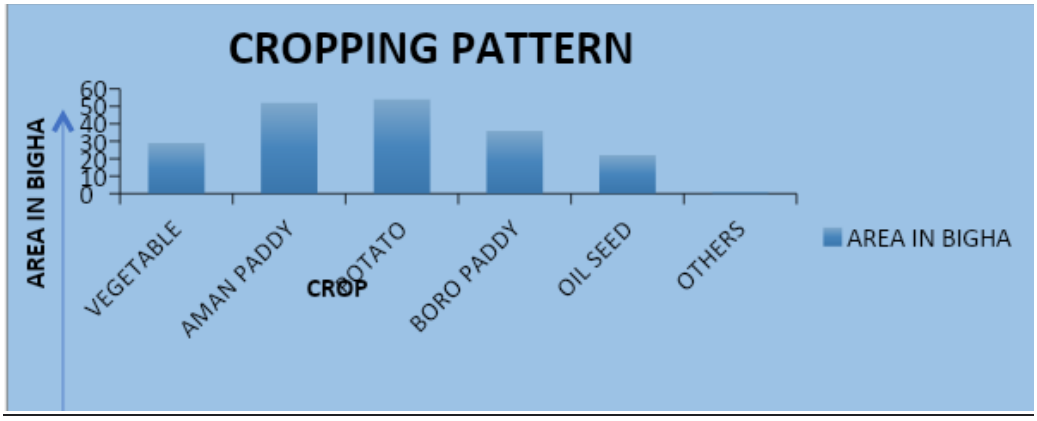


Table: 16 Cropping pattern

CROPPING PATTERN							
CROP	VEGETABLE	AMAN PADDY	POTATO	BORO PADDY	OIL SEED	OTHERS	TOTAL
AREA IN BIGHA	29	52	54	36	22	1	194
AREA(%)	14.95	26.8	27.84	18.56	11.34	0.51	

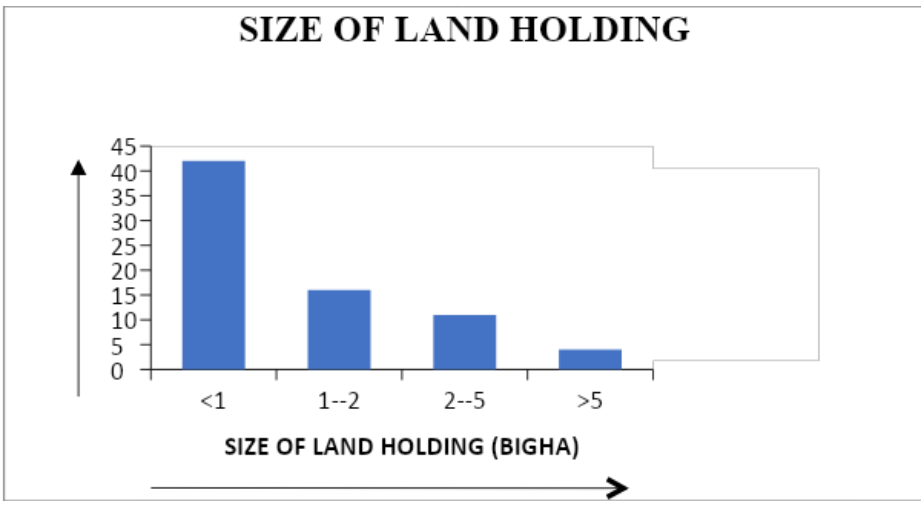


2 . AGRICULTURAL LAND AND SIZE OF LAND HOLDING

Land bolding indicates average size of agricultural land held by the farmers in this village about 57.53% families have <1 bigha land , 22% families have 1-2 bigha land ,15% families have 2-5 bigha land and 5.48% families have >5 land for agriculture. so ,the size of land holding shoes that 1-2 bigha land is more and more then 5 bigha land is few in this area. This agriculture condition indicates this is a developing villages.

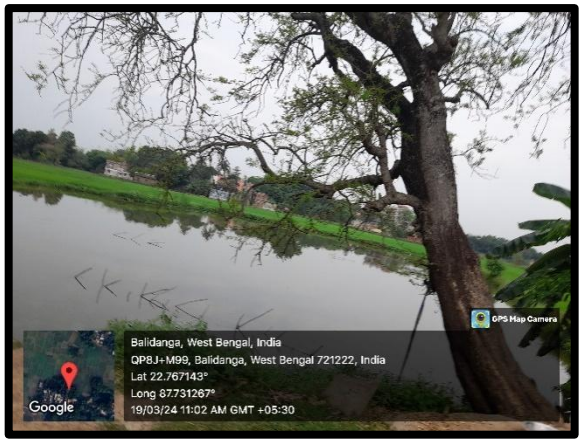
Table:17 Size of land Holding

SIZE OF LAND HOLDING					
HOLD SIZE(BIGHA)	<1	1--2	2--5	>5	TOTAL
NO.OF HOLDING	42	16	11	4	73
%HOLDING	57.53%	22%	15%	5.48%	

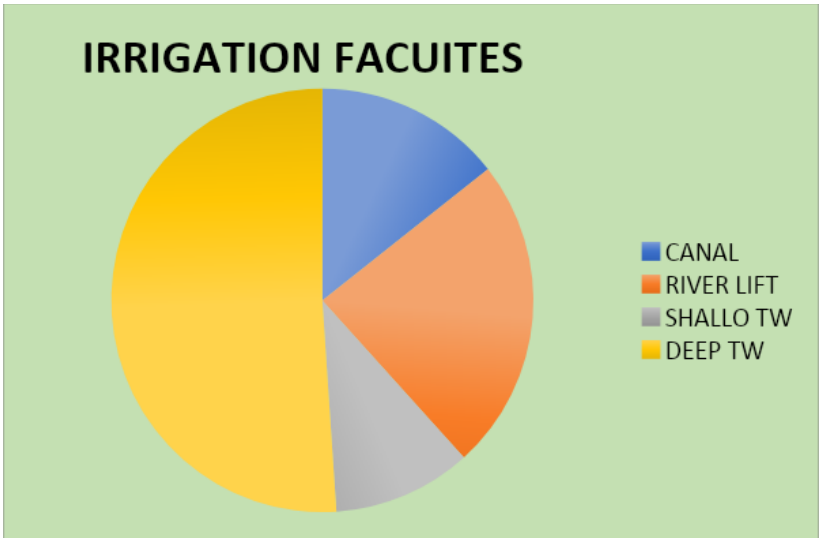


3. IRRIGATION

The village is facilitated by both canal and shallow TW irrigation. this is necessary to meet the demand of water by HYV seeds and chemical fertilizers that are used in agriculture. Irrigation is used in rabi season for boro paddy cultivation in zaid season.

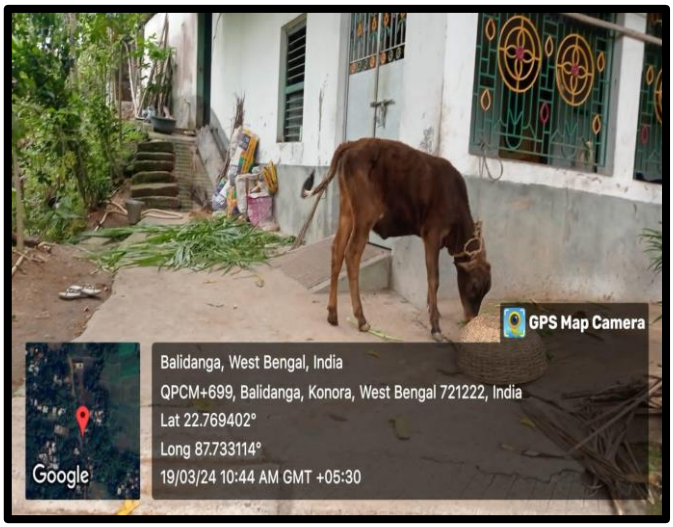


IRRIGATION FACUITES				
CANAL	RIVER LIFT	SHALLO TW	DEEP TW	TOTAL
4	27	45	20	96
4.16%	28.13%	46.88%	20.83%	100.00%



4. LIVESTOCKS

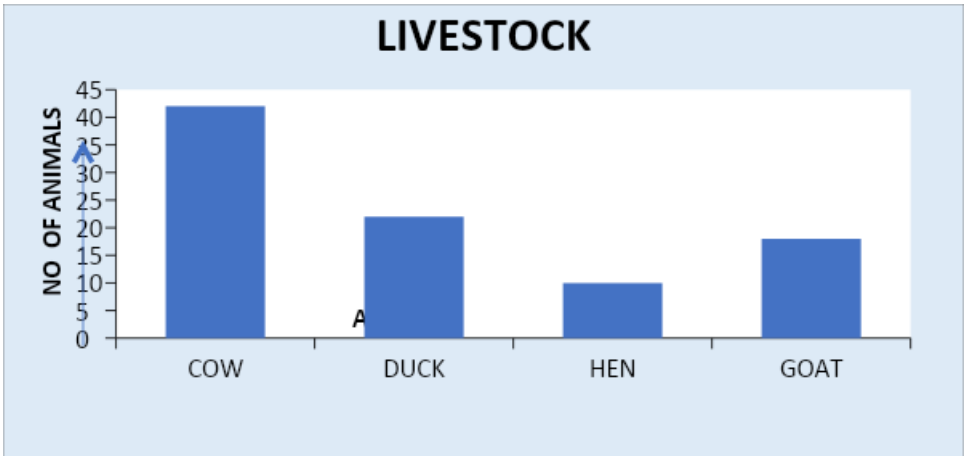
As SAOYAI is an agriculture village livestock is very common here. Among the livestocks cow coprises about 45.65%and goat comprice 19.57% of livestock. In addition to 34.4% hens are also found. Milk is used for domestic use and is also sold to the neighbouring people. Similarly, eggs and hens are also sold and they can earn from the livestock products.



❖ LIVESTOCK

Table:19 livestock:

LIVESTOCK					
ANIMALS	COW	DUCK	HEN	GOAT	TOTAL
NO.	42	22	10	18	92
%	45.65	23.91	10.89	19.57	



5. LANDUSE

Village SAOYAI is located at the GHATAL block in Paschim Medinipur. So settlement has grown to the central western part of the village, away from the eastern boundary. The village being rich in fertile alluvial soil entire village in surrounded by agricultural land is north, east, west and southern part. The village is dotted with numerous ponds. A river is found to the northern part. ARAMBAGH-GHATAL state highway. Inside village settlements are connected by pitch roads and few concrete roads. there is a play-ground and a grazing land to the western part of the village near the canal. To the central park there is a primary school and a temple in the village.

CHAPTER-5

DISASTER

DEFINATION:

As per the Oxford dictionary a disaster is “a sudden accident or a natural catastrophe that causes great damage or loss of life”.

A Disaster is an event or series of events, which gives rise to casualties and damage or loss of properties, infrastructure, environment, essential services or means of livelihood on such a scale which is beyond the normal capacity of the affected community to cope with. Disaster is also sometimes described as a “catastrophic situation in which the normal pattern of life or ecosystem has been disrupted and extra-ordinary emergency interventions are required to save and preserve lives and or the environment”.

DISASTER MANAGEMENT:

As per Disaster Management Act, 2005, “disaster management” means a continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for:

(i) Prevention of danger or threat of any disaster;
(ii) Mitigation or reduction of risk of any disaster or its severity or consequences,
(iii) Capacity-building;
(iv) Preparedness to deal with any disaster;
(v) Prompt response to any threatening disaster situation or disaster;
(vi) Assessing the severity or magnitude of effects of any disaster; evacuation, rescue and relief;
(vii) Rehabilitation and reconstruction;

FLOOD:

Floods are the most frequent type of natural disaster and occur when an overflow of water submerges land that is usually dry. Floods are often caused by heavy rainfall, rapid snowmelt or a storm surge from a tropical cyclone or tsunami in coastal areas.

DIFFERENT TYPES OF FLOOD:

A. Dam floods.

B. Flash floods.
C. Coastal floods.
D. River floods.

CAUSES OF FLOOD:

- Rains. Whenever there are more rains than the drainage system can take, they can cause floods.
- River overflow. Rivers can overflow their banks to cause a flood. ...
- Strong winds in coastal areas. ...
- Dam breaking---

EFFECTED OF FLOOD:

Generally, flood affects the any type of structure, including buildings, bridges, sewerage systems, roadways, and canals as a primary effects and water contamination, crop damages, communication disturbance etc as a secondary effects.

In the study area those effects are critically observed. Agricultural loss is the main affects of flood in the SAOYAI village. About 75% Agricultural lands are located in low lying areas where water logging condition prevails about 3 months. So huge amount of crop damages (mainly paddy) are found to occurred for flood.

IMPACT OF FLOOD:

Recurring floods SAOYAI in GHATAL in Paschim Medinipur district damage people's homes and crops, shattering their lives and livelihoods. Almost every home in GHATAL, a subdivision of PASCHIM MEDINIPUR in WEST BENGAL, has suffering from flood. These are the most impacted like-

- Loss of human life.
- Property and infrastructure damage.
- Road closures, erosion, and landslide risks.
- Crop destruction and livestock loss.
- Threats to salmon and other aquatic species.
- Health risks due to water contamination.
- Housing displacement.
- Economic impacts.

FLOOD PRONE AREAS IN PASCHIM MEDINIPUR:

The flood is one of the most effective events of environment. GHATAL subdivision is one of the flood prone areas in West Bengal. Therefore, GHATAL block is very vulnerable for flood hazards. Critical drainage pattern of river SILABATI and monsoonal climatic fluctuation are the main cause of flood in GHATAL block, which may effects not only sudden devastating damages but also affects for long time as water contamination and unhealthy environment. During rainy season in this area affects by structural damages including house damages, crop failure and loss of production, damage of road and communication system. Therefore, people suffered for a long time for economic loss and unhealthy environment in the study area. Local people are also suffered from their daily life and due to this people are adapted with an alternative livelihood system against flood during this situation.

State government takes some important management proposal like "GHATAL MASTER PLAN", but it is not a full solution of this problem. So hydrological and Geo-morphologically including local people participation and awareness, is the way to manage the effects of flood in GHATAL block, which may interested field for future study.

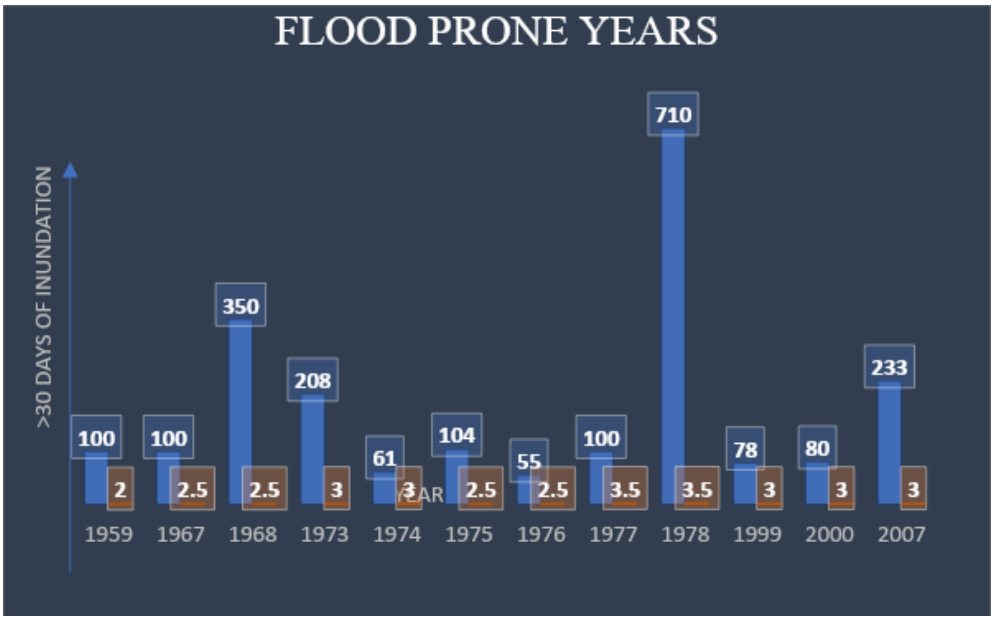
- **FREQUENCY OF FLOODING AREA IN GHATAL:**

  Generally, speaking the SHILABOTI-DWARAKESWAR and the DWARAKESWAR-RUPBARAYAN interfluves are most affected by flooding due to both the basin –shaped topography of the region and the ineffectiveness of the circit embankments on the left bank of the SHILABOTI. However, flooding is not very common in the SHILABOTI-RUPNARAYAN interfluves itself and this in spite of the erratic discharge outflows through the RUPNARAYAN. Standing at least 4m higher than its surroundings and encircling the GHATAL town, the well-maintained Chetua Circit embankment on the right bank of the SHILABOTI usually protects this interfluves from flooding.

- Officially records revealed that the GHATAL region was ravaged devastating floods in 1888,1942,1913,1956,1959,1968,1973,1978,2000,2007 and 2013

- **Table: Extent of the flooded areas in the GHATAL region and surroundings in relevant flood-prone years.**

Year	>30days of inundation		15-30 days of inundation	
	Area (sq.km)	Depth (m)	Area (sq.km)	Depth (m)
1959	100	2	184	1.5
1967	100	2.5	69	1.5
1968	350	2.5	308	2
1973	208	3	150	1.5
1974	61	3	102	1.5
1975	104	2.5	110	1.5
1976	55	2.5	104	1.5
1977	100	3.5	130	1.5
1978	710	3.5	356	1.5
1999	78	3	100	1
2000	80	3	121	1
2007	233	3	400	2

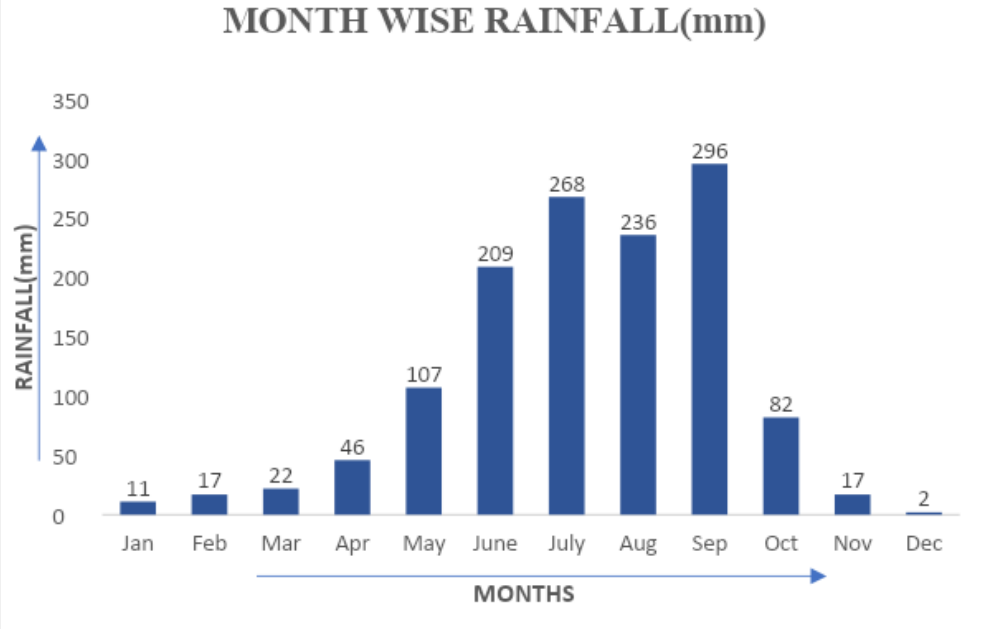


- **ROLE OF CLIMATE:**

  The month wise rainfall distribution of 2019 also show the concentration of rainfall in a sudden period. This rainfall concentration for few months in a particular year may cause of flood because each river have some capacity to carry the volume of water. But huge amount of water in a sudden period is the cause of overflow in the SILABATI River and its tributaries. The poor availability of water in summer season is the cause of river water.

- **Table: Month wise Rainfall distribution (2019)**

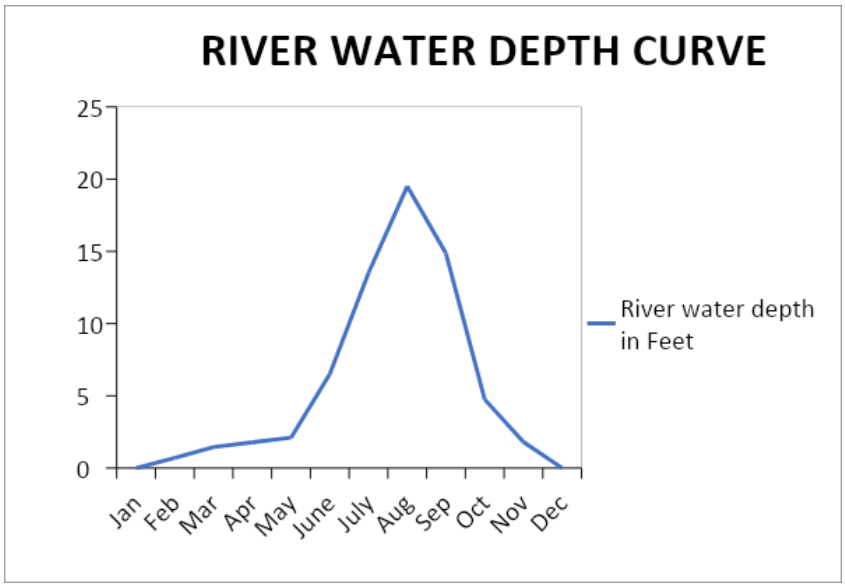
MONTHS	RAINFALL IN (mm)
Jan	11
Feb	17
Mar	22
Apr	46
May	107
June	209
July	268
Aug	236
Sep	296
Oct	82
Nov	17
Dec	2



Because of maximum rainfall concentration in rainy season (June to september) that is shows that in river water depth curve. The peak amount of water flows in river on this period which leads to flood hazards in Ghatal Block.

- **Table: Month wise river water depth(2011**

Month	River water depth (feet)
Jan	0
Feb	0.7
Mar	1.45
Apr	1.78
May	2.1
June	6.5
July	13.5
Aug	19.5
Sep	14.85
Oct	4.75
Nov	1.8
Dec	0



FLOOD OF SAOYAI MOUZA IN GHATAL

We went to SAOYAI mouza, situated in the lower basin of JHUMJHUMI river to this flood prone aera. The main purpose of visited there to make a project about disaster management. The main three stages which are- Preparedness, Mitigation and Prevention. We know about the impact and their problem due to this flood whit our observation and interaction with them. We try represent their problems and solutions with reference to disaster management process.

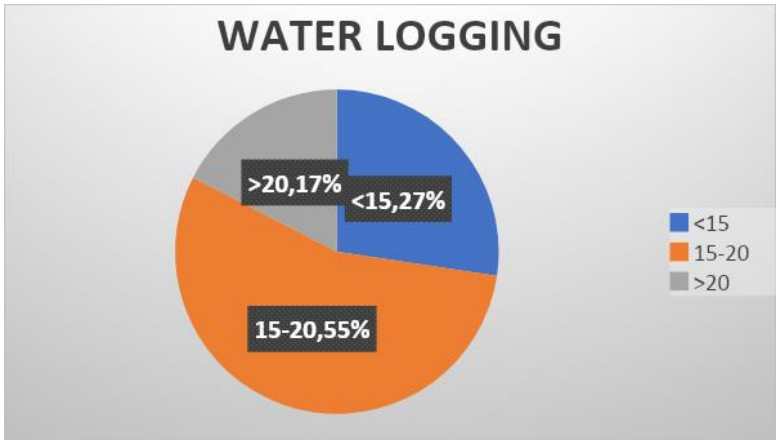
The area is under study name as SAOYAI MOUZA situated in GHATAL block of the PASCHIM MEDINIPUR in WEST BENGAL, INDIA.

WATER LOGGING:

SAOYAI mouza is located much below the sea level. The river JHUMJHUMI, flows through this village and on the other side there is a canal. Due to the lack of proper embankment in this canal, the water level of the canal rises during heavy rains. And the canal dam broke and this village was flooded.

SAOYAI village is among the sever flood prone village of GHATAL. This area gets flooded once or twice a year. This village was last flooded in September, 2023. Villagers suffers water logging for 15-20 days in every year. Our survey shows that about 2.38% of houses faced waterlogging for minimum in a year. About 17.50% of houses submerged under flood water for more than 20 days in a year.

HOW LONG ITS STAY(DAYS)	<15	15-20	>20
NO. OF TOTAL HOUSES (%)	27.5	55.5	17.5

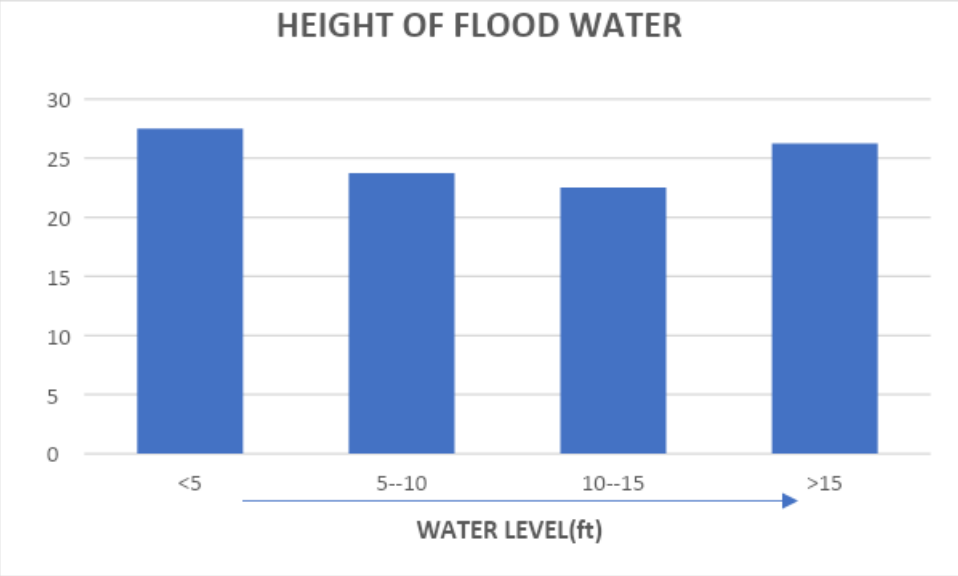


THE HEIGHT OF WATER LEVEL DURING FLOOD

During this time the height of water level is 5-15ft. In this time, the villagers took shelter in the village school.

The survey shows there are 27.5% household have faced flood water elevation up to < 5ft, 23.75% household have faced flood water elevation up to 5 to 10ft ,22.5% household have faced flood water elevation 10 to 15ft and 26.25% household have faced flood water elevation > 15ft.

WATER LEVEL (ft)	<5	5--10	10--15	>15
TOTAL	22	19	18	21
%	27.5	23.75	22.5	26.25



FLOOD RELIEF PROGRAM

SAOYAI villagers suffers flood for almost every year. In this difficult situation, most of the villagers do not get any compensation from the government or any other organization.

But during flood few villagers get some relief packages from government as well as from some NGOs also. Dry food, drinking water, tripal and sometimes money also distributed among the villagers during this natural calamity.

IMPACT OF FLOOD

SAOYAI located at the lower basin of JHUMJHUMI river. So it is geographically low land area, as it is a part of low basin area that's why the river bank is very shallow so the water is overflowed in every monsoon, in this area. In 2023 flood plays a devastating role due to heavy rainfall and the canal dam broke.

As a result of the flood the villagers faced many problems like-Houses are broken, Roads are flooded, Electricity is deflected, Crisis of drinking water, Various diseases occur, Many livestock were swept away by the flood, Crops are damaged due to inundation of cultivated land. For this reason the economical structure of the village is very poor.

Villagers of SAOYAI has been badly affected by the devastating flood, hare we surveyed only 80 families and the impact of the flood given below-

SETTLEMENT: Most of the houses in this study area affected due to flood. During flood the water level goes up about 5 to 15 ft so the ground floor of concrete houses are totally submerged. Whether the non-concrete housed are damaged badly due to the rise of water level and dwellers are bound to shift to the nearest school building.

HEALTH: Flood is one of the major causes of water pollution. So water based disease like Hepatitis, Diarrhea, cholera, Typhoid, Stomach Problem are the main health issues caused after flood, in this area. Lack of clean water and poor sanitation are the main cause of this disease. Other disease like Malaria, Dengue &sometimes snake bites also around after the flood water goes down.

AGRICULTURE: Agriculture is the main source of income of most families, in this area. But every year severe flood damaged this cultivation especially Amon cultivation as this is the main season of Amon cultivation.

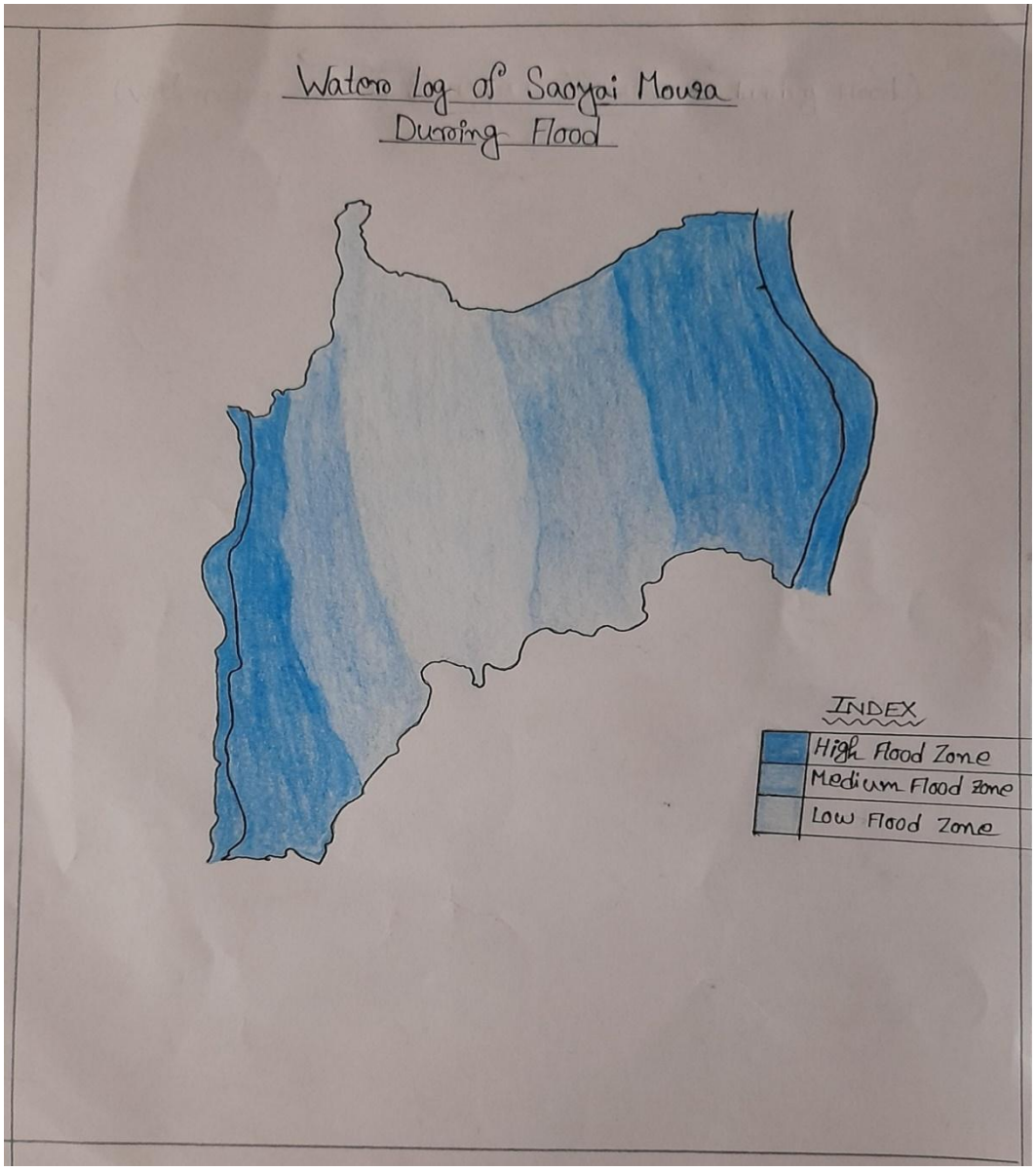
ECONOMIC CONDITION: After flood, prices of daily use goods in-creases tremendously. These goods are mainly rice, potato, onion, wheat, oil etc. The people of this area found a bad economic condition during and after the flood.

OTHERS PROBLEM: Water logging due to flood leads to the scarcity of drinking water also. As most of the tubewell submerged due to flood, people of this area face major scarcity of drinking water.

During the water logging period, the whole area goes under the darkness as there is no electricity during this time. This condition may sustain up-to ten days.

Another problem the people of this area faces is problem of transportation. During the flood, one and only transport system in this area is boat. Even after flood water goes down, road condition is not suitable for any transport for a long time.

FLOOD EFFECTED AREAS OF SAOYAI MOUZA



MANAGEMENT OF FLOOD

PREPAREDNESS :-

Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. In devastating floods administration and government should take some preparedness which helped them from severe loss of life, property and natural calamity. This Preparedness helps to survive local people and the geographical condition of the area. Disaster preparedness refers to measures taken to prepare for and reduce the effects of disaster. So here I discuss the preparedness of the JHUMJHUMI flood of SAOYAI, 2023.

- MAPPING OF DISASTER -PRONE AREAS.
- STUDY OF NATURE, MAGNITUDE AND SOVERITY OF HAZARDS.
- RISK ASSESSMENT OF DISASTER.
- STUDY THE PAST HISTORY AND REOCCURENCE INTERVALS OF HAZARDS.
- STUDY THE PSYCHOLOGICAL, SOCIAL IMPACT.
- PREDICATION TECHIQUES ETC.
- EARLY WARNING SYSTEM.
- LANDUSE PLANNING.

MITIGATION:-

Disaster mitigation can be defined in several ways, for instance as taking measure in advance of a hazardous event (emergency of disaster) that are aimed at preventing disaster for occurring or (more commonly) reducing the adverse effects of disaster on society and the environment. This can be archived by reducing the vulnerability of communities to the hazard, or by changing the environment in which hazards and communities interacts. In this devastating flood West Bengal government took a mitigation strategy was divided into two types. These were -----

A. Structural mitigation strategies.

B. Non – Structural mitigation strategies

Structural Mitigation Strategy:-

1. In this mitigation strategy administrative body looked at physical structure were constructed or modified to reduce the impact of flooding on individual properties.

2. Flood wall/ river bank constructed out of materials such as concrete to control the flow of flood water and prevent flooding of specific areas.
3. As there is no dam of the upper flow of DWARAKESWAR river that's why here flood occurred every monsoon. So, it is necessary to construct a dam.
4. As huge amount clay, sand, silt deposit in the bank of river DWARAKESWAR in a long time so the navigability become depleted. So, it is necessary drizzling and increases the navigability.

Non- Structural Mitigation Strategy:-

1. By using flood forecasting and warning methods local officials can determine weather or not a river will flood based on the level of the water.
2. Preparing and disseminating guide lines for natural hazards and raising awareness among the local administration bodies and local people.
3. Socioeconomic and development trajectory.
4. Training and education.

PREVENTION:-

It may be pointed out that floods are nature phenomena and one cannot entirely gate rid of them but their impact can be minimized by man's technology skill, better warning system and positive human response of flood warning and various control measures adopted by government.

MOUZA MAP

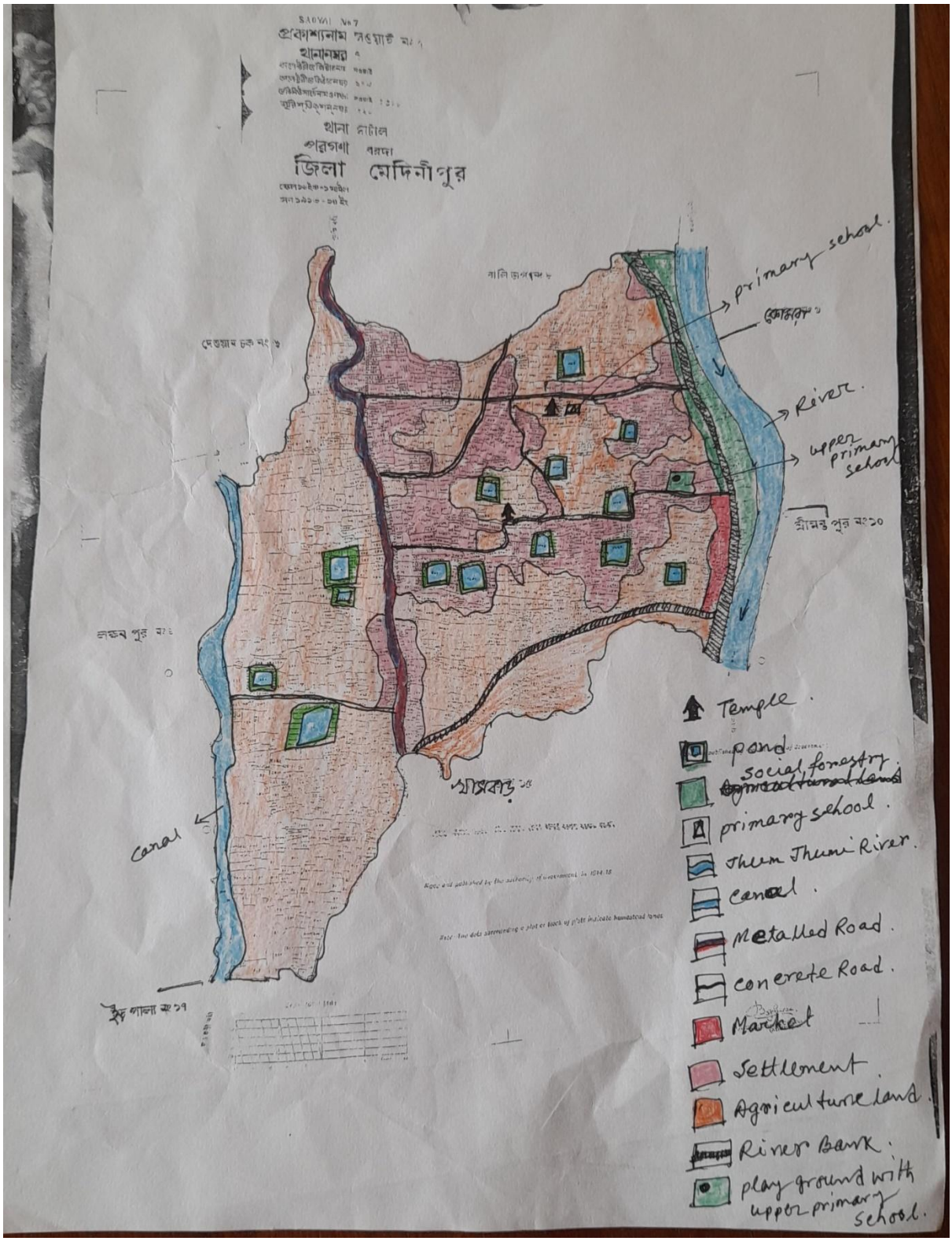

জিলা মেদিনীপুর
primary school.
River.
upper primary school
Temple.
pond
social forestry
primary school.
Jhum Jhumi River.
canal.
Metalled Road.
concrete Road.
Market
Settlement.
Agriculture land.
River Bank.
play ground with upper primary school.
Canal

PHOTO GALLARY OF SURVEY

CONCLUSION:

The study revealed a number of important factors about the interactions between people and floods. In depth interviews is the most effective data collection tool because it focused on psycho-social factors and drew out in depth responses from respondents about what they think and how they feel about the flood hazard. Experience with floods influences the perceived threat and concern related to them. Absolute safety against flooding cannot be achieved, but people prefer to feel safe. They like to pay the lowest money cost, while asking for satisfactory solutions. The best answer to flood management lies in a integrated approach and joint actions of both government and public sides.

Local resources available for flood risk reduction should be more utilized with less reliance on external aids to ensure sustainability. The health workers should be enhanced to promote food security, water and sanitation and health services. Additional training and incentives could extend their services concerning flood control and proper understanding of early warning systems. Community links with government agencies and NGOs should be strengthened in order to ensure continuity of efforts at flood risks reduction. Flood risk management need to be considered within development strategies and planning at all levels. However, an integrated approach to flood protection and rapid technical development requires the additional education of experts and improved public knowledge about flood.

BIBLIOGRAPHY

1. Sen,J. (2007) – Janasankhya Bhugol Books & Allied Pvt. Ltd, Kolkata
2. Chandra R.C (2005) – Geography & Population Kalyani publishers, Ludhiana
3. Sing R.L (2006) – India – A Regional Geography National Geo. Soc of India, Varanasi
4. Sarkar Ashish (2011) – Practical Geography – A Systemic Approach Orient hangman, Kolkata
5. Govt. of India – District cencus, Handbook, Govt. of India – Mouza Map of SAOYAI P.S. - GHATAL
6. Sing, R.L. & R.P.B. Sing (2005) – Elements of Practical Geography, Kalyani Publishers, New Delhi
7. Census of India, 2011.

THE UNIVERSITY OF BURDWAN

NETAJI MAHAVIDYALAYA

B.A/B.SC SEMESTER VI GEOGRAPHY HONOURS CBCS EXAMINATION - 2022

PAPER – CC 14 DISASTER MANAGEMENT (PRACTICAL)

TITLE

A THEORETICAL CASE STUDY OF IMPACT ASSESMENT AND MANAGEMENT OF LANDSLIDE WITH SPECIAL REFERENCE TO LINGTHAM, 2022

CERTIFICATE

This is to certify that …… bearing Roll No:…… has successfully completed ……. Project report on disaster management as per the syllabus of CBCS semester –VI (Hons) CC -14 of the University of Burdwan, under our supervision.

.....

Signature of supervisor

Content

ACKNOWLEDGEMENT

During the preparation of the field report in Lingtham with in a limited time span. I got strong co-operation from my teachers, department non-teaching stuffs, officials and habitants of the villagers.

I convey my sincerest respect and thanks to Dr. M. Laha, Dr. E.Hossain, Dr.M.Acharya, S.Mondal, D.Jana, D.Das, of the department of geography for extending their help at various steps to prepare this field report.

DISASTER MANAGEMENT PROJECT WORK

INTRODUCTION

India has the highest mountain chain on earth, the Himalayas, which are formed due to collision of Indian and Eurasian plate, the northward movement of the Indian plate towards Eurasian Plate causes continuous stress on the rocks rendering them friable, weak and prone to landslides and earthquakes. The slow movement of the Indian plate, about 5 cm/year accumulates stress. Earth quake and Landslides are among the major geological hazards that affect large parts of India besides the Himalayas, the North-Eastern hill ranges, the Western Ghats, the Nilgiris, the Eastern Ghats and the Vindhyans, in that order. The Himalayan Region of India is one of the most vulnerable areas prone to land slide hazards, this region is badly affected by many small to big landslide in each and every moment which leads to disruption of the means of communication, and loss of life and property, and day to day life of the inhabitants are greatly suffered. The North-Eastern states of India including Sikkim is largely affected by the land slide related problems. Keeping in view the complex geo-physical conditions of the Lingtham area of East Sikkim district our current study focuses on the overview of the landslides related issues and the mitigation and prevention of landslides in Lingtham of East Sikkim district of Sikkim.

AIMS AND OBJECTIVES

1. To identify the case of effect of the annual nature hazard, landslide in the village. To an overall geographical knowledge about the area under study.

2.To get a primary level training of physical as well as socio economic survey of the study area.

METHODOLOGY

Methodology followed towards completion of the field report are-

1. Pre-field lecture by professors.

2. Collection of secondary data climatological characteristics.

3. Making questionnaires on physical of socio-cultural and economic aspects.

4. Dividing the students into six groups , professors send them through different part of the village.

5. Door to door survey has been taken based on the questionnaires.

6. Perception survey of individual on group of the villagers to know the course of landslide in the village.

7. Tabulation of data collected from the field.

8. Preparing a map and diagrams. Excel 10 has used to prepare diagrams here.

9. Interpretation of map and diagram to complete the field report. Entire report has been type in Microsoft Word.

DISCUSSION

The word disaster derived from French ‘’desastre’’ which means in Greek is ‘’bad aster=bad star’’**.**

The root of the word disaster comes from and astrological theme in which the ancients used to refer to the destruction or deconstruction of a star as a disaster.

The ancient people believed that the disaster is occurred due to the unfavourable positions of the’’planets’’or ‘’act of God’’.

DEFINITION OF DISASTER

‘’Disaster can be defined as any event ,human-made or natural ,sudden or progressive ,causing widespread human material or environmental losses,which exceed the ability of the affected community to cope using its own resources ‘’. (Asian Disaster Preparedness Centre).

‘’an overwhelming ecological disruption occurring on a scale sufficient to require outside assistance’’….**PAHO 1980**

CLASSIFICATION OF DISASTER

1.Water and climate related disasters: a)Flood and drainage management.

b)Cyclones.

c)Cloud burst.

d)Tsunami etc.

2.Geological related disaster: a)Landslide and mudfiows.

b)Earthquakes.

3. Chemical,Industrial and nuclear related

Disaster: a)Chemical and industrial disaster.

b)Nuclear disaster.

4. Accident related disaster: a) Forest fire

b)Urban fires.

c)Village fire.

5.**Biological related disaster**: a)Food poisoning.

b)Pest attacks.

c)Biological disasters and epidemics.

DISASTER MANAGEMENT

Disaster Management is a systematic process, based on the key management principles of planning, organising, and leading which includes coordinating and Controlling). Aims to reduce the negative impact or consequences of adverse events (i.e., disasters cannot always be prevented, but the adverse effects can be minimised)

STEPS IN DISASTER MANAGEMENT

Disaster Management activity basically comprises of three stages -

1. Pre disaster stage
2. During disaster (on - disaster stage)
3. Post disaster

Pre – disaster Stage

Pre – disaster stage of disaster reduction and management aims at informing people of the area to be affected by a hazard. To make community to be prepared and mentally ready to face any sorts of eventuality through various measures.

Pre – disaster Steps

Pre – disaster stage has three major steps known PMP steps

1. **Disaster preparedness (P)**
2. **Disaster Mitigation (M)**

3. **Disaster Prevention (p)**

Disaster Preparedness (P)

Preparedness means necessary arrangements to meet any eventuality if a hazards strikes a locality and community. This involves the study of vulnerability of a region to certain hazards. To access the risk of individual hazard.

Disaster Mitigation (M)

Processes and initiatives to reduce the impact of hazard. '' while it may be possible to prevent some disaster effects, other effects will obviously persist. The concept of mitigation recognizes this and maintains that the application of certain measures (usually in the form of specific programs) can moderate or reduce disaster effects'' (ADB, 2008)

Disaster Prevention (P)

Disaster prevention does not mean to prevent the occurrences of disasters. It means to prevent the adverse effect of disasters by adopting certain measures. Disaster prevention based on the out come of disaster preparedness and mitigation .

During disaster (on – disaster stage)

The main activity is to take prompt response to deal with the emergent situations. Addressing the needs and requirements of victims or affected while the disaster is occurring or has just occurred.

Post disaster

The post disaster stage comprises the following steps to absorb the adversities of natural disaster.

1. Relief measures.
2. Recoveries from the shock of disasters.

3. Rehabilitation of displaced communities.

DEFINITION OF LANDSLIDE

The movement of the rocks or debris etc. on a slope downwards is called a landslide. It is a type of ‘’mass wasting ‘’ which refers to the movement of any mass, soil, or rocks under the influence of gravity. It is one of the natural hazards and can be a disaster if the damages occur in large amounts.

A landslide, also known as a landslip, is a geological phenomenon that includes a wide range of ground movements, such as rock falls , deep failure of slopes and shallow debris flow.

TYPES OF LANDSLIDE

The most common types of landslide are described in the below –

1. **SLIDES =**

   Although many types of mass movements are included in the general term ‘landslide’, the more restrictive use of the term refers only to mass movements, where there is a distinct zone of weakness.

2. **FALLS =**

   Falls are abrupt movements of masses of geologic materials, such as rocks and boulders , that become detached from steep slopes or cliffs.

3. **TOPPLES =**

Toppling failures are distinguished by the forward rotation of a unit or units about some pivotal point , below or law in the unit , under the actions of gravity and forces ekerted by adjacent units or by fluids in cracks.

4. **FLOWS =**

There are five basic categories of flows that differ from one another in fundamental ways.

CAUSES OF LANDSLIDE

1. Geological causes
   a. Weak or sensitive materials
   b. Weathered materials
   c. Sheared,jointed, or fissured materials
   d. Adversely oriented discontinuity (bedding,schistosity,fault,unconformity,contact,and so forth)
   e. Contrast in permeability and/or stiffness of materials
2. Morphological causes
   a. Tectonic or volcanic uplift
   b. Glacial rebound
   c. Fluvial,wave ,or glacial erosion of slope toe or lateral margins
   d. Subterranean erosion(solution,piping)
   e. Deposition loading slope or its crest
   f. Vegetation removal (by fire,drought)
   g. Thawing
   h. Freeze-and –thaw weathering
   i. Shrink-and-swell weathering

3. Human causes
   a. Excavation of slope or its toe
   b. Loading of slope or its crest
   c. Drawdown (of reservoirs)
   d. Deforestation

e. Irrigation
f. Mining
g. Artificial vibration
h. Water leakage from utilities

PROCESSES OF LANDSLIDES

a. Landslides and water

Slope saturation by water is a primary cause of landslides.This effect can occur in the form of intense rainfall,snowmelt,changes in ground-water levels ,and water level changes along coastline ,earth dams ,and the banks of lakes,reservoirs,cannels,and rivers .Landslides can cause flooding by forming landslide dams that block valleys and stream channels ,allowing large amounts of water to back up.

b. Landslides and seismic activity

Many mountainous areas that are vulnerable to landslides have also experienced at least moderate rates of earthquake occurrence in recordedtimes. The occurrence of earthquakes in steep landslide –prone areas greatly increases the likelihood that landslides will occur, due to ground shaking alone or shaking – caused dilation of soil materials , which allows rapid infiltration of water .

MAJORS LANDSLIDES IN INDIA AND THEIRS IMPACT

Major Landslide Zones in India Hit till Date	Year & Responsible Factor	Impact Due to the Destruction
Malpa landslide in Uttarakhand	Consecutive landslides for 7 days between 11th to 17th August 1998 due to Earthquake	An entire village was washed off with 380 people
Darjeeling landslide in West Bengal	4th October 1968 due to Flood	More than 1000 people died, and a 60km highway was broken into 91 parts
Darjeeling Landslide In West Bengal	4th October 1968 due to Flood	More than 1000 people died, and a 60km highway was broken into 91 parts
Kotrupi landslide in Himachal Pradesh	13th August 2017 due to Excessive rainfall	More than 50 people died, 40 were missing, and there were severe casualties
Kuwari landslide in Uttarakhand	10th March 2018 due to Heavy rainfall	More than 400 people died, and 106 houses perished

Dareeling Landslide, West Bengal:

The landslide happened around Oct 4,1968. The landslide was triggered by floods and the 60 km long highway was cut in 91 parts. As per reports, thousands of people died in the landslide.

Malpa Landslide, Uttarkhand:

Consecutives landslides occurred between Aug 11 and Aug 1`7 in 1998.in the village of Malpa where over 380 people died as the entire village washed away in the landslide.The landslide worst landslides in India.

Guwahati landslide, assam:

The landslide to place on sep 18,1948 due to heavy rains. Over 500 people died in the landslide and according to the reports, the landslide buried an entire village.

Mumbai landslide, maharastra:

The landslide was caused in July 2000.the landslide took place in the suburbs of Mumbai due heavy rains which was followed by land erosion. As per reports around 67 people died and the local trains were also stricken.

Kedarnath landslide, uttarakhand:

The landslide took place on June 16, 2013 and was the result of Uttarkhand floods. Over 5700 were reported dead an over 4200 villages had been affected by the floods and post –floods landslide.

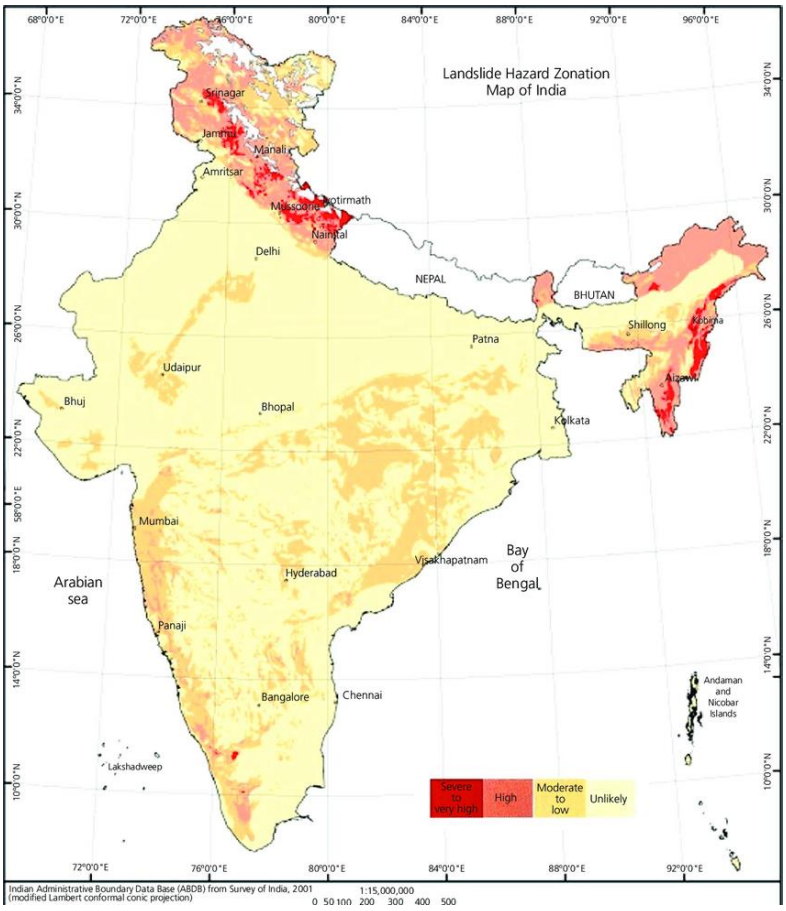
Amboori landslide,kerala:

The landslide was known as the worst landslide in Kerala's history. The landslide occurred on Nov 9,2001 due to heavy rains a around 40 people died in the incident.

LANDSLIDE OF VULNERABILITY ZONES IN INDIA

Following landslide vulnerability zones are recognized in India:

1. **Very High Vulnerability Zones.**



This zone includes young mountains of the Himalayas ,Andaman and Nicobar,steep and rainy slopes of the Western Ghats and Nilgiris, the north eastern regions and areas of intense human activities particularlythose related to construction of roads ,dams etc.

.

2. **High Vulnerability Zones.**

These areas have geographically conditions similar to those which have very high vulnerability. The only difference is that the intensity frequency of landslides is less as compared to areas of very high vulnerability. All the Himalayan states and the states from the north eastern region except the plains of Assam are included in the high vulnerability zones.

3. **Moderate to Low Vulnerability Zones.**

Areas that receive less precipitation such as Trans-Himalayan areas of Ladakh and Spiti (Himachal Pradesh), undulated yet stable relief and low precipitation areas in the Aravali, rain shadow areas in the Western and Eastern Ghats and Deccan plateau also experience occasional landslides. Landslides due to mining and subsidence are most

common in states like Jharkhand, Orissa. Chhattisgarh, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu, Goa, and Kerala.

4. **Other Areas:**

The remaining parts of India, particularly states like Rajasthan, Haryana, Uttar Pradesh, Bihar, West Bengal (except district Darjeeling), Assam (except district KarbiAnglong) and Coastal regions of the southern States are safe as far as landslides are concerned.

CONSEQUENCES OF LANDSLIDES

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides have relatively small and localized area of direct influence, but the roadblock, destruction of railway lines and channel-blocking due to rock-falls have far-reaching consequences. It is a geologic procedure in which gravity causes rock, soil, simulated fill or a combination of the three to move down a slope. Several things can trigger landslides, including the slow weathering of rocks as well as soil erosion, earthquakes, and volcanic activity.

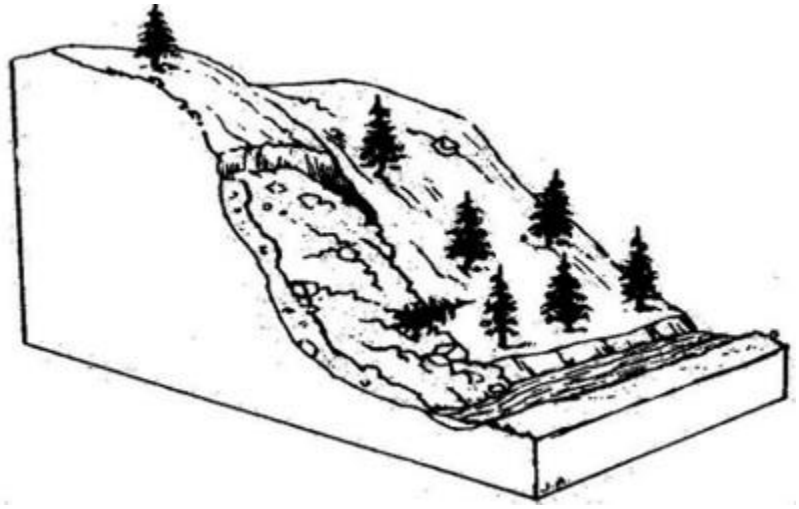


Fig: Landslides

Diversion of river courses due to landslides can also lead to flood and loss of life and property. It also makes spatial interaction difficult, risky as well as a costly affair, which, in turn, adversely affects the developmental activities in these areas.

MITIGATION

It is always advisable to adopt area-specific measures to deal with landslides. Restriction on the construction and other developmental activities such as roads and dams, limiting agriculture to valleys and areas with moderate slopes, and control on the development of large settlements in the high vulnerability zones, should be enforced. This should be supplemented by some positive actions like promoting large-scale afforestation programs and construction of bunds to reduce the flow of water. Terrace farming should be encouraged in the northeastern hill states where Jhumming (Slash and Bum/Shifting Cultivation) is still prevalent.

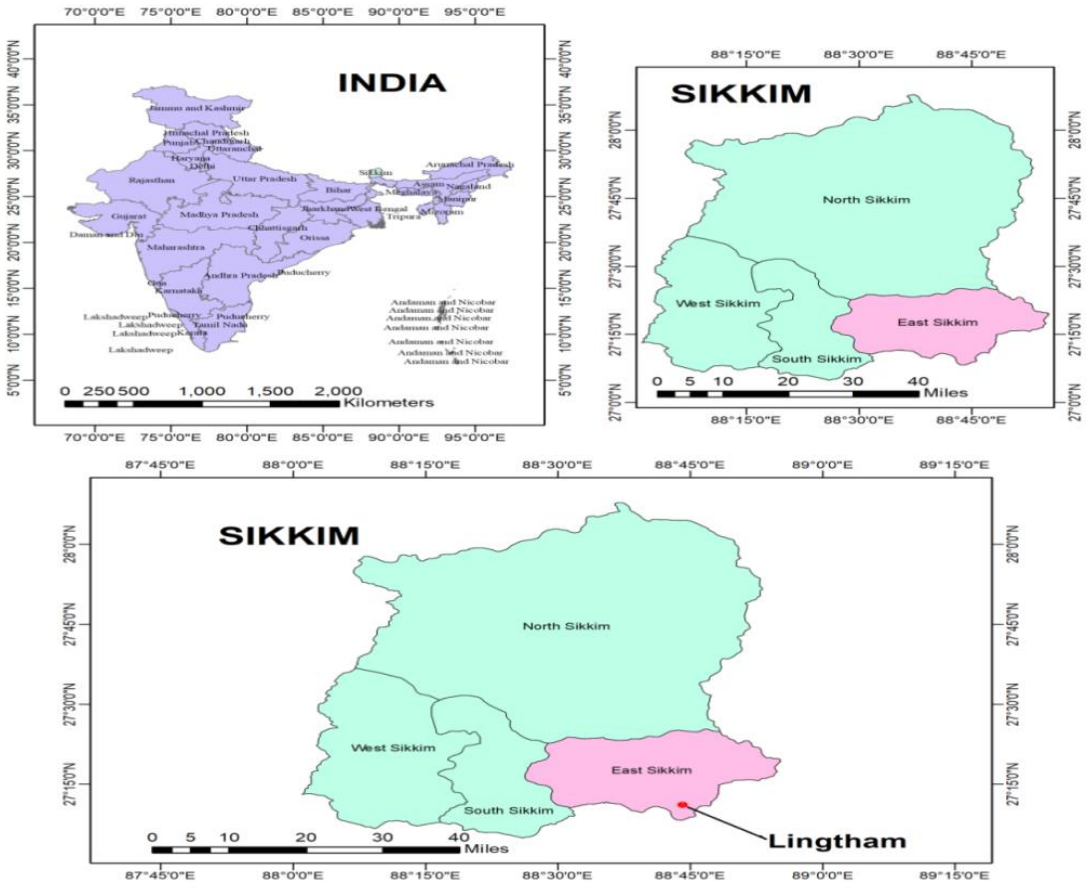
A CASE STUDY ON LANDSLIDE IN LINGTHAM AREA OF SIKKIM

Introduction

Among the natural hazards, landslide and mass-movement are very common in Sikkim Himalaya. Sikkim is a small Himalayan state in North-East India with geographical area of 7,096sq km. Present population of this state is 610,577 as per Census, 2011. Nepal bound thestate in the west, vast stretches of the Tibetan plateau, in the north, Bhutan and Chumbi valley of Tibet in the east and Darjeeling district of West Bengal along the southernboundary. Tista and Rangit, which originates respectively, from Cholamu Lake (ZemuGlacier) and Rathong Glacier, are the two major rivers of the state. The state of Sikkim has been administratively divided into four districts Viz North Sikkim, South Sikkim, East Sikkim and West Sikkim.With increase in the population the modern economic activities also increase in the mountainous region, thus paving a way for landslide to take place. The greatest damages which landslides effects are the transportation system i.e. roads and the highways which directly or indirectly affects a large number of people in the hilly terrain. Apart from this loss, other essential facilities like water supply, power and the communication are also being affected by the landslide activities. Therefore, to study the nature and the impact of landslides in Sikkim Himalayan region have to be done thoroughly. Our present study focuses on the causes and impact of landslides on the socio-economic environment in near Lingtham area of East Sikkim District of Sikkim.

Location

The area under study name as Lingtham village situated in Sikkim. This village is located at 127 km away from NJP station. Lingtham village is connected to NJP town by NJP to RONGLI route metalled road. The small village is known for its peacefulness with a sparkling weather guarded by a small river called Bakhuterkhola.The village is located at an altitude of around 5000 feet above sea level, Lingtham is surrounded by hills on all sides and has two monasteries.



Location Map of the Study Area

Geology

The major portion of east Sikkim is covered by Precambrian rocks consisting of five major rock formations e.g., Everest politic formation, Rangoli Schist formation, Darjeeling gneiss formation, Chungthang formation and Kanchanjunga Gneiss formation. Sikkim group of rocks consists of Rongli Schist formation and Darjeeling Gneiss formation. The early-Paleozoic formations are represented by Dailing and Buxa formations of Rabung group of rocks. The area is traversed by two major thrust e.g., the Chungthang thrust and the main central thrust (MCT). The geological map of east Sikkim shows presence of different rock types i.e., phoillite, quartzite,quartzite-phyllite,quartzite-schist and gneisses.

Drainage

The district is mainly drained by the perennial TistaRiver with tributaries DikChhu,RateChhu and RangpoChhu.

Climate

The district is characterized by cool and humid climate. It receives adequate rainfall from south-west monsoon, which sets in the later half of June and continues up to the middle of October.Pre-monsoon rains are received during March –April maximum and minimum temperature as recorded are 27.5^{o} and 1.5^{o}c.

Soil

Soil in the area are mostly derived from parent rocks such as schist, gneiss and colluvial materials. The characteristics of soil varies from place to place due to topographical variations.

The texture of the soil is loamy sand to silty clay loam. Soils are generally acidic in nature having the PH value of 5.0 to 6.0. Brown red and yellow soils are found in a small area around RANGPO TOWN.

National Bureau of soil survey and landuse planning (ICAR) conducted soil survey has given below group:

1. Udalfa – High base status soil of humid region.
2. Orthents – Recently formed soil.
3. Ochrepts – shallow black, brown and alluvial soils.

Vegetation

Alpine –type vegetation is typically found between an altitudes of 3500 to 5000 meters (11500 to 16400 ft.) In lower elevations are found juniper,pine,firs,cypresses and rhododendrons from the eastern Himalayan subalpine conifer forests.

Some of the well-known orchids found here are Arachnanthe, Dendrobium, Cymbidium, Vanda, Phalaenopsis, Caelogyne, and Saccolabium. Rhododendron is also the state tree of Sikkim.

Demographic Characteristics

There are total population 1347 and among them male population are 696 and female population are 651. Through the village there is dominated by ST categories people and they are 856 in numbers (male ST-445 and female ST-411), followed by them SC category peoples are 16 in numbers.

Causes of Landslide in Lingtham

Natural Factor:

1. **Gravity :**

   Gravity is the force by which a planet or other body draws objects toward its center. The value of the gravitational force depends on the weight of the materials present on the slope. As a weight of that material increases the value of the gravitational force. As a result of that the slope became more vulnerable to landslide. That's why Lingtham area of East – Sikkim witnessed many landslides in various scale.

2. **Excess load on the slope :**

   Excessive geological loads and artificial loads on slopes increase the likelihood of landslides. Landslides are also seen in Lingtham for this reason.

3. **Weathering :**

   Weathering is a natural process of rock crushing. Weathering causes the rock to crumble and separate from the bed rock. Then due to the effect of gravitational force or due to geo-vibration, those crushed rock deform their place and cause landslides. Landslides are also happened in Lingtham for this reason.

4. **Earthquake :**

   Earthquake creates cracks in the rock layer, destroying rock stability, even destroying mountain roads etc. Due to this reason landslide took place in Lingtham hill area.

Man made causes:

1. **Deforestation:**

   The inhabitants of Lightam area are dependent on forest for their livelihood and daily need of fuel woods. As a result, the land area gradually becomes deforested, the rock and soil compaction of the affected areas is rapidly destroyed therefore the chances of landslides increases.

2. **Construction:**

As civilization has evolved in the world, the range of different construction of roads, high-rise buildings has increased under the pressure of overpopulation. The steep slopes of the Lingtham hill have not been spared from construction in order to address the problem of human settlement. In particular, new attempts to erect houses along the steep slopes of the hill, with unbridled construction of highways, have inevitably resulted in landslides.

3. **Unscientific Agriculture:**

Step farming is a popular farming method in Lingtham hill area. Here the steep hilly terrain is leveled by cutting steps, makes it suitable for growing crops. In addition, people from several tribal communities in all of these regions have been engaged in shifting agriculture. As a result of these two types of unscientific farming practices, the soil and rock barriers of the respective areas gradually become loose and cause landslide.

4. **Repercussion of Landuse:**

Extensive urbanization, new settlements, traditional farming methods and uncontrolled deforestation, spread of railways and roads the vast area of Lingtham hill area have made landmass much weaker that before and landslides are occurring.

Effects of Landslide in Lingtham

1.Lead to economic decline:

Landslides have been verified to result in destruction of property. If the landslide is significant, it could drain the economy of the region or country. After a landslide, the area affected normally undergoes rehabilitation.

2. Loss of life:

Communities living at the foot of hills and mountains are at a greater risk of death by landslides. A substantial landslide carries along huge rocks, heavy debris and heavy soil with it. This kind of landslide has the capacity to kills lots of people on impact. For instance, Landslides in the Sikkim that happened a few years ago caused rotation of debris that destroyed a school and killed over 144 people including 116 school children aged between 7 and 10 years.

3. Decimation of infrastructure:

The force flow of mud, debris, and rocks as a result of a landslide can cause serious damage to property. Infrastructure such as roads, railways, leisure destinations, buildings and communication systems can be decimated by a single landslide.

4.Affected Beauty of Landscape:

The erosion left behind by landslides leaves behind rugged landscapes that are unsightly. The pile of soil, rock and debris downhill can cover land utilized by the community for agricultural or social purposes.

5.Impacts river ecosystems:

The soil, debris, and rock sliding downhill can find way into rivers and block their natural flow. Many river habitats like fish can die due to interference of natural flow of water. People of Lingtham depending on the river water for household activities and irrigation will suffer if flow of water is blocked.

6.Impact of landslide on tourism

Although Lingtham is a landslide prone area, it is an important tourist destination due to its natural andgeographical features. The economic basis of Lingtham is tourism. Since it is a landslide prone area, thetourism industry in the area is being suffered. As a result of landslides, tourists are unable to reach theirown destinations, which is frustrating for tourists. It also costs tourists more to leave and go elsewhere.

Landslide Management in Lingtham

The essential steps are to be taken to prevent the landslide .The following steps are-

- Construction ofconcrete houseand road, bridges, on the steep slopes of Lingtham areas will have to be stopped.
- Multi-storey concrete house should not be built in this landslide prone area.
- Geological and soil tests should be done beforeconstruction, work in this Lingtham area.
- People need to be made aware of the causes and consequences of landslides in theLingtham villagearea.

- Retaining walls can be built to stop land from sleeping. It constructed to prevent smaller size and secondary landslide that often occur along the toe portion of the larger landslide.

Conclusion

Sikkim,a small mountainous state of India situated in the eastern Himalayan region with a total area of 7059sq.km.Here, landslide are a serious geologic hazard. As people move into new areas of hilly or mountainous terrain, it is important to understand the nature of their potential exposure to landslide hazards, and how cities, towns can plan for land use, engineering of new construction and infrastructure which will reduce the costs of living with landslide. Although the physical causes of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land-use management regulations can reduce landslide hazards. It is also important to understand the science of landslides – their causes, movement characteristics, soil properties, the geology associated with them, and where they are likely to occur.

References

1. C.K.(1999),Landslide hazard zonations along NH-31Afrom sevok to Rangpo –Aterrain evaluation study. ISEG journal of Engineering Geology Vol.27,No.1-4.
2. Ghosh,R.N.(2008),Landslide and its investigation techniques.ISEG Journal of Engineering Geology Vol.35,No.1-4.
3. Roslanl, Z.A. and Shafee, H. M. (2011), Forecasting erosion induced landslide. Disaster & Development Vol.5,No.1&2, April & November2011.
4. Goswami, S.C.(1948), Seismotectonic significance in the distribution of landslides caused by the Assam Earthquake of August 15, 1950. ISPG journal Engineering Geology Vol. 13, No.3-4.
5. Kumar, S.(1999), Mass wasting. ISEG. Journal of Engineering Geology Vol.27 No. 1-4 .
6. Government of India. (1997) Vulnerability Atlas of India. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.

A

PROJECT REPORT

ON

OnlineJobPortal

Submittedby

In partial fulfilment for the award of the degree

of

B.Sc(H) in Computer Science

Netaji Mahavidyalaya

Arambagh, Hooghly - 712601

NETAJI MAHAVIDYALAYA

BONAFIDE CERTIFICATE

Certified that this project report "**ONLINE JOB PORTAL**" is the bonafide work of

"_____

_____"

who carried out the project work under my supervision.

SIGNATURE OF HEAD
AJIT KUMAR SINGH

Netaji Mahavidyalya

SIGNATURE OF SUPERVISOR

Netaji Mahavidyalya

ACKNOWLEDGMENT

I wish to record my deep sense of gratitude and profound thanks to my research supervisor

_____, NETAJI MAHAVIDYALAYA, the University of Burdwan, for his keen interest, inspiring guidance, constant encouragement with my work during all stages, to bring this dissertation into fruition.

Finally, I extend my sincere thanks to All faculty members, non-teaching staff members and Lab Assistants of the CS Department, NETAJI MAHAVIDYALAYA , for their valuable support throughout the course of my B.Sc(H) in Computer Science Dissertation.

I thank my friends and family members who have encouraged me in my research efforts and shouldered me in needy times.

Abstract

Job portal service was developed for creating an interactive job vacancy form for candidates. This web application manage updates both from the job seekers as wellasthecompanies.It’suniquedevelopmentmethodologyhelpsinacquiringtheclienta nd candidate information and separating them according to the job requirements and vacancies.

The online access to it provides details of the job. An employer being registered inthe web site has the facility to use the services. Being an authorized user he canpublish vacancy details and can search no of Employees on portal and also he cansearchcandidatesonbasisofthekeyskillwhichemployeeprovidesonregistration.

TableofContents

ListofFigures

ListofTables

Chapter1:Introduction

1.1 BriefOverviewofWork

Now a day, we know that searching of jobs is so difficult in proficient areas the portal developedfor the providing the simple and good job searching. With the help of this portal easily the jobseekercansubmittheirresumeandgetthelotofopportunityofthejobrelatedtotheirprofile.Andbythiswebsitethecompanies oremployer canalsofind thegoodandwellprofiledresume.

1.2 Objective

TheonlinejobPortalSystemthatistobedevelopedprovidesthemembershwithjobsinformation,online applying for jobs and many other facilities. This system provides service to the jobapplicantsto search for working opportunities.

JobPortalwillallowjobprovidertoestablishonetoonerelationshipswithcandidates.This Portalwill primarily focus on the posting and management of job vacancies. This system is designedsuchthatultimatelyallvacancieswillbepostedonlineandwouldoffer employersthefacilitiestopost their vacancies online. It helps to review and manage the resulting applications efficientlythrough the web. Employer can also find the resume according to key skill in very less amount oftime.

1.3 Scope

AsofIndianmarket,thereisampleopportunitiesforthejobportalsites,asmoreandmorenumberofeducatedandskilledyoungpeoplearecomingouteachandeveryyear.Also,astheg rowthrateofIndiaiszoomingtobeatahealthyrateover7%,soitisboomtimeforcorporateal so.So,moreand more number of lucrative careers will be available for the job

seekers. So, it is now the rightperiod for the job portal sites to think out of the box, and to make most of the opportunitiesavailable.

1.4 ProjectModules

1.4.1 Registration

EmployeeorEmployercanregisterwithvaliddetailslikecontactdetails,experiencedetails,profiledetails.

1.4.2 Search

EmployeeCan Searchjob according totheir interest. Andalso apply forthat job. Employersearchcandidatesfortheirrequirementsusingkeyword.Employeralsocanco mmunicatewith employeefortheirany other query orinformationvia send message.

1.4.3 Job Post

Employerpostjobfortheirorganization.Andincludejob vacancy,salarydetails,working hours,designationdetails, experienced details.

1.4.4 ManageAccount

AdminCanManageEmployeeandEmployerDetails.AdminobservedUsersActionlikejobposting,candidatedetailsfalse ornot.

1.5 ProjectRequirements

1.5.1 Hardware

Thesystemrequiresthefollowinghardware:

- RAM:1GB(furtherincreasethatasperrequirement.)
- HardDisk:80GB(furtherincreasethatasper requirement.)
- Display:1024 * 768, TrueTypeColor-32 Bit
- Mouse:AnyNormal Mouse.
- Keyboard:Any window SupportedKeyboard.

1.5.2 Software

- DatabaseServer:PHP MyAdmin
- WebServer:Internet InformationServer
- Technologies:HTML,CSS, PHP,
- Tool : Xampp

1.6 Software Details:

1.6.1 PHP :

PHP is a general-purpose scripting language geared towards web development. It was originally created by Danish-Canadian programmer Rasmus Lerdorf in 1993 and released in 1995. The PHP reference implementation is now produced by the PHP Group.[11] PHP was originally an abbreviation of Personal Home Page, but it now stands for the recursive initialism PHP: Hypertext Preprocessor.

PHP code is usually processed on a web server by a PHP interpreter implemented as a module, a daemon or a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code—which may be any type of data, such as generated HTML or binary image data—would form the whole or part of an HTTP response. Various web template systems, web content management systems, and web frameworks exist that can be employed to orchestrate or facilitate the generation of that response. Additionally, PHP can be used for many programming tasks outside the web context, such as standalone graphical applicationsand robotic drone control.PHP code can also be directly executed from the command line.

The standard PHP interpreter, powered by the Zend Engine, is free software released under the PHP License. PHP has been widely ported and can be deployed on most web servers on a variety of operating systems and platforms.

The PHP language evolved without a written formal specification or standard until 2014, with the original implementation acting as the de facto standard that other implementations aimed to follow. Since 2014, work has gone on to create a formal PHP specification.

W3Techs reports that as of January 2023, "PHP is used by 77.8% of all the websites whose server-side programming language we know." It also reports that only 8% of PHP users use the currently supported 8.x versions. Most use unsupported PHP 7, more specifically PHP 7.4, while 23% use PHP 5, which is not supported with security fixes and is known to have serious security vulnerabilities. This does not necessarily indicate that these websites are vulnerable, though, since Linux distributions such as Debian provide security patches for unsupported versions of PHP.

1.6.2 HTML:

In 1980, physicist Tim Berners-Lee, a contractor at CERN, proposed and prototyped ENQUIRE, a system for CERN researchers to use and share documents. In 1989, Berners-Lee wrote a memo proposing an Internet-based hypertext system. Berners-Lee specified HTML and wrote the browser and server software in late 1990. That year, Berners-Lee and CERN data systems engineer Robert Cailliau collaborated on a joint request for funding, but the project was not formally adopted by CERN. In his personal notes of 1990, Berners-Lee listed "some of the many areas in which hypertext is used"; an encyclopedia is the first entry.

The first publicly available description of HTML was a document called "HTML Tags",first mentioned on the Internet by Tim Berners-Lee in late 1991. It describes 18 elements comprising the initial, relatively simple design of HTML. Except for the hyperlink tag, these were strongly influenced by SGMLguid, an in-house Standard Generalized Markup Language (SGML)-based documentation format at CERN. Eleven of these elements still exist in HTML 4.

HTML is a markup language that web browsers use to interpret and compose text, images, and other material into visible or audible web pages. Default characteristics for every item of HTML markup are defined in the browser, and these characteristics can be altered or enhanced by the web page designer's additional use of CSS. Many of the text elements are mentioned in the 1988 ISO technical report TR 9537 Techniques for using SGML, which describes the features of early text formatting languages such as that used by the RUNOFF command developed in the early 1960s for the CTSS (Compatible Time-Sharing System) operating system. These formatting commands were derived from the commands used by typesetters to manually format documents. However, the SGML concept of generalized markup is based on elements (nested annotated ranges with attributes) rather than merely print effects, with separate structure and markup. HTML has been progressively moved in this direction with CSS.

1.6.3 CSS :

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language such as HTML or XML (including XML dialects such as SVG, MathML or XHTML).CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of content and presentation, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device

The name cascading comes from the specified priority scheme to determine which style rule applies if more than one rule matches a particular element. This cascading priority scheme is predictable.

The CSS specifications are maintained by the World Wide Web Consortium (W3C). Internet media type (MIME type) text/css is registered for use with CSS by RFC 2318 (March 1998). The W3C operates a free CSS validation service for CSS documents.

In addition to HTML, other markup languages support the use of CSS including XHTML, plain XML, SVG, and XUL. CSS is also used in GTK widget toolkit.

1.6.4 PHP MyAdmin:

phpMyAdmin is a free and open source administration tool for MySQL and MariaDB. As a portable web application written primarily in PHP, it has become one of the most popular MySQL administration tools, especially for web hosting services.[4]

Tobias Ratschiller, then an IT consultant and later founder of the software company Maguma, started to work on a PHP-based web front-end to MySQL in 1998, inspired by MySQL-Webadmin. He gave up the project (and phpAdsNew, of which he was also the original author) in 2000 because of lack of time.[5]

By that time, phpMyAdmin had already become one of the most popular PHP applications and MySQL administration tools, with a large community of users and contributors. In order to coordinate the growing number of patches, a group of three developers (Olivier Müller, Marc Delisle and Loïc Chapeaux)[6] registered The phpMyAdmin Project at SourceForge and took over the development in 2001.[7]

In July 2015, the main website and the downloads left SourceForge and moved to a content delivery network.[8] At the same time, the releases began [9] to be PGP-signed. Afterwards, issue tracking moved to GitHub[10] and the mailing lists migrated.[11] Before version 4, which uses Ajax extensively to enhance usability, the software used HTML frames.

1.6.5 Xampp:

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.[3][4] Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server possible.

XAMPP's ease of deployment means a WAMP or LAMP stack can be installed quickly and simply on an operating system by a developer, with the advantage that common add-in applications such as WordPress and Joomla! can also be installed with similar ease using Bitnami.

Chapter2:System Analysis

2.1 LiteratureReview

JobProcurement:OldandNewWaysJobseekingusuallyinvolvesdifferentwaystolookforjobssuchasthroughpersonalcontacts,directtelephonecallstoemployers,jobagencyoffice,scanningonline job listings, etc. Before the Internet, became widely uses as a method of seeking jobs,jobseekers spent a lots of time using various methods to look for job openings. Today, jobseekersuse online methods which are very convenient and save a lot of time. Galanaki lists the followingmethodsto bethetraditional (old) ways for recruitment:

1) Employmentrecruitmentagencies
2) Jobfairs
3) Advertisingin themass mediasuchas newspapers
4) ManagementConsultants
5) Advertisementintelevisionandradio
6) Existingemployeecontacts
7) Schoolscollegesoruniversitiesstudentsservicesdepartment
8) Workersorprofessionalreferrals

These old job seeking methods are too slow, stressful, challenging and also lack quality. Inaddition, the applicants have to consider the cost and the amount of time to get the informationtheyneed,andotherpreparationstheyhavetomake.Finding allavailablejobvacanciesisamainstep at in the job-seeking process. The Internet is now a powerful tool that jobseekers can use.Today,therearemanysitesthatadvertisejobpositionstobefilledbypeoplewithcertainskillsinvarious fields. The Internet plays an important role in the area of human resource planning anddevelopment. Most planning and development organizations are now using computer technologyand the Internet for staff recruitment. It should be noted that although the Internet has facilitatedtheprocess of job-seeking,it has notreplacedthetraditionalmethods, completely.

Importanceof JobPortals

In the age of technology, the Internet has become the main source of information for jobseekers.Large corporations, Institutions, and universities include information on career Prospects on theirwebsites. According toasurvey,70%ofthe workforce useswebsites or portalsonthe Internet toSearch for jobs in France. These websites or portals provide search engine to access informationon jobopportunities.

2.2 ProjectFeasibilityStudy

2.2.1 TechnicalFeasibility

Technicalfeasibilitystudyisconcernedwithspecifyingequipmentandsoftwarethatwillsuccessfullysatisfytheuserrequirement;thetechnicalneedsofthesystemmayvaryconsiderably.

The facility to produce outputs in a given time. Our project is a web based application which isbased on client-server based application. In this application every page as output is render fromserver to client so it is necessary that the page should be rendered in time. For this I have avoidedmoreand morecodein thepage-load event.

2.2.2 EconomicalFeasibility

Economicalfeasibilityisthemeasuretodetermine thecostandbenefitoftheproposedsystem.Aprojectiseconomicalfeasiblewhichisundertheestimatedcostforitsdevelopment.Thesebenefitsand costs may be tangible or intangible. Job Portal is the cost-effective project in which there islesspossibilityof intangiblecost sothereisno difficultytodeterminethecost ofthe project.

2.2.3 OperationalFeasibility

Operation feasibility is used to check whether the project is operationally feasible or not. Ourproject is mainly different from the other system because of its web-support feature. So themeasureforoperationalfeasibilityissomethingdifferentfromothersystem.Generallytheoperationalfeasibility isrelated to organization aspects.

The change determination is as such that early product were either a man or group of men or thejobsbased manual but now aday with theadventof Internet technology.

2.3 ProjectTimelineChart

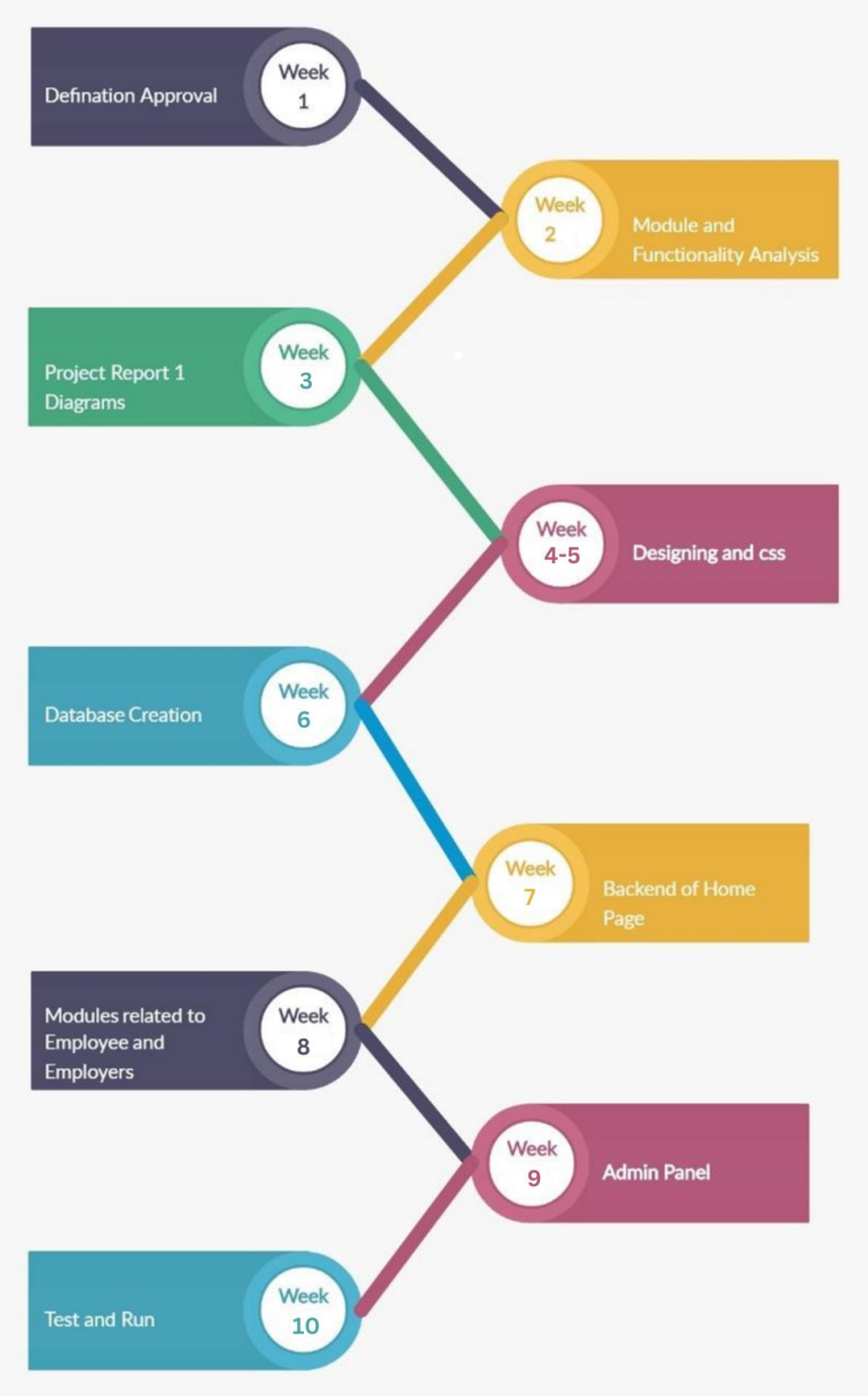


Figure1-Timelinechart

2.4 DetailedModuleDescriptionwithallFunctionalities

2.4.1 Registration

In the registration module job seeker have to include all the details like personal details,contactdetails, education details etc.Also job seeker has to add his experience details, job requirements and uploading resume.

While job recruiter has to add his contact details and organization details for the registration anduploadcompany profile.

2.4.2 JobPost

Employer can post a job by providing all the job details like qualifications details, requirementsfor the job, designation details, job salary details and also provide type of jobs. They also candelete the jobs whenever they want. After successfully posted a job it will be available for all thejob seekers who are searching for a job. And it will be available on home page as recently postedjob.

2.4.3 Search

Employee Can Search job according to their interest. And also apply for that job .

Employer search candidates for their requirements using keyword like technology. And also cancommunicate with employee for their any other query or information via send message .and alsoemployerseetheresumeof applicants.

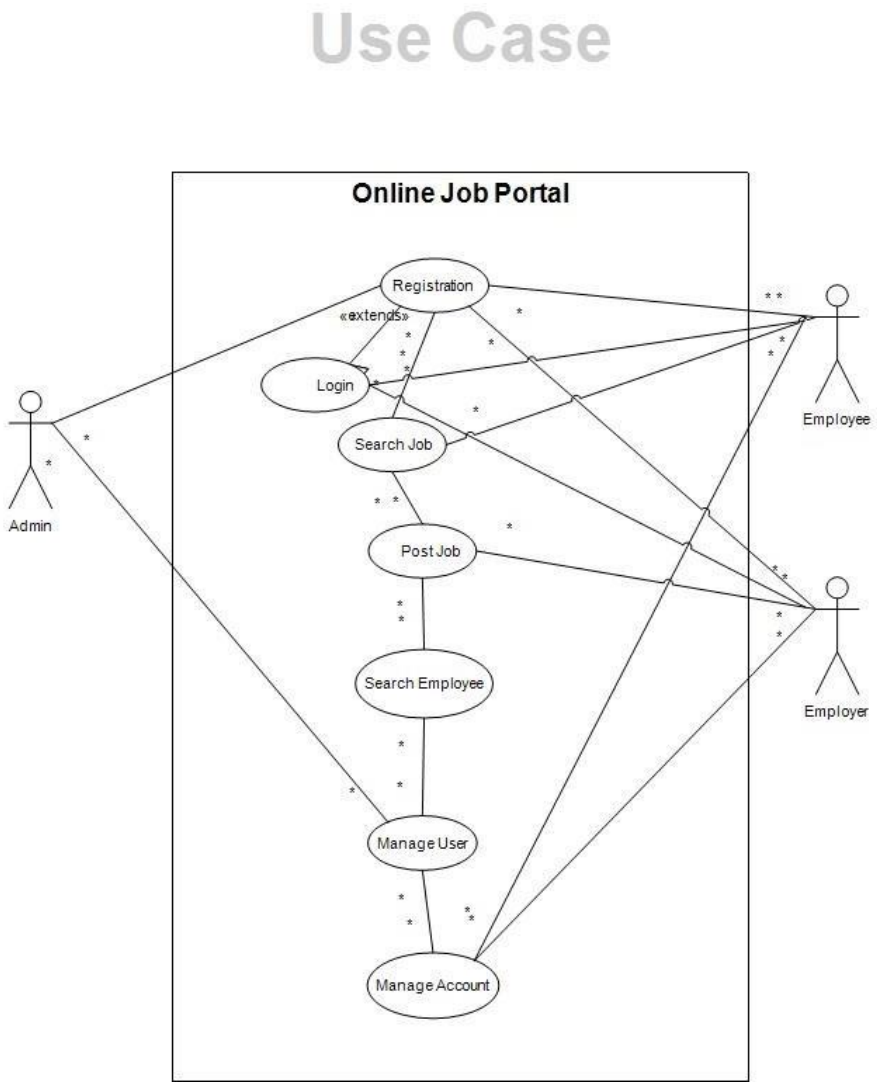
2.4.4 ManageAccount

Whileemployerscanmanagetheirjobpostings.Andprovidingallthejobdetailslikequalifications details, requirements for the job, designation details, job salary details and alsoprovidetype ofjobs.

Chapter3: System Design

3.1 UseCaseDiagrams

Figure2-Usecase Diagram



3.2 DataFlowDiagrams

3.2.1 Context-Level(Level0)DFD

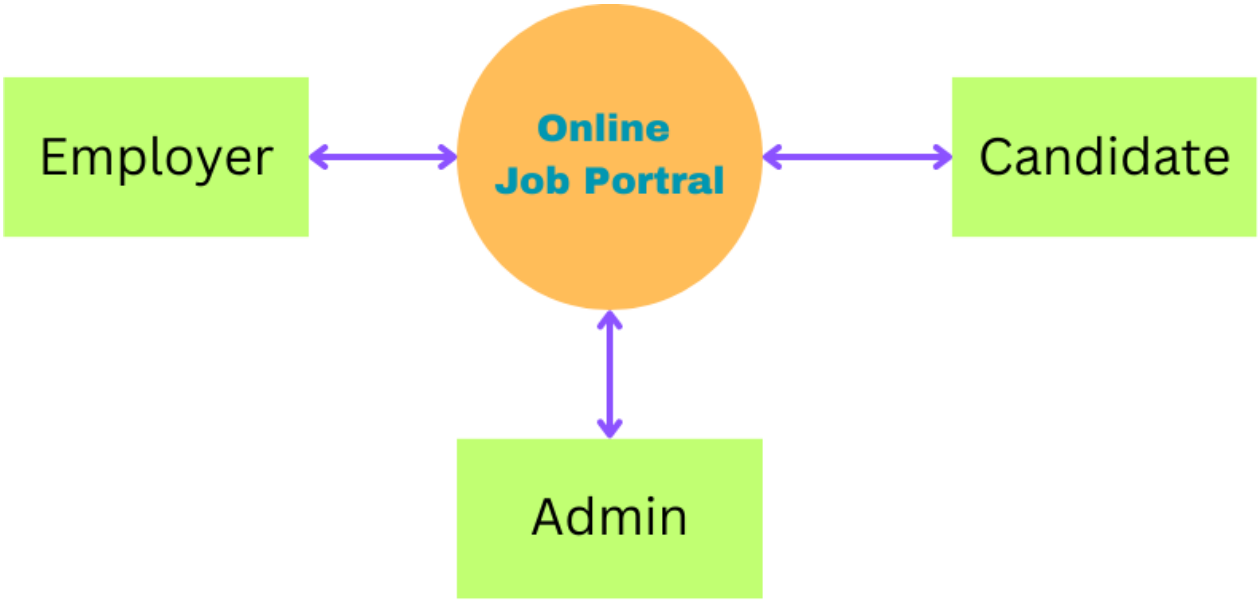
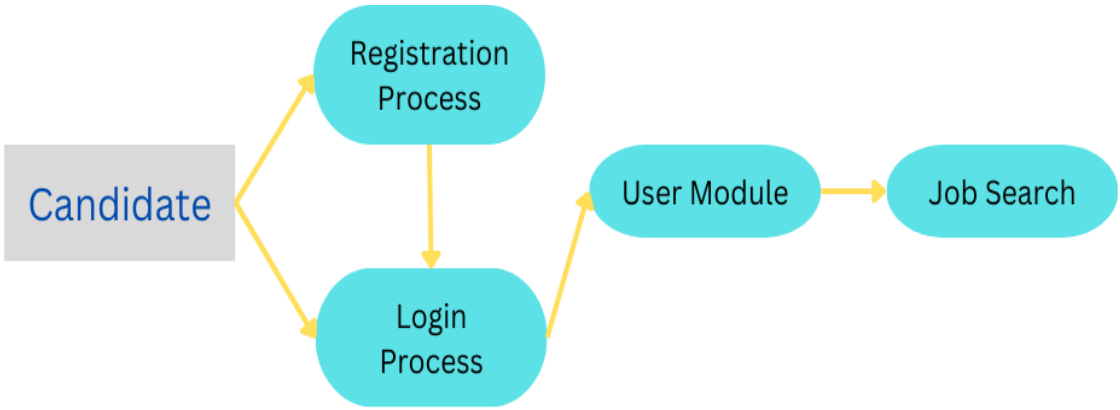


Figure3- DFD 0level Diagram

3.2.2Level 1DFD

Figure4- DFD 1level Diagram



3.2.3Level2DFD

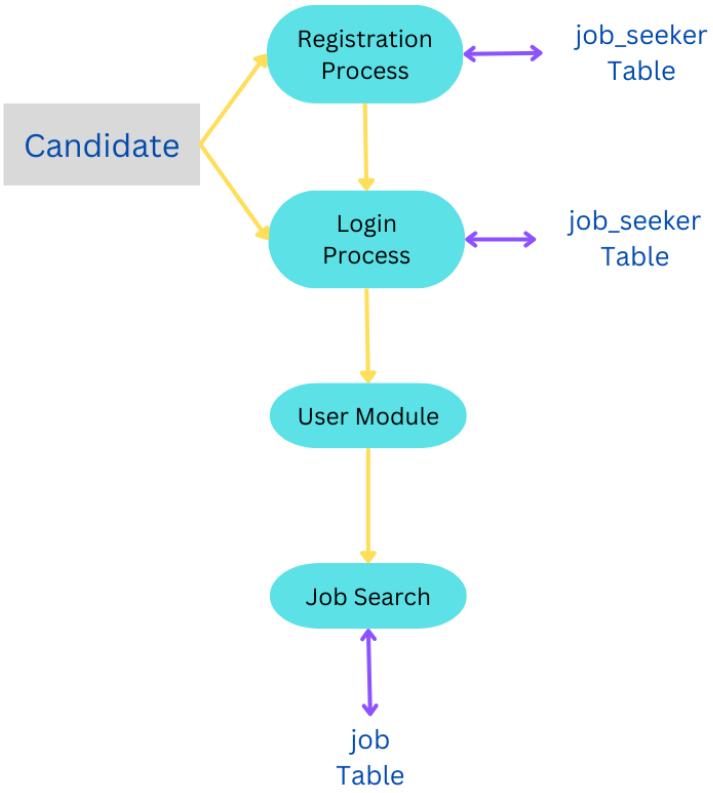
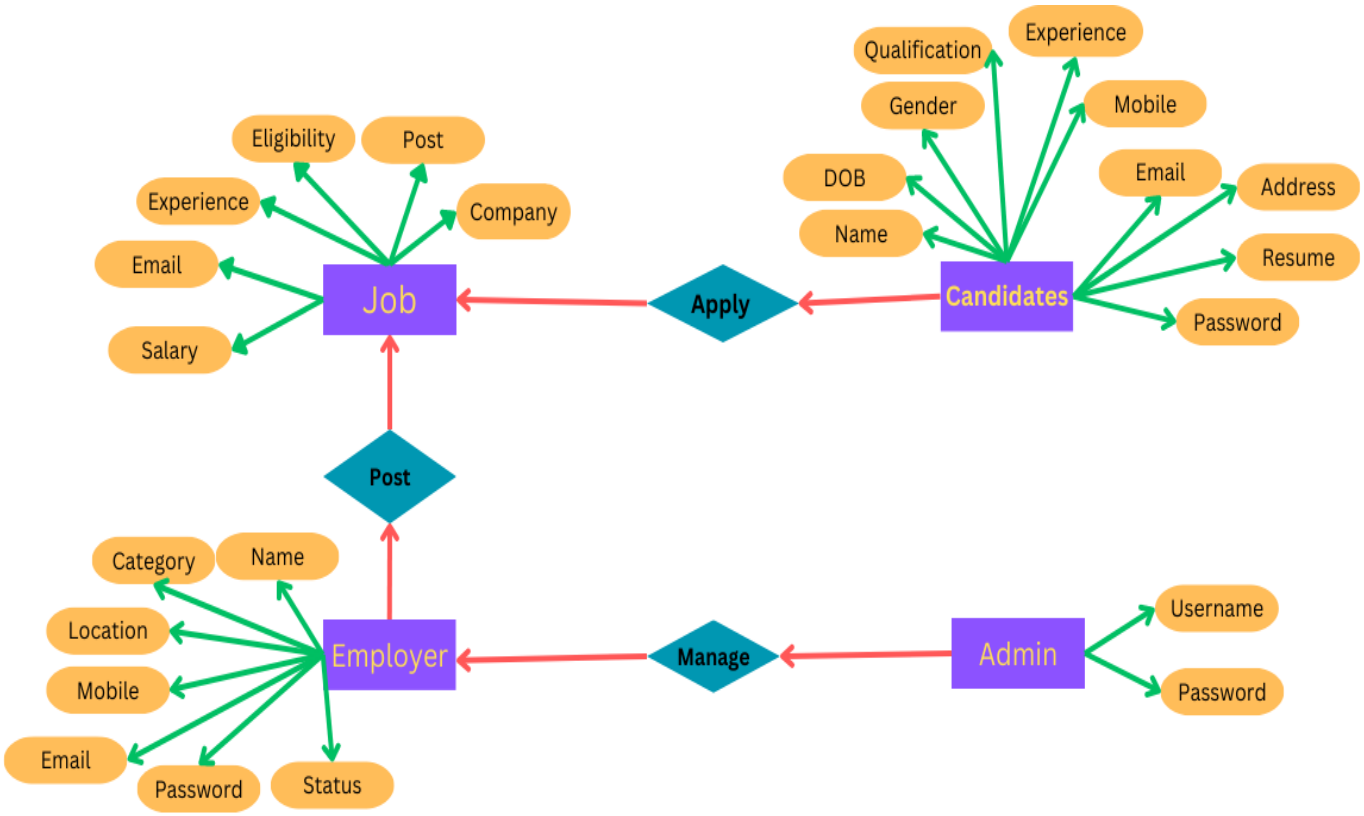


Figure5- DFD 2level Diagram

3.3 EntityRelationshipDiagram

Figure6- ERDiagram



3.4 ActivityDiagram

3.4.1 Employer

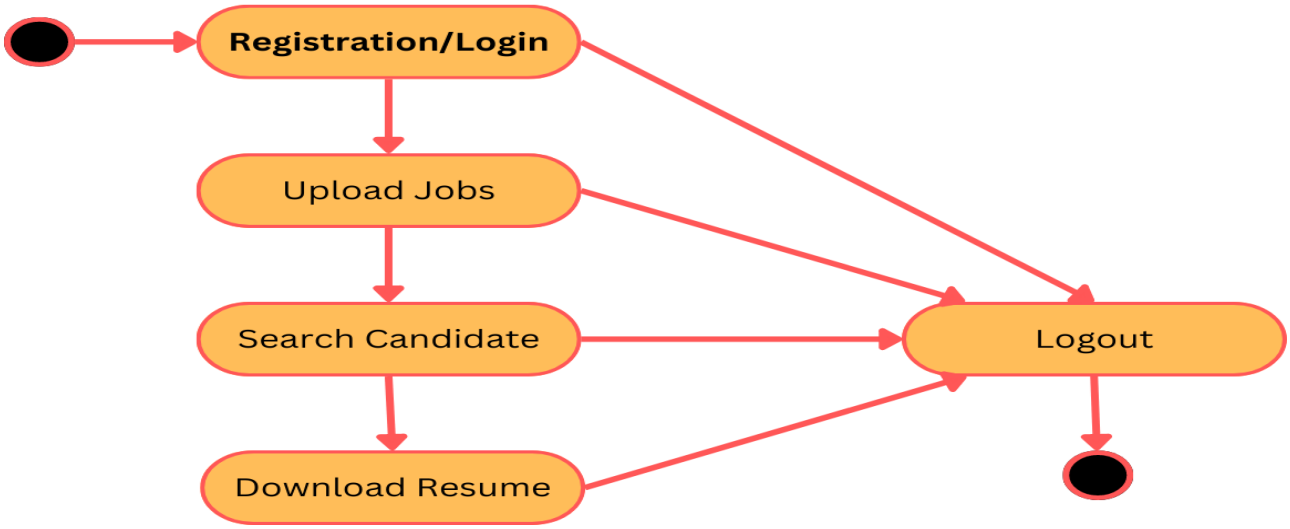
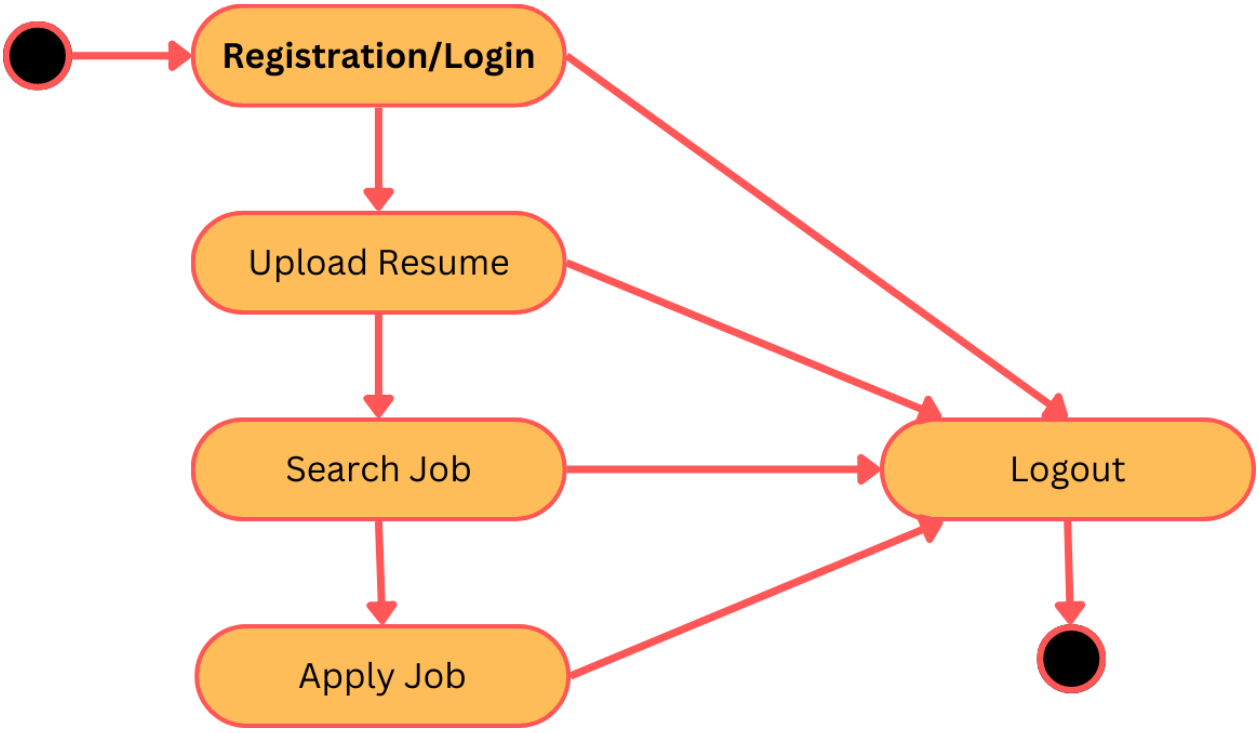


Figure7-EmployerActivityDiagram

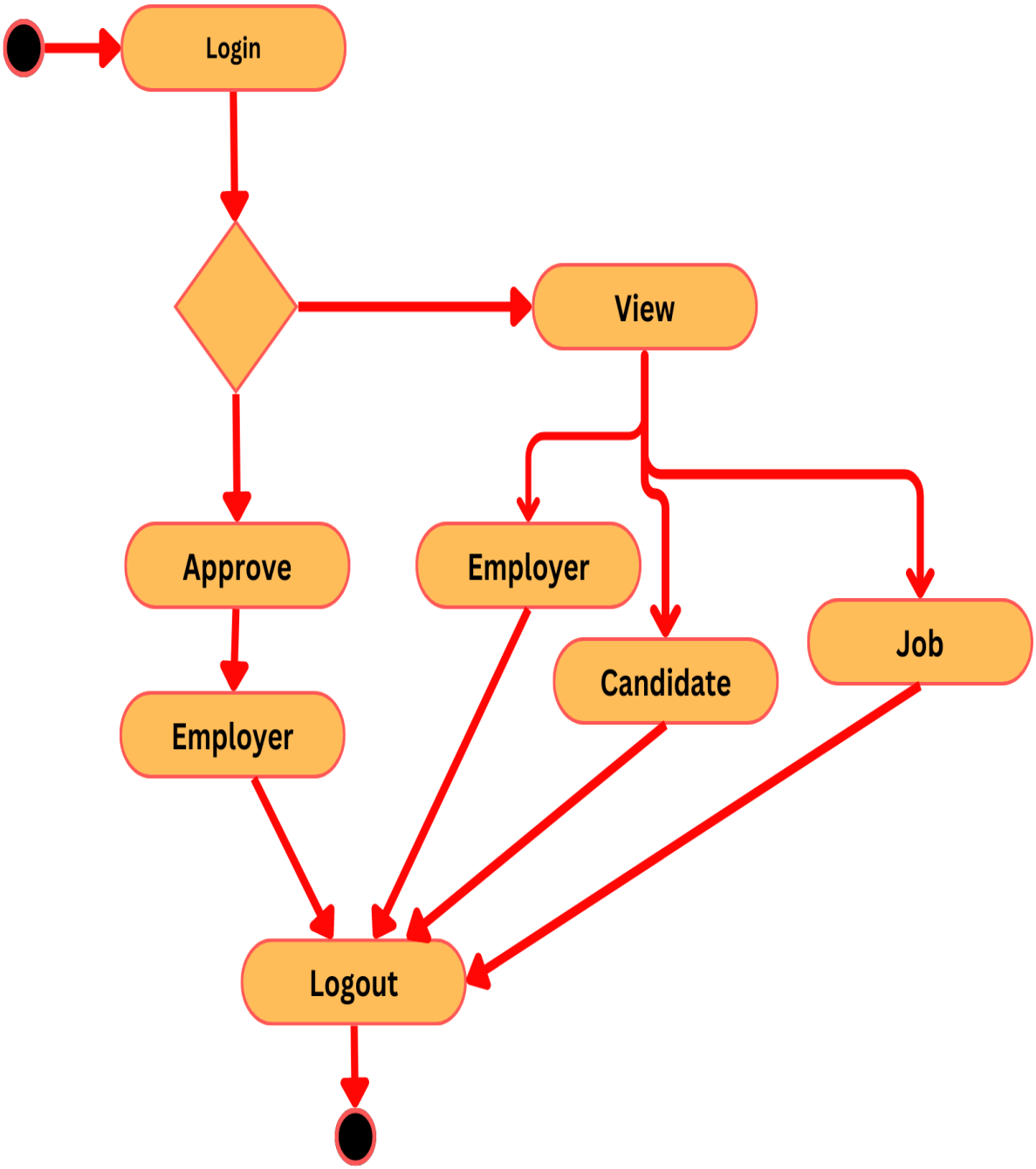
3.4.2 Employee

Figure8-EmployeeActivityDiagram



3.4.3 Admin

Figure9-AdminActivity Diagram



3.5 DataDictionary

Table1- employertable

Table1:				
Name:	Employer			
Description:	Recordsinformationregardingemployer.			
Fields				
Sr. No.	**Field Name**	**Field Type**	**Constraints**	**Description**
1	Name	varcher(30)	Null	HoldsName ofemployer.
2	Category	varchar(30)	Null	HoldsCategoryof theemployer.
3	Location	varchar(30)	Null	Holds Location oftheCompany.
4	Mobile	varchar(12)	Null	Holdsmobile oftheemployer.
5	Email	varchar(20)	P	HoldsEmailof employer.
6	Password	Varchar(30)	Null	Holdspasswordof employer.
7	Status	varcher(20)	Null	Holdscompanyapproval status.

Table2–job_seekertable

Table2:				
Name:	job_seeker			
Description:	Recordsinformationregardingemployee.			
Fields				
Sr. No.	**Field Name**	**Field Type**	**Constraints**	**Description**
1	Name	varchar(20)	primarykey	Holdstheemployee Name
2	DOB	varchar(20)	Null	HoldsDate of Birthof employee.
3	Gender	varchar(10)	Null	HoldsGenderofemployee.
4	Address	varchar(50)	Null	HoldsAddressofemployee.
5	Qualification	varchar(20)	Null	HoldsQualificationofemployee.
6	Experience	varchar(10)	Null	HoldsExperienceofempl oyee.
7	Mobile	varchar(10)	Null	Holds Mobile ofemployee.
8	Email	Varchar(20)	Null	HoldsEmailofemployee.
9	Resume	mediumblob	Null	HoldsResumeofemployee.
10	Password	varchar(20)	Null	HoldsPasswordofemployee.

Table3-job Table

Table4				
Name:	Job			
Description:	Recordsinformationaboutjobpostedbyrecruiter.			
Fields				
Sr. No.	**Field Name**	**Field Type**	**Constraints**	**Description**
1	Company	Varchar(30)	Null	Job posted Company Name
2	Post	Varchar(30)	Null	Hold the Job Post
3	Eligibility	Varchar(30)	Null	Holds Eligibility for the Job
4	Experience	Int(30)	Null	Holds Experience for the Job
5	Salary	Varchar(30)	Null	Holds Job Salary
6	Email	varchar(30)	Null	Holds Email For Job

Table4-Admin Table

Table4				
Name:	Admin			
Description:	RecordsinformationaboutAdmin.			
Fields				
Sr. No.	**Field Name**	**Field Type**	**Constraints**	**Description**
1	ID	Varchar(20)	Null	Admin ID
2	Password	Varchar(20)	Null	Admin Password

Chapter4:ImplementationandTesting

4.1 UserInterfaceandsnapshots

HomePage

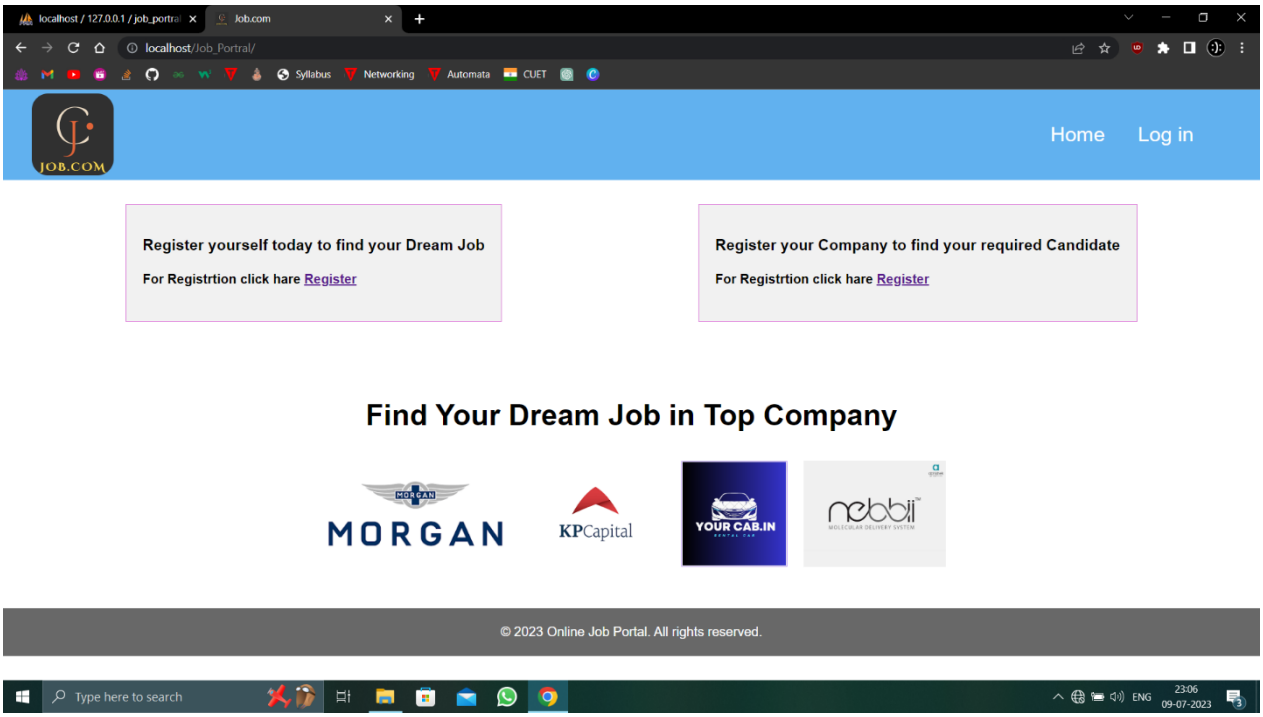


Figure10- Home page

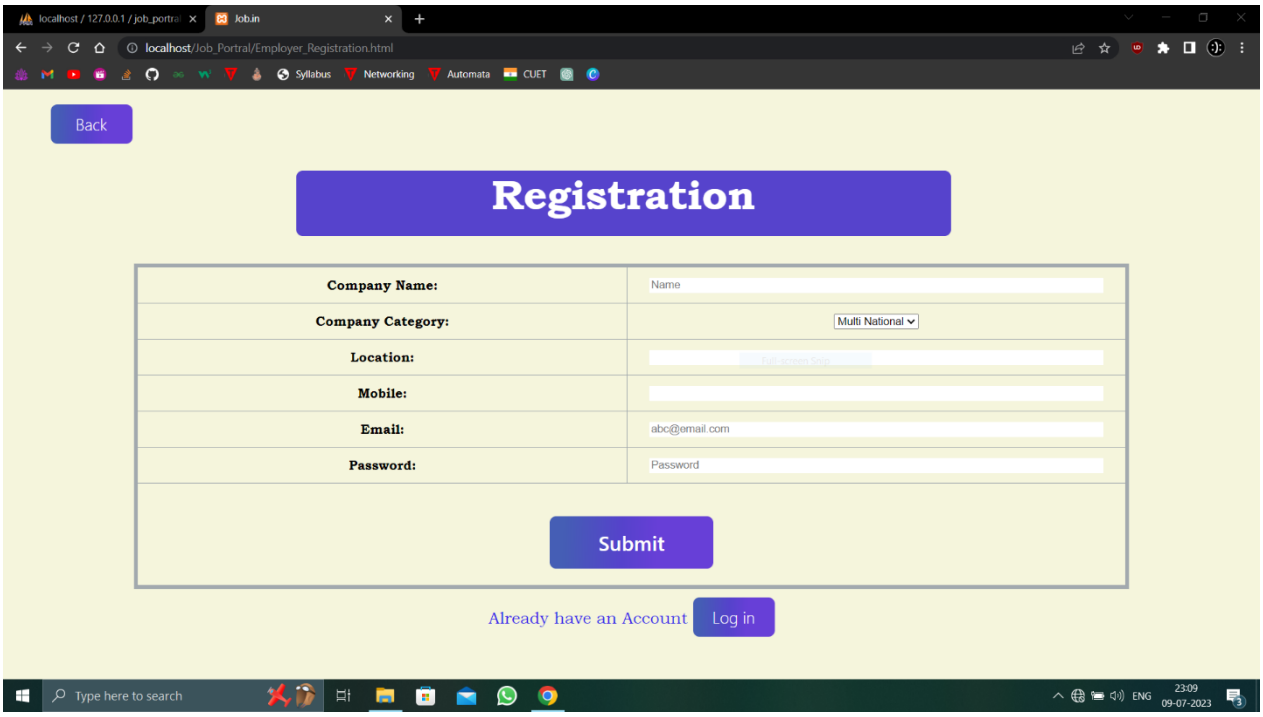


Figure11-EmployerRegistration

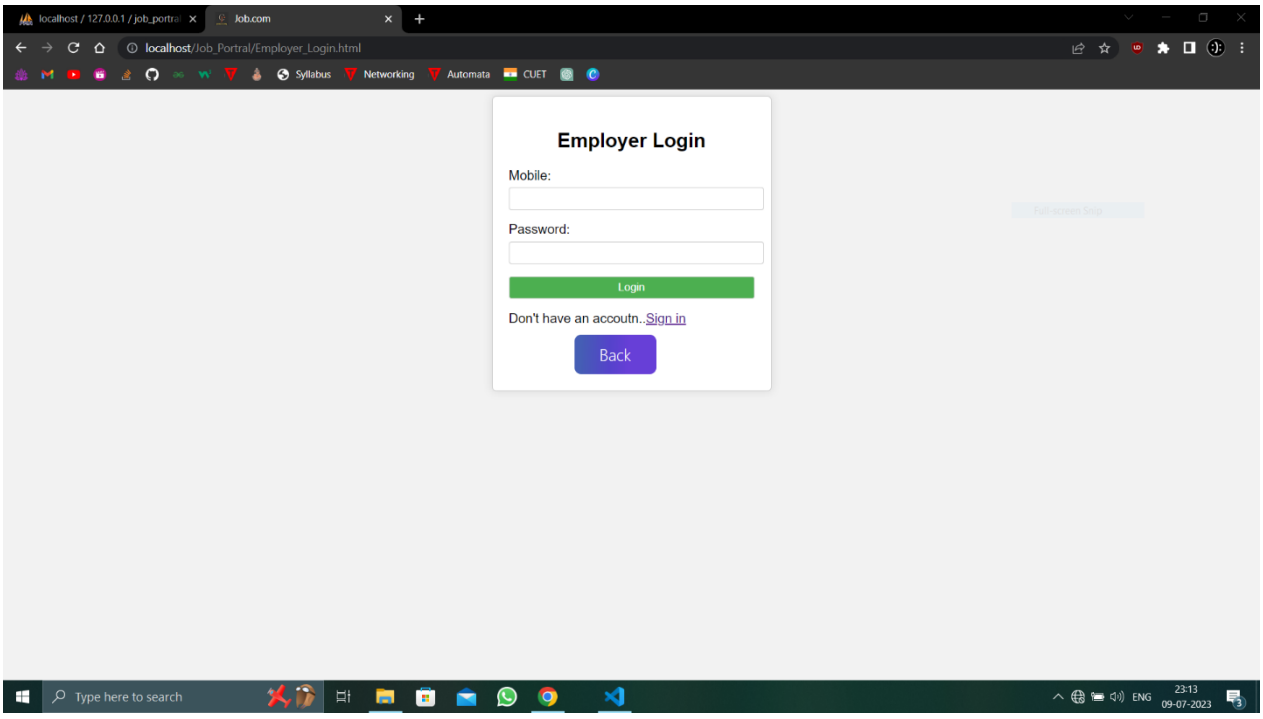


Figure12-Employer Login

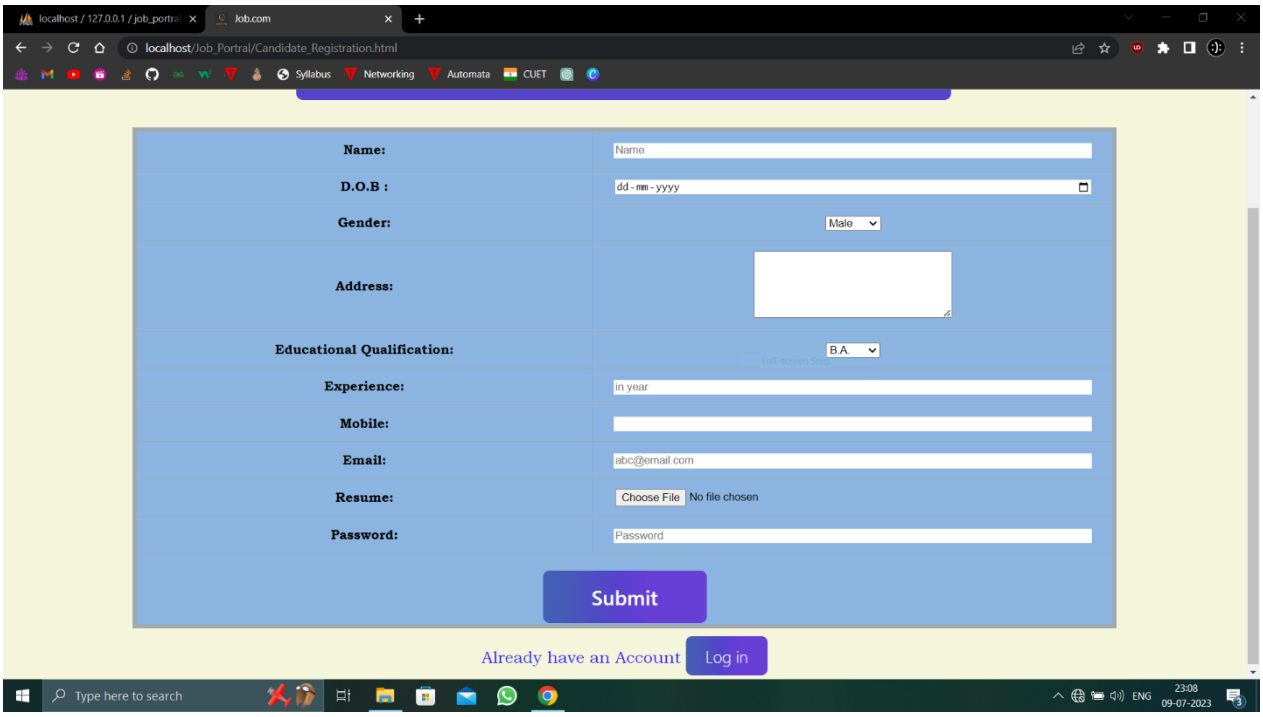


Figure13-Candidate Registration

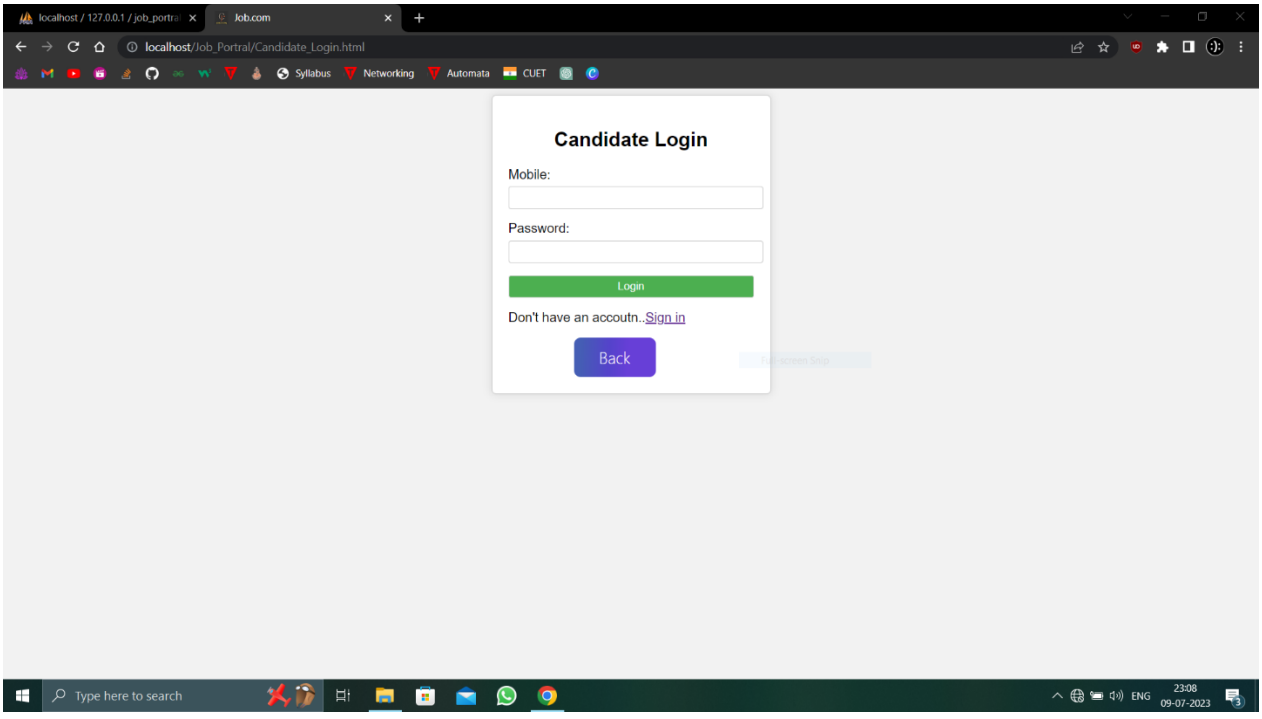


Figure14-Candidate Login

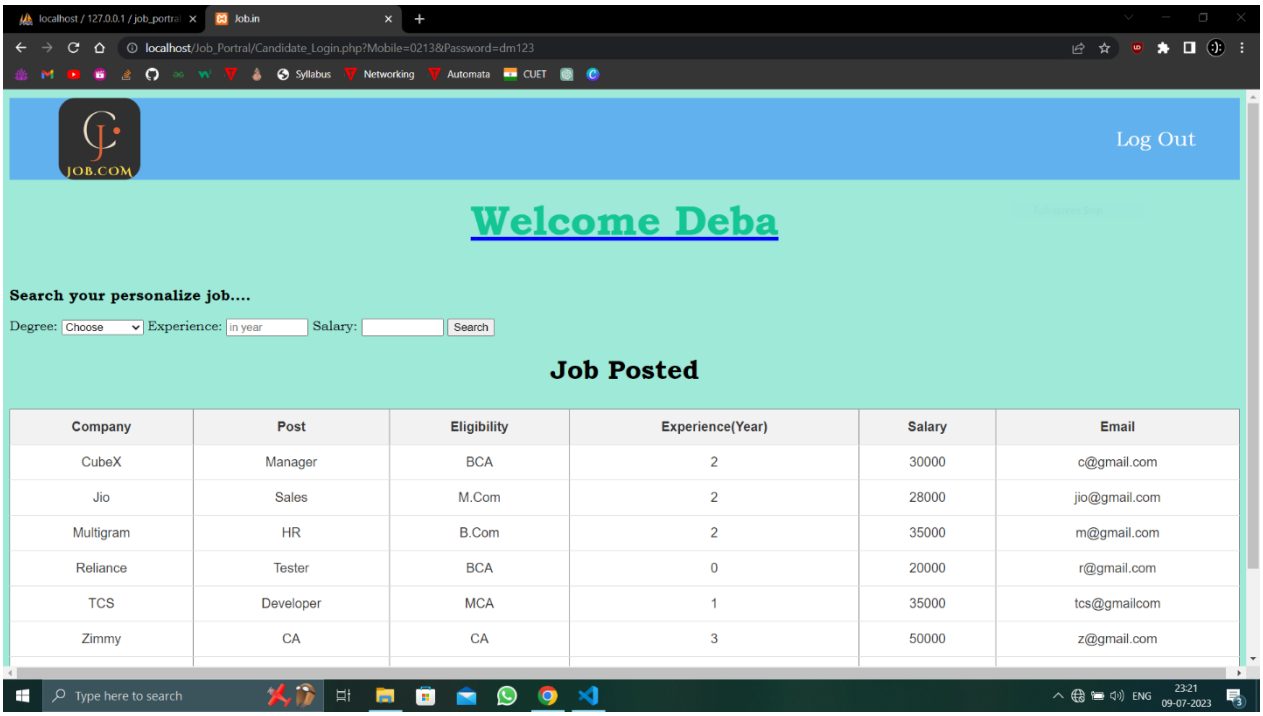


Figure15-EmployeeHome page

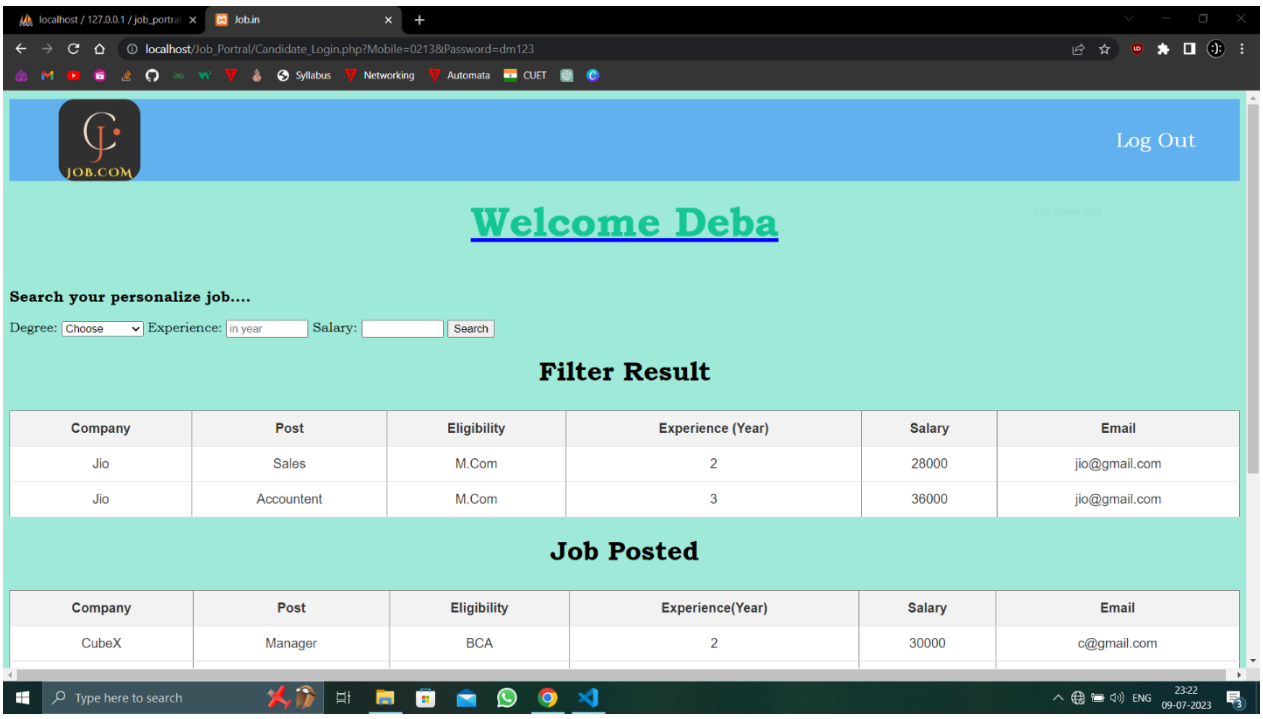


Figure16-Employeejob filter page

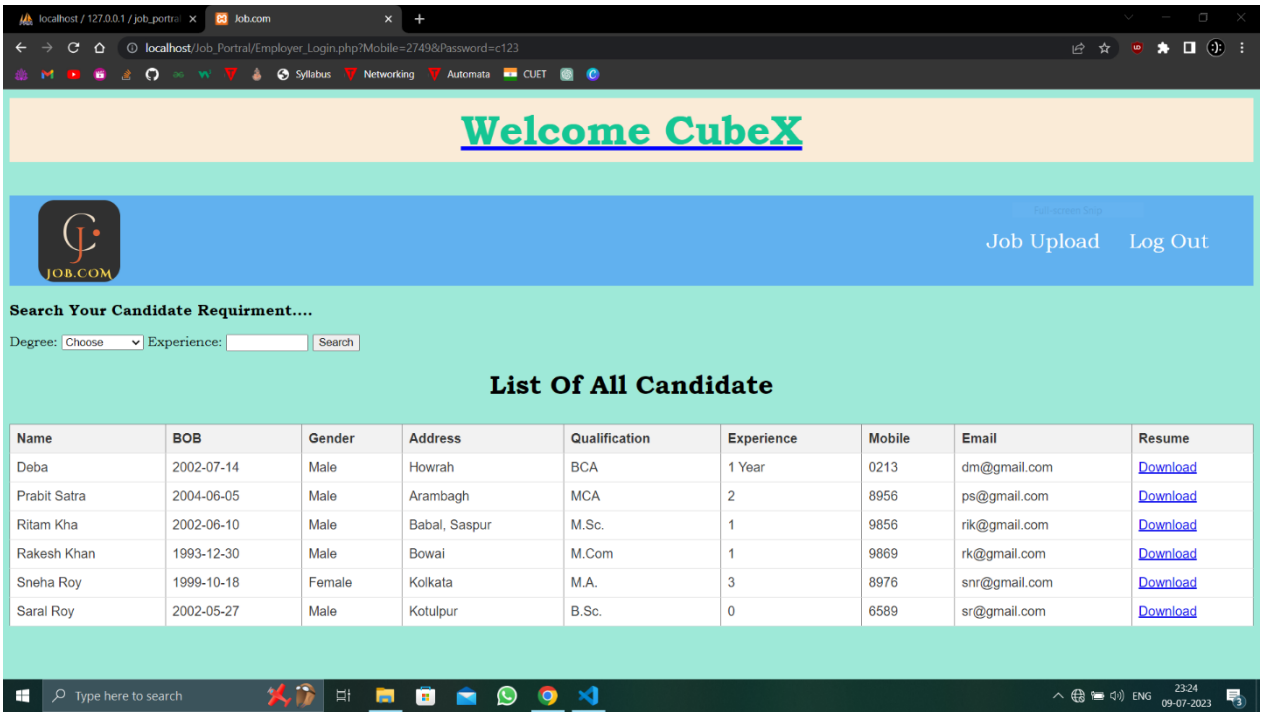


Figure 17- Employer Home

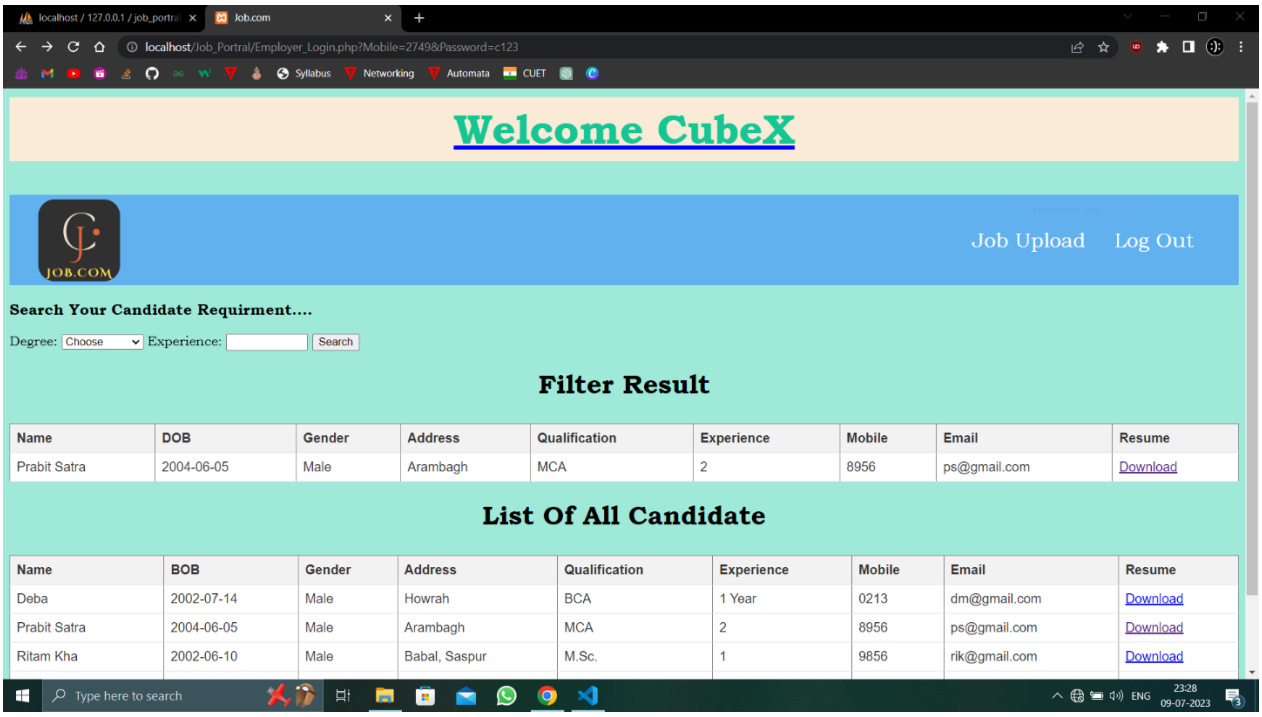


Figure18-Employercandidate filter

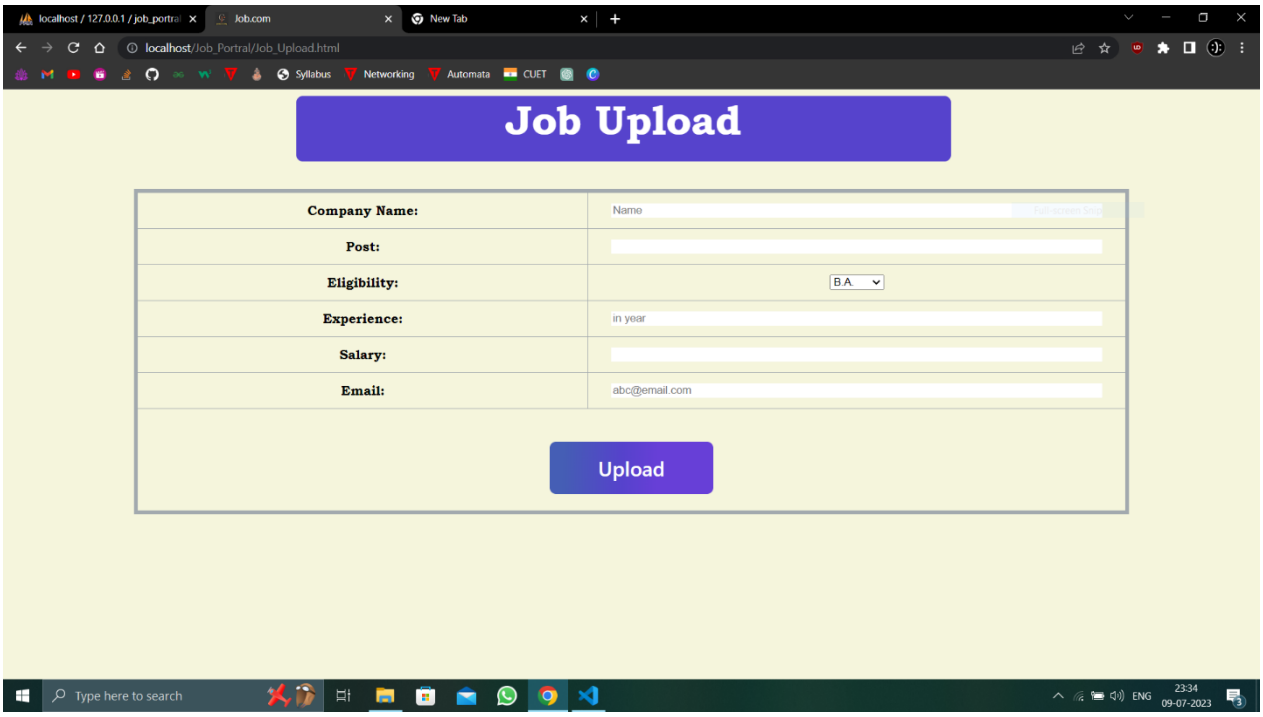


Figure19-Job Upload

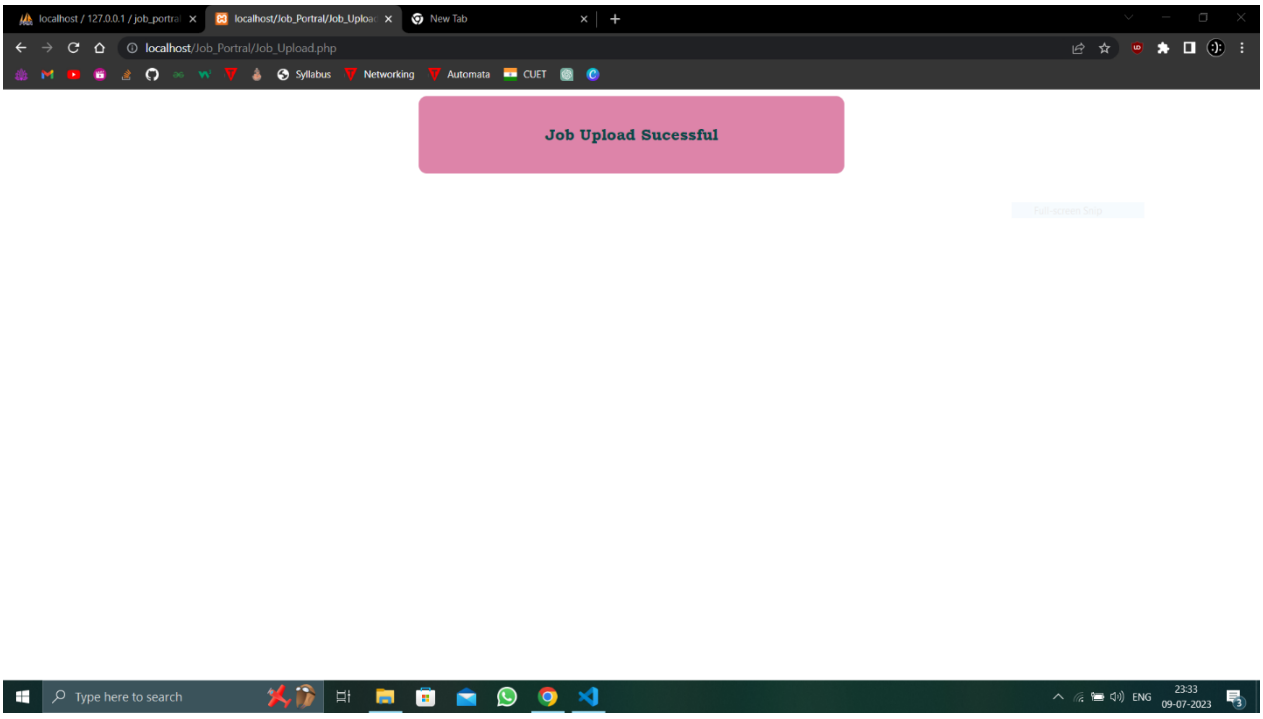


Figure20-Successful Job Upload

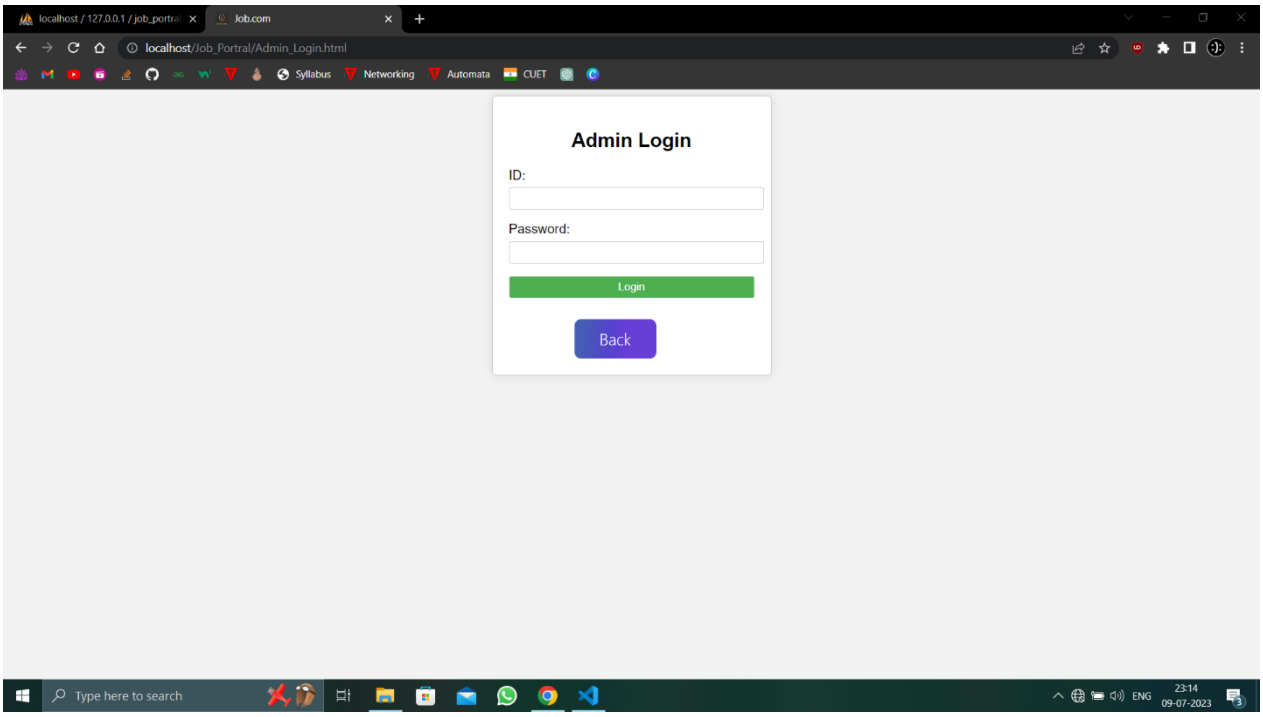


Figure21-Admin Login

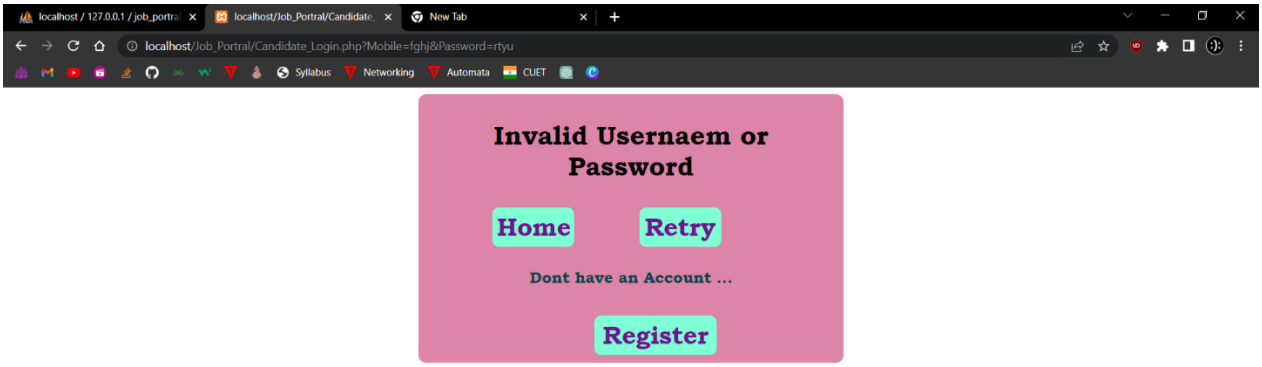


Figure22-Log in error

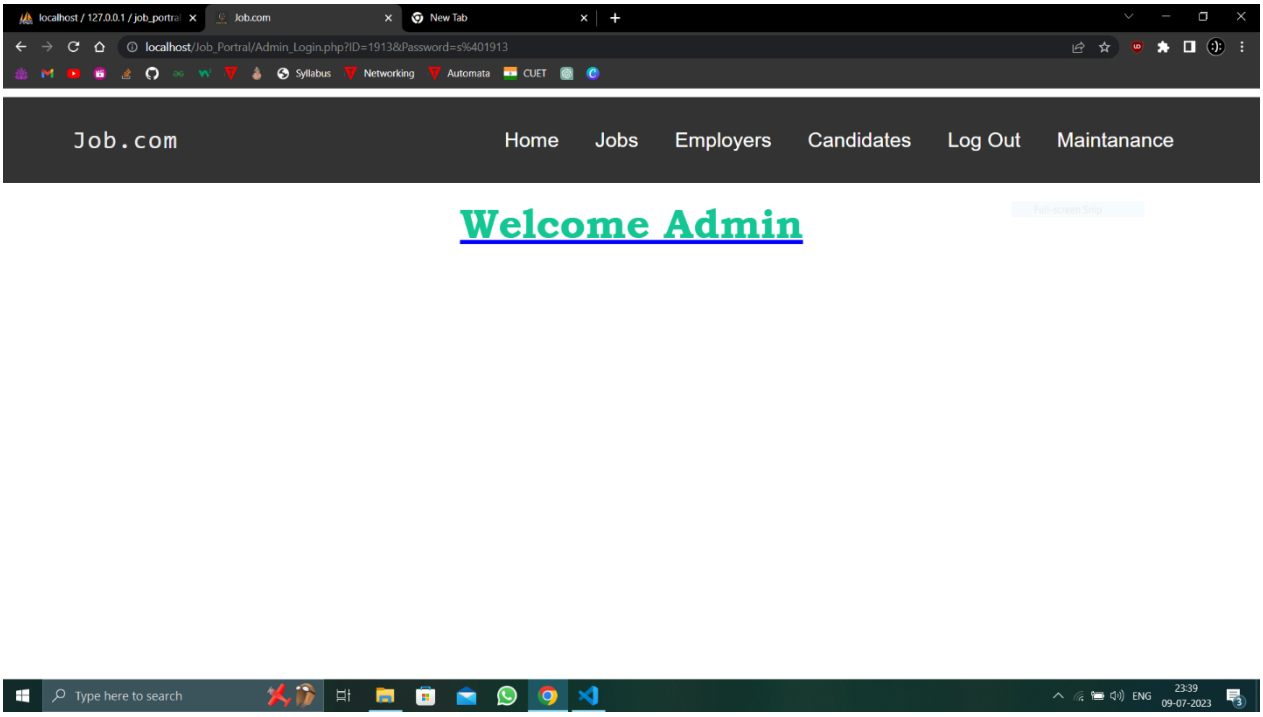


Figure*23-Admin Home*

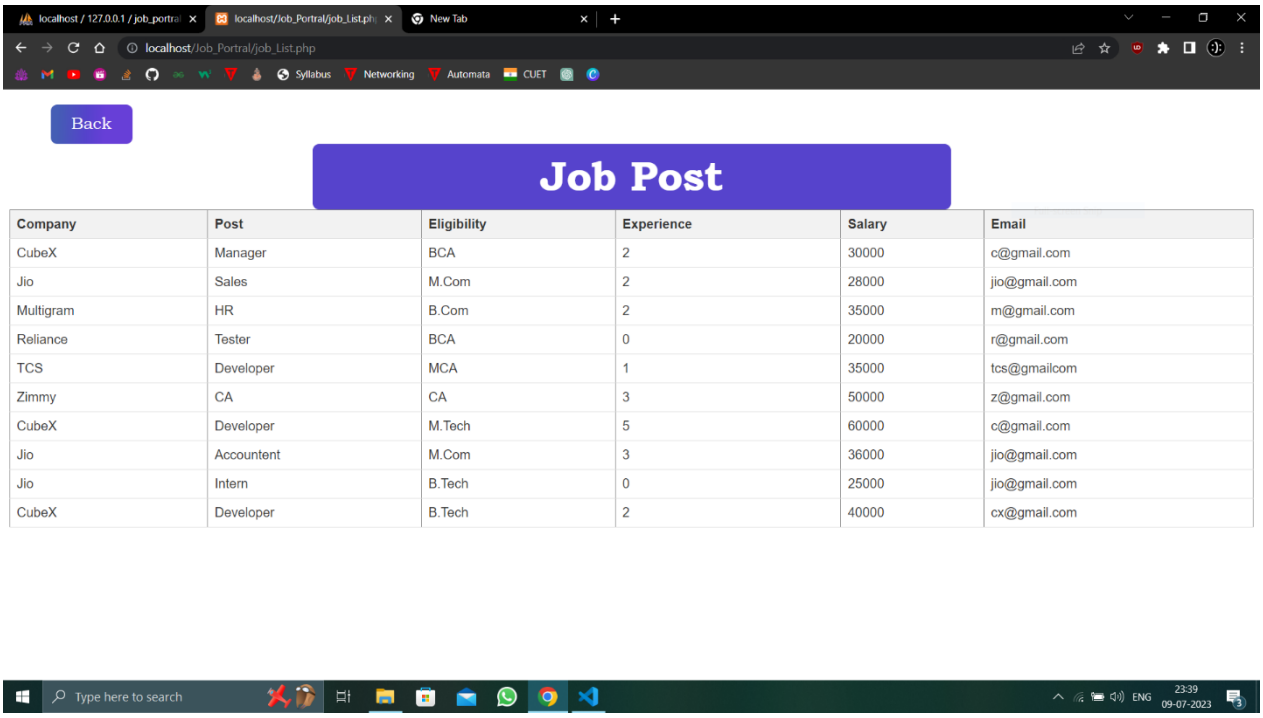


Figure24-All Job

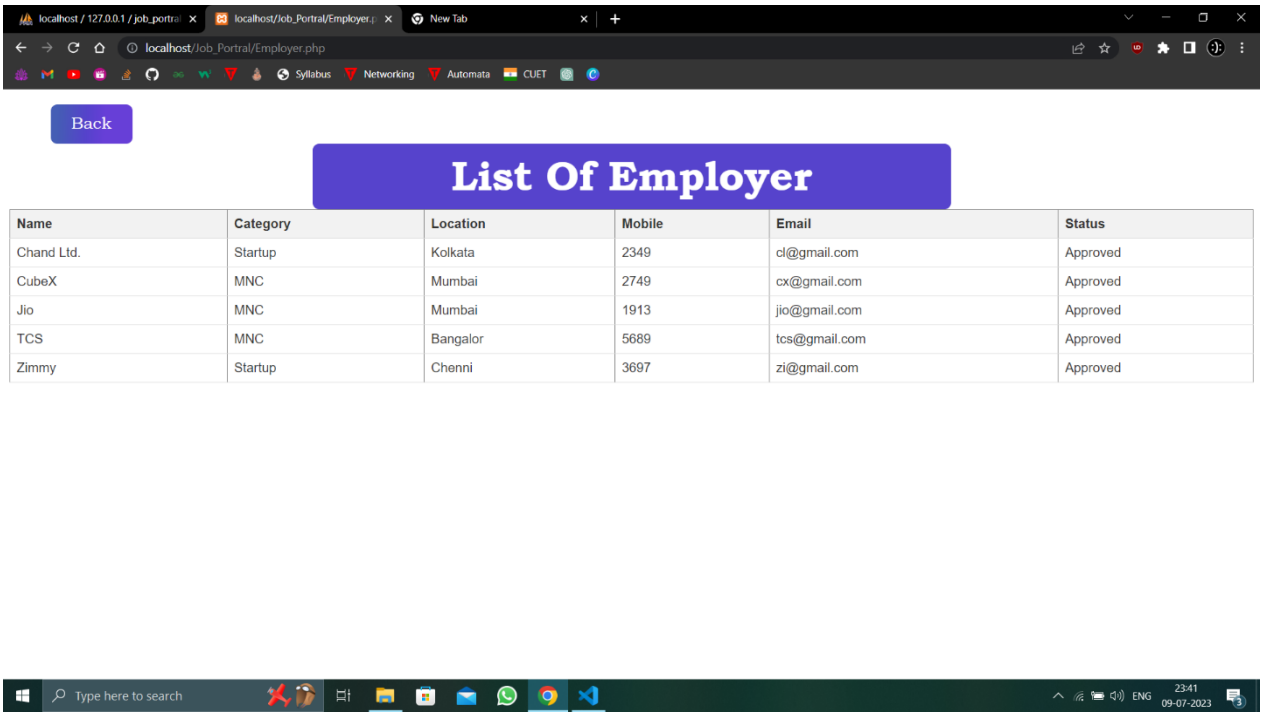


Figure25-All Employer

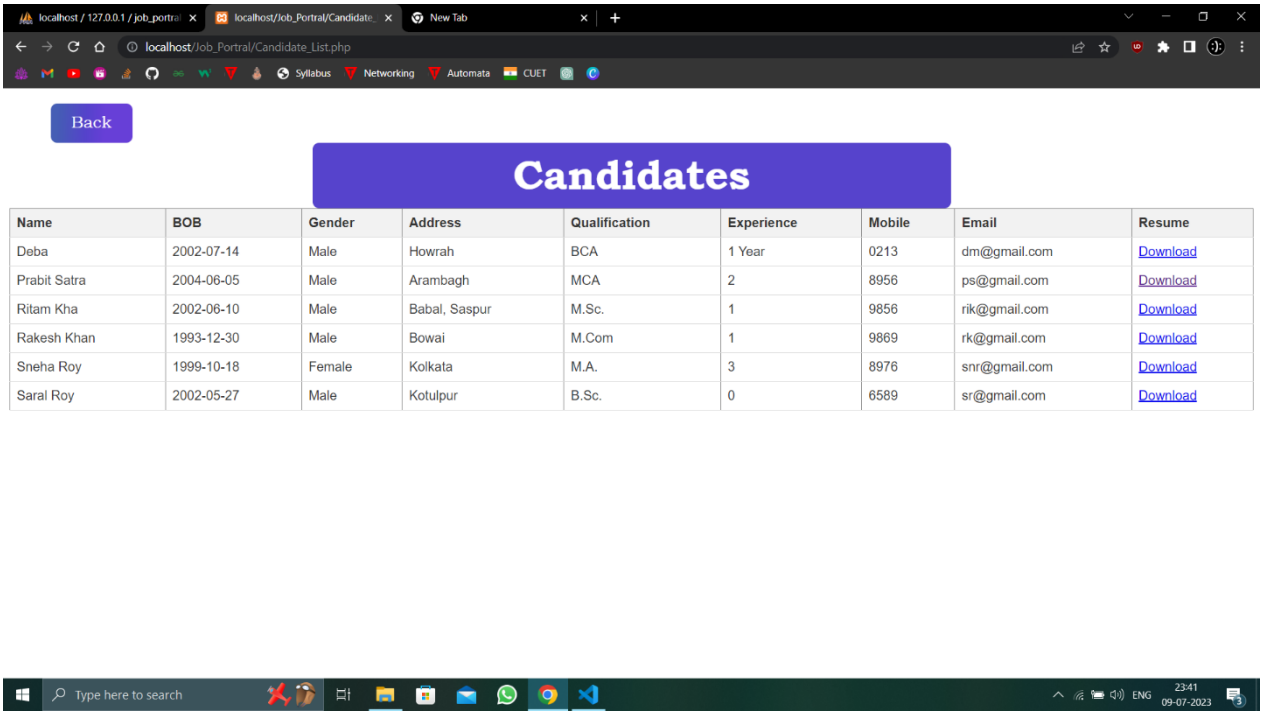


Figure26-All Candidates

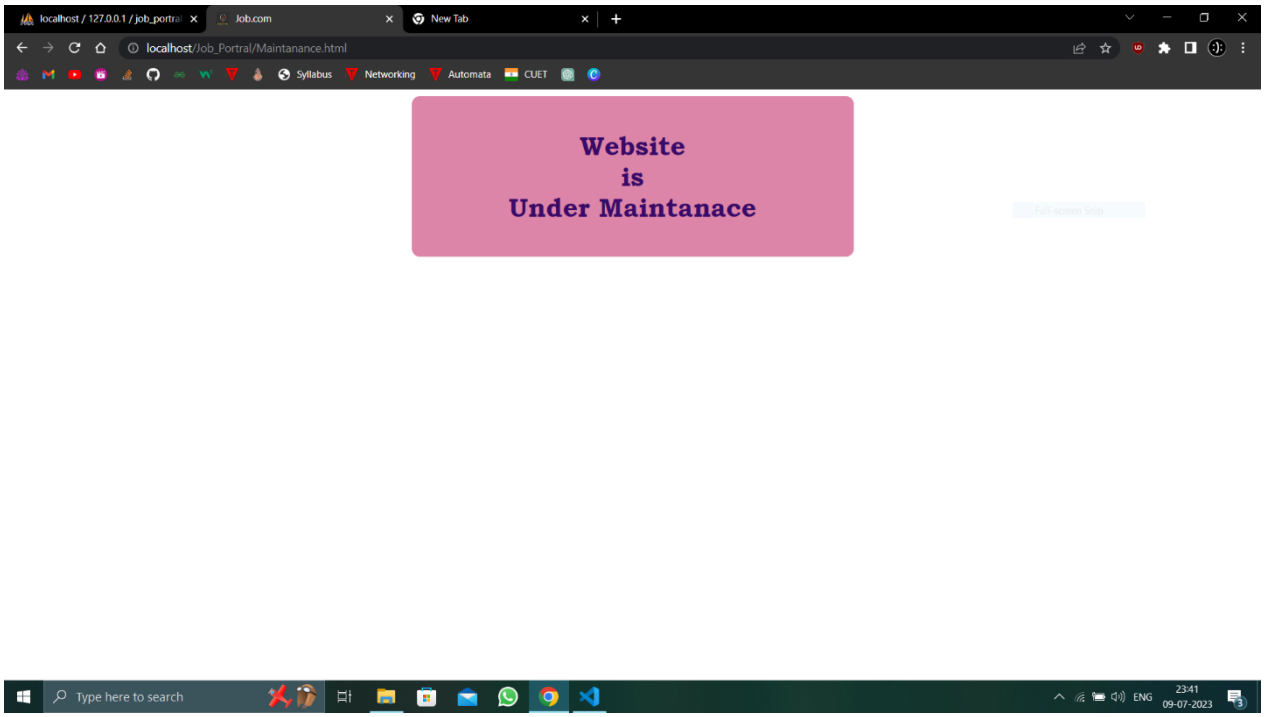


Figure27- Maintenance page

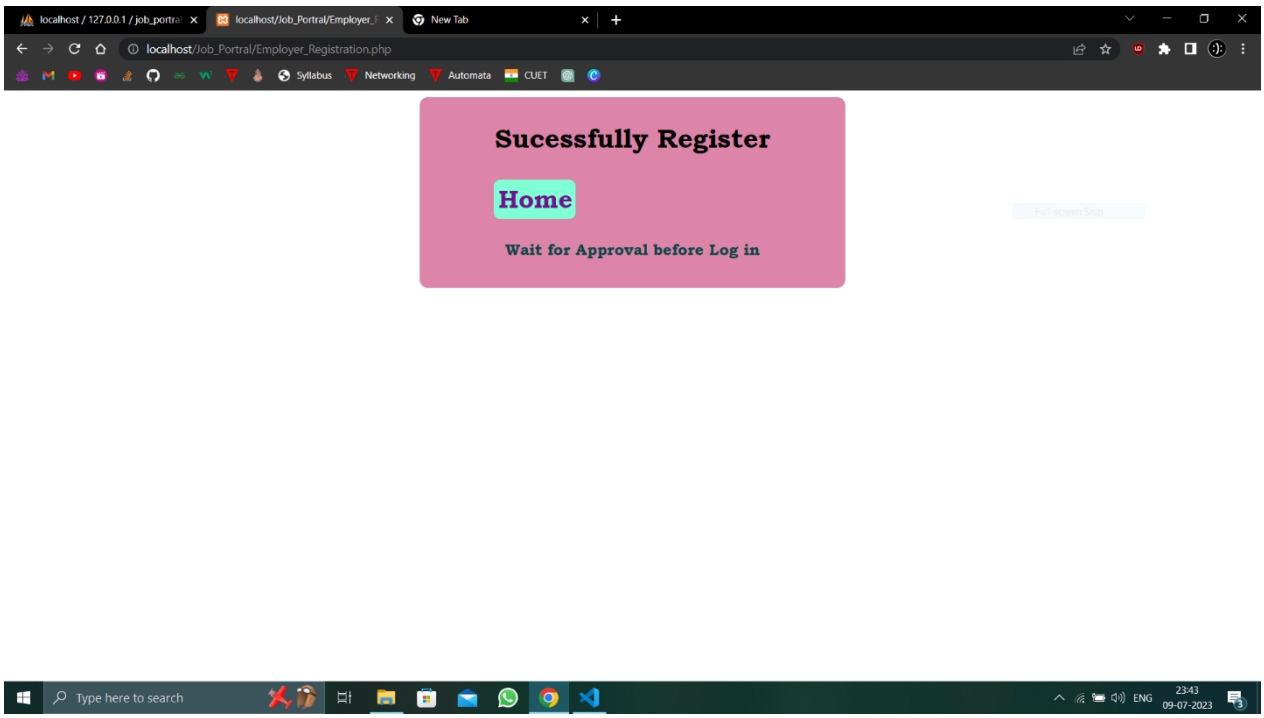


Figure28-Registration Successful

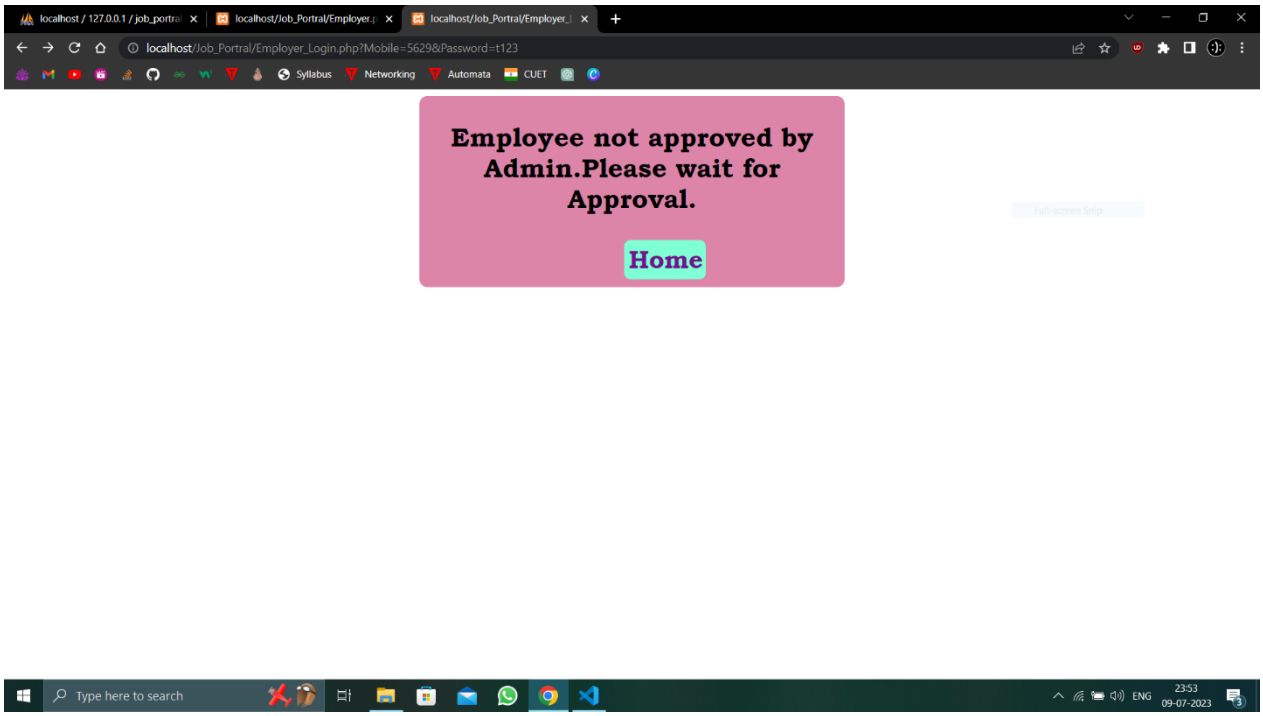


Figure29-Waiting for Approval

4.2 TestCasesandResult

Table12-TestCase

TestCaseId	Testscenario	Teststeps	Testdata	Expected result	Actualresult
UU01	Createemp loyerregistr ationpage	1. Openwebsi teandclicke d onemploye r registration	Information ofemployer data to beadded	Data issuccessful lyadded inemployer table	Asexpected
UU02	Createemp loyeeregist rationpage	1. Openwebsi teandclicke d onemploye e registration	Information ofemployee data to beadded	Data issuccessful lyadded injob_seeke r table	Asexpected
UU03	Cratelogin page foremploy er	1.openwebs ite andclicked onemployer Log in 2. enteru sernamea nd password	Employer enter validdata	Dataisfetchf romemploye rtable	Asexpected

UU04	Cratelogin page foremploy ee	1.openwebs ite andclicked onemploye eLogin 2. enter username	Candidate enter validdata	Dataisfetchf romjob_see kertable	Asexpected

		and password			
UU05	Create log in page for Admin	1.open website and clicked on employee Login 2.enter username and password	Admin enter valid data	Dataisfetchfro madmintable	Asexpected
UU06	Job Search	Candidate search there shotable job by filter	Enter Degree, Experience, Salary expect	Data is fetch form job table , and show the specific job	Asexpected

UU07	Candidate Search	Employer search Candidate by their requireme nt.	Employeedo wnload theresume,	Data is fetch fom job_seeker table and employer can Successfully download theresume,	Asexpected

Conclusion& Future work

It has been a great pleasure for me to work on this exciting and challenging project. This projectprovedgoodformeasitprovidedpracticalknowledgeofnotonlyprogramminginPHPwebbased application and no some extent Windows Application and SQL Server, but also about allhandling procedure related with online job portal. It also provides knowledge about the latesttechnology used in developing web enabled application and client server technology that will begreatdemandinfuture.Thiswillprovidebetteropportunitiesandguidanceinfutureindevelopingprojectsindependently.

References

1. https://www.naukri.com/account/register/basicdetails
2. https://www.wikipedia.org/
3. https://www.canva.com/
4. https://www.w3schools.com/
5. https://www.javatpoint.com/
6. https://youtube.com/

THE UNIVERSITY OF BURDWAN

NETAJI MAHAVIDYALAYA

KALIPUR :: ARAMBAGH :: HOOGHLY

SUBJECT:- MATHEMATICS

PROJECT PAPER:- BMH6PW01

Topic:- ***A Study on Number Theoretic Functions***

UNDER THE SUPERVISION OF - Dr. Biswanath Garai

SUBMITTED BY

NAME:- SOUMYA MANNA

SEM:- 6th Sem

ROLL:- 210340900112

REG. NO.:- 202101056025 of 2021-2022

CONTENTS

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my guide Dr. Biswanath Garai who gave me the support, encouragement and invaluable guidance throughout the project on the topic "A study on number Theoretic Functions"

During the last three years he has done a lot for us. I am also thankful to Dr Sharmila Bhattacharyya and Dr. Sudipta Ghosh for their constant co-operation and encouragement.

I am also thankful to Netaji Mahavidyalaya, Arambagh, Hooghly and the University of Burdwan for giving me an opportunity to complete this project work.

Date: 15.06.24

Soumya Manna.

INTRODUCTION

Mathematicians like pythagoras (569 - 500 B.C), Diophantus, Fibonacci, Fermat (1601 - 1665), Gold bach (1690 - 1714), E.L Euler (1707 - 1783), J.L. Lagrange (1736 - 1813), J. Wilson (1741 - 1793), C.F. Grauss (1777 - 1855), Möbius (1790 - 1868), David Hibert (1862 - 1943), G.H. Hardly (1877 - 1947), S. Ramanujan (1887 - 1920) have worked in the field of number theory and all of them played a viral role. In the present project work, we delt with Fermat theorem, connecting to Euler Phi-function τ and σ..

Any function whose domain of definition is the set of positive integers is said to be number theoretic function are integer valued. For this we shall considered to functions τ and σ.

THE UNIVERSITY OF BURDWAN

Project Work Entitled

"Graph Theory"

Under

The Supervision of

Sarmila Bhattacharyya

Submitted by

Ratri Pore

Roll No:- 210340900076

Reg. No.: 202101055972 of 2021-22

For the evaluation of project paper BMH6PW01

Department of Mathematics

Netaji Mahavidyalaya

Kalipur, Arambagh, Hooghly

Pin-712601

West Bengal

Acknowledgements :→

I would like to begin by expressing my gratitude to the supervisor of my project paper Dr. Sarmila Bhattacharyya, the H.O.D of the Department of Mathematics, Netaji Maharidyalaya. It has been an absolute privilage to have her as my advisor. It was only because of her persistent and insightful guidance for every mistake that this project paper has taken it's final shape.

I would like to express my sincere thanks to Netaji Maharidyalaya for giving me an opportunity for the project paper and providing me various facilities. I also wish to express my sincere gratitude to our respected teachers Dr. Biswanath Gorai, Dr. Sudipta Ghosh and Manideepa Ghosh of department of Mathematics, Netaji Maharidyalaya, Arambagh for all kinds of intellectual and logistical support.

It was needed not possible to continue my B.Sc course unless I recieved assistane and encouragement from my parents. I own to them. Since they have extended better hospitality, their un-doubted sense of confidence kept me going through every thick and thin during these years.

Ratri Pore.

Contents

Introduction:

The origins of graph theory can be traced back to the work of the Swiss mathematician Leonhard Euler in 18th century. In 1736, Euler solved the famous seven Bridges of Königsberg problem by representing the city's land masses and bridges as vertices and edges in a graph. This problem laid the foundation for development of graph theory as a separate branch of mathematics.

Later in 1852, Francis Guthrie, a student of geography, noticed that a map of the countries of England could be colored with only 4 different colors in such a way that each country had exactly 1 colour and adjacent country each had different colour. He wondered if 4 colours would be enough to colour the map of a country such that each state has exactly 1 colour and adjacent states each have a different colour. He discussed this with his brother, a student of Augustus, De morgan could not answer the problem and he communicated it to Sir William Rawan Hamilton. Hamilton thought that a proof might be possible, but, he had no time to work on it.

In 1878, Arthur Cayley gave a seminar on the four-colour problem at a meeting of the London-Mathematical society. At last the problem attracted the groth of graph theory. In 1976, the problem was finally solved by Kenneth Appel and Wolfgang Haken proving that 4 colours are sufficient to colour the map of a country such that each states has exactly 1 colour and adjacent states each have different colour. The proof required 1200 hours of computing time using fast large computers. Appel and Haken

worked on the problem for 10 years. We shall not attempt to prove the four-colour problem in this project. However, we discuss various types of graph colouring.

THE UNIVERSITY OF BURDWAN

Project Work Entitled

"AN ELEMENTARY TREATISE ON LINEAR DIOPHANTINE EQUATION, DISTRIBUTIONS OF PRIME NUMBERS AND THEORY OF CONGRUENCES"

Under
The Supervision of
DR. SUDIPTA GHOSH

Submitted by

ANWESHA KONAR

Roll No:- 210340900009
Reg. No:- 202101055880 of 2021-22

For the evalution of project paper BMH6PW01

Department of Mathematics
Netaji Mahavidyalaya
Kalipur, Arambagh, Hooghly
Pin:- 712601
WEST BENGAL

CONTENTS

INTRODUCTION

Number theory or Higher Arithmetic (in older usage) is a branch of pure mathematics devoted primarily to the study of the integers and arithmetic functions. German mathematician Carl Friedrich Gauss (1777-1855) said, "Mathematics is the queen of the sciences and number theory is the queen of Mathematics".
Number theorists study prime numbers as well as the properties of Mathematical objects constructed from integers (for example, Rational numbers), or defined as generalizations of the integers (for example, algebraic integers).

We shall discuss some interesting topics like Diophantine Equation, primes and their Distribution, Theory of congruences throughout the whole project work. Fermat's Theorem and Wilson's Theorem are also discussed in this project. Phi-function and Mobius function are very useful and important topics within the field of 'Number Theory'. But this type of discussion is beyond the scope of this project.

In mathematics, a Diophantine equation is an equation, typically a polynomial equation in two or more unknowns with integer coefficients for which only integer solutions are of interest. A linear Diophantine equation equates to a constant the sum of two or more monomials, each of degree one. We shall discuss about the solution of this type of equation in upcoming chapter called 'Linear Diophantine Equation'.

Here, we shall discuss the notion of prime numbers in the chapter named 'primes and their Distribution' together with Sieve of Eratosthenes, which is also an important topic. Studying it we can find all primes which are less than a given positive integer.

We have discussed divisibility tests in this chapter by using the properties of congruence, which is one of the most important topics in 'Number Theory'. Linear congruence and it's related theorem, chinese Remainder theorem, the Fermat's theorem and Wilson's Theorem are also discussed in this chapter. By studying Wilson's Theorem, we see that, the number of composite numbers is infinite. For this purpose, Wilson's theorem is very important.

We have discussed all such matters in upcoming chapters.

1. LINEAR DIOPHANTINE EQUATION

Diophantus

NETAJI MAHAVIDYALAYA

ARAMBAG: HOOGHLY

THE PROJECT REPORT- ON

"ANALYSIS OF FINANCIAL STATEMENT OF CEMENT INDUSTRY"

THIS PROJECT REPORT SUBMITTED TO

ANALYSIS OF FINANCIAL STATEMENT OF CEMENT INDUSTRY (WITH SPECIAL REFERENCE TO ACC LIMITED AND ULTRATECH CEMENT)

Research Project Submitted in Partial Fulfillment of the Requirements for the Degree of

BACHELOR OF BUSINESS ADMINISTRATION (BBA)

BY

RAJA MODAK

Registration Number: -202005000751 of 2020-21

ROLL Number: -2015409020013

To the DEPARTMENT of

BBA(H)

NETAJI MAHAVIDYALAYA

JUNE, 2023

Submitted by	Guided by
Raja Modak	Dr. Arnab Kumar Samanta

CERTIFICATE

This is to certify that Mr. “RAJA MODAK,” bearing Roll No: - 2015409020013, Reg. No: - 202005000751 of 2020-21 is a Bonafede student of Bachelor of Business Administration course of NETAJI MAHAVIDALYAYA; Arambagh, 2020-2023Batch, affiliated to the University of Burdwan, Burdwan. Project report on “ANALYSIS OF FINANCIAL STATEMENT OF CEMENT INDUSTRY (WITH SPECIAL REFERENCE TO ACC LIMITED AND ULTRATECH CEMENT)” is prepared by him under the guidance of Dr. Arnab Kumar Samanta is partial fulfillment of the requirements for the award of the Degree of Bachelor of business Administration the University of Burdwan.

Wise him all success in his future endeavors.

Signature of Supervisor

Signature of HOD

DECLARATION

I hereby declare that this project report entitled "A Study on **analysis of financial statement of cement industry** (With Special Reference to ***ACC LTD. AND ULTRATECH CEMENT LTD.***)''Was carried out by me for the degree of ***BBA HONOURS*** under the guidance and supervision of Dr. ***ARNAB KUMAR SAMANTA***, Professor of Department of BBA, ***NETAJI MAHAVIDYALAYA***. The interpretations put forth are based on my reading and understanding of the original texts and they are not published anywhere in any form. The other books, articles and websites, which I have made use of are acknowledged at the respective place in the text. This research report is not submitted for any other degree or diploma in any other University.

Place: ARAMBAGH

Name: RAJA MODAK

Class & ***Section***: *BBA (Honor's), Final Year*

Date: 15, April, 2021

ACKNOWLEDGEMENT

I would like to thank our Principal Dr. Asim Kr. De for his immense support and blessings. I would like to express my special thanks of gratitude to my research guide our HOD Dr. Arnab Kumar Samanta, Professor of Department of BBA for his valuable suggestions and guidance and for giving me the golden opportunity to do this wonderful research project on the topic: A Study on analysis of financial statement of cement industry (With Special Reference to ACC LTD. AND ULTRATECH CEMENT LTD.) Without his help it would have been difficult for me to have reached this state of completion of my project report. Also, I would like to thank my parents and friends who helped me a lot in the preparation of this project.

I wish to acknowledge the help of all those who have provided me information, guidance and other help during my research period.

Date: -

_____

Place: - ARAMBAGH

Signature

TABLE OF CONTENT

CHAPTER-1

INTRODUCTION OF THE TOPIC

1.1 RATIONAL OF THE STUDY

Ratio analysis is an important technique of financial analysis. It is an accounting tool which presents complicated accounting variables in simple and concise form. Accounting ratio simplifies, summarizes and systemizes accounting data to make it understandable. Its main contribution lies in communicating precisely the interrelationships which exist between various elements of financial statements. Accounting ratios are useful for assessing the financial health and performance of an enterprise. It is assessed by evaluating liquidity, solvency and profitability. Accounting ratios are helpful in business planning and forecasting. The trend of ratios is analyzed and used as a guide for future planning. Accounting ratios assist in locating the weak areas of the business even though the overall performance may be good. The management can then pay attention to the weaker sections and can take immediate actions.

1.2 INTRODUCTION TO THE INDUSTRY

A binder is a substance used in construction that sets, hardens, and adheres to other materials in order to bind them together. Cement is typically used to bind sand and gravel (aggregate) together. Cement is mixed with fine aggregate which produces mortar for masonry, or mixed with sand and gravel which produces concrete. Concrete is the most widely used material and is planet's most-consumed resource.

Cements used in construction are usually inorganic, based on lime or calcium silicate, and are graded as either non-hydraulic or hydraulic, depending on their tendency to set in the presence ofwater (see hydraulic and non-hydraulic lime plaster).

India is the world's second-largest cement manufacturer. India's infrastructure and construction sectors have a lot of room for development, and the cement industry is expected to benefit greatly from it. Some recent initiatives, such as the development of 98 smart cities, are expected to give the sector a significant boost. Several international players, including Lafarge-Holcim, Heidelberg Cement, and Vicat, have recently invested in the country. The ready availability of raw materials for making cement, such as limestone and coal, is a significant factor that aids the sector's development.

Cement production reached 329 million tons (MT) in FY20, with 381 MT forecast by FY22.However, consumption was 327 MT in FY20 and is expected to rise to 379 MT by FY22.By 2020, cement production capacity is expected to reach 550 MT. Since India has abundant and high-quality limestone deposits throughout the region, the cement industry has enormous growth potential. The Indian cement market, according to CLSA (institutional brokerage and investment group), is seeing increased demand. ACC, DALMIA, and ULTRATECH Cement are among the company's key players. Cement companies in India posted a sharp increase in earnings in the second quarterof FY21, as demand for the industry increased due to rural recovery. The demand outlook remained high as the rural markets stabilized. CLSA anticipates a 14% YOY rise in EBITDA in the cement industry for its coverage stocks in FY21.

1.3 INTRODUCTION TO THE COMPANY

1.3.1 ACC CEMENT: -

With a pan-India manufacturing and marketing presence, ACC Limited (ACC) is a leading player in the Indian building materials space. It contributes significantly to the country's landscape with 17 cement production units, over 90 ready mix concrete facilities, over 6,600 talented workers, a large distribution network of 50,000+ distributors and retailers, and a countrywide spread of sales offices.

When the doyens of the Indian cement industry consolidated their operations more than eight decades ago, they laid the groundwork for a business that has only grown stronger with each passing year. ACC cement is at the core of iconic landmarks across the world, from the BHAKRA NANGAL DAM in 1960 to the MUMBAI-PUNE Expressway.

The Gold and Silver product ranges in ACC's brand architecture ensure superior quality for general construction as well as advanced applications and environments. The ready-mix concrete product line offers one-stop shopping for anything from basic needs to high-grade concrete for the country's tallest structures.

ACC was one of the first Indian corporations to include environmental conservation as one of its corporate goals. ACC have built this dedication into every aspect of their value chain, from mining to sales to encouraging the use of renewable fuels and energy, resulting in one of the lowest carbon footprints in the cement industry

ACC was acquired by the Holcim Group of Switzerland in 2005.Following that, in 2015, Holcimand Lafarge merged to create Lafarge Holmic, the world's leading provider of construction materials and solutions. Being a part of this large group has aided ACC's

growth and the resultant technology sharing continues to help them stay ahead of the curve in the fast-paced Indian market.

1.3.2 ULTRATECHCEMENT

UltraTech Cement Ltd is India's biggest grey cement, ready-mix concrete (RMC), and white cement producer. It is also one of the world's leading cement manufacturers, and the only cementcompany (outside of China) with a capacity of more than 100 million tons in one country.

It has a total capacity of 116.8 million tons of grey cement per annum (MTPA). Ultratech Cement operates 23 integrated units (one outside India), 27 grinding units (four outside India), six bulk packaging terminals in India and one bulk packaging terminal in Sri Lanka, two white cement and putty units, and 100 RMC plants. It has operations in India, the United Arab Emirates, Bahrain, and Sri Lanka.

In the white cement segment, UltraTech goes to market under the brand name of Birla White. With a current capacity of 1.5 MTPA, it has two White Cement and wall care putty units. UltraTech is India's largest concrete producer, with more than 100 Ready Mix Concrete (RMC) plants in 41 cities. It also provides a range of special concretes to appeal to the needs of discriminating customers.

UltraTech created the UltraTech Building Solutions (UBS) concept to offer individual home builders a one-stop-shop solution for home construction. This is the country's first multi-categoryretail chain catering to individual home builders (IHBs). The aim of this initiative is to engage home builders at every point of the construction process, provide them with high-quality construction products and services, and help them finish their dream homes.

1.4 JUSTIFICATION OF THE TOPIC

This project will help the stakeholders in making various decisions regarding investment. Ratio Analysis helps to understand company's present profitability and future financials & operations. It will provide a comparative study of the performance of both the companies. The long term andshort-term health of both the companies will also be studied and compared with the objective of helping the management of both the companies in recognizing the various methods in which their company's performance can be enhanced. It also helps in making effective control of the business.

CHAPTER -2

REVIEW OF LITERATURE

2.1 International Reviews

(Baran, Pastýr, & Baranová, 2016) Financial analysis is a powerful method for fostering the decision-making of various stakeholders in today's volatile global environment, and it's an essential part of business monitoring. Financial analysis made it simple to identify the factors that had the greatest effect on the business. It aids the company in predicting future growth as well as the risk of bankruptcy.

(Houghton & Woodliff, 1987) The researchers used financial ratios to see if they could predict business failure in this study. Human Information Processing (HIP) and environmental predictability prediction were used to achieve this.

(Hasanaj & Kuqi, 2019) The main goal of this research is to identify, predict, and assess the best future economic conditions and company performance. The study's other goal is to analyze financial statements and provide information to financial managers so that they can make business decisions. The financial statement makes use of tools, analytical techniques, and necessary procedures for business analysis. It is a diagnostic tool for evaluating financing activities, investment activities and operational activities as well as an assessment tool for management decisions and other business decisions. The analysis of financial statements, respectively the analysis of the financial reports are used by

managers, shareholders, investors and all other interested parties regarding the company's state.

(Farah Naz, 2016) Financial output primarily represents business sector outcomes and results over time, demonstrating the sector's overall financial health. It shows how effectively a company uses its capital to increase profits and wealth for its shareholders. This paper conducts a thorough review of the financial results literature pertaining to Pakistan's cement industry. Profitability ratios, asset usage ratios, debt ratios, liquidity ratios, and the cash conversion cycle were used to assess the financial performance of the cement sector from 2006 to 2014.

The expected variable is Return on Investment (ROI), and the predictor variables are five ratio parameters. Except the leverage ratios the test analysis discovered that all parameters have a positive relationship with the dependent variable. To resolve the study's shortcomings in the future, the number of years considered should be expanded and other variables such as MVA, CAPM, and EVA should be reviewed for the research to analyze other variables which might influence financial results.

(Delen, Kuzey, & Uyar, 2013) This paper examines how financial ratios can be used to assess a company's performance. It aids in the identification of specific ratios that can accurately predict a company's performance. The researcher used a two-step data analysis approach, which included:

1) Using exploratory factor analysis (EFA) to determine underlying dimensions of financial ratios; and 2) Identifying the potential relationship between the firm's performance and financial ratios using predictive modeling methods. The researchers used four decision-tree algorithms to examine this relationship: CHAID, C5.0, QUEST, and C&RT.

(EL-Maude, 2016) The influence of capital structure on financial performance of businesses in the Nigerian cement industry is investigated in this research. A sample of four publicly traded firms was chosen from the study's population of seven companies. The post factor study design was used to examine the effects of long- and short-term debts on Return on Assets (ROA) and Return on Equity (ROE). The study concluded, however that businesses in the cement industry's performance is not optimized due to their inability to use debts in their capital structures. Finally, the paper suggests that cement companies should promote the use of long-term debt in their capital structures because it improves financial performance.

(Tanveer Bagh, 2016) The aim of this research was to investigate the influence of working capital management (WCM) on the performance of selected manufacturing companies listed on the Karachi Stock Exchange (KSE). Quantitative research techniques, such as correlation matrices and multiple regressions, secondary data, and purposive sampling, have all been devised. Inventory turnover (ITO), cash conversion cycle (CCC), average collection period (ACP), and average payment period (APP) have all been used as independent variables in the WCM (APP). The dependent variable was firm performance (FP), which included return on asset(ROA), return on equity (ROE), and earnings per share (EPS). WCM has an impact on the FP of chosen companies, according to the findings of the research. It will benefit students' academic, legal, and practical behavior. The conclusions of the study provided deeper insights into WCM methods and presented recommendations that improved the FP of the targeted companies

(Kumaraswamy, 2016) The current research aims to investigate the influence of working capital on the firm performance of cement manufacturing Gulf Cooperation Council (GCC) firms for theperiod 2008-2014 as an extension of previous literatures that proven the relationship between working capital and firm performance. Using linear regression models, four theories about working capital components were explored. The study discovered a positive relationship betweeninventory conversion period and profitability, as well as a negative relationship between average payment period and company profitability. According to the regression model, the most important considerations are average collection period and inventory conversion period, followed by average payment period. It demonstrates that the average collection period and high inventory levels have a significant impact on the profitability of GCC cement manufacturing companies.

(Mobeen Ur Rehman, 2013) The effect of running assets management on the profitability of thePakistan cement industry is investigated in this paper. Secondly the study outlines the main factor that primarily determines working capital in the financials of the Pakistan cement sector. To manage a firm's liquid assets, or working capital management, and to achieve a desired level of profitability and risk, figures were collected from Annual Reports and a sample of ten Pakistani cement companies listed on the KSE from 2003 to 2002.

(ZUBAIR ARSHAD, 2013) The aim of this study is to determine the empirical influence of the working capital management and profitability of Pakistan cement industry. In this case, the researcher used a quantitative research approach to test a research theory. The study used rations from 21 listed cement companies on the Karachi stock exchange between 2004 and 2010.

The findings revealed that there is a considerable negative relationship between working capitalmanagement and company's profitability.

2.2 National Review

(Sharma, 2015) The purpose of this paper is to investigate the effectiveness and versatility of cement manufacturing companies in India. The effectiveness of the cement industry in India has been assessed using various data envelopment analysis (DEA) models. According to the major conclusions of the DEA analysis, 43 percent of businesses are found to be technically effective. Returns to scale results show that 14 companies are experiencing higher returns to scale, 12 are experiencing declining returns to scale, and the remaining 21 are experiencing constant returns to scale. The findings show that international firms are theoretically more efficient than domestic firms, and that large-scale firms are more scale efficient than small- and medium-scale firms due to economies of scale. The research emphasizes the importance of flexibility in inefficient firms' production processes in order to put their productivity up at par with that of efficient firms.

(Bansal, 2013) The purpose of this paper is to identify the factors that influence working capital requirements in the Indian cement industry. ACC Cement is a firm that is listed on both the NSE (National Stock Exchange) and the BSE (Bombay Stock Exchange) in India. For this research, data from the years 2000 to 2012 was used. WCR (working capital requirement) was used as the dependent variable, with growth in sales, company size, performance, operating cash flow, operating productivity, debt equity ratio, company indicator, and raw material price as the independent variables. It was discovered that the debt-to-equity ratio is the only factor that influences the working capital requirements of a company.

(Bhayani, 2010) The effectiveness of any company can be used to assess its profitability. Internal and external factors, such as the size of the business, liquidity management, expansion

of the organization, expense component, and inflation rate, all have a significant impact on the firm's profitability. The purpose of this paper is to determine which variables are used to determine the profitability of the Indian cement industry. The study includes all listed cement companies operating in India from 2001 to 2008.Backward regression analysis was used on the study's variables to determine profitability. The study's findings show that liquidity, company age, operating profit ratio, interest rate, and inflation rate that plays a role in the profitability of the Indian cement industry.

(Panigrahi, 2017) The relationship between the effectiveness of working capital management and its various components, such as inventory, cash and bank balances, and various current liabilities. The goal of the research is to determine the efficiency and effectiveness of management in each working capital segment. Because the net concept of working capital has been widely adopted in this research, the management of both current assets and existingliabilities will be evaluated in due course. For the study, a sample list of 30 Bombay Stock Exchange (BSE) listed cement companies from various parts of India was chosen. The information relating to the nature of the business, size, age, state and area, business background, value of total assets, and annual financial statements of sample businesses for the period 2006 to 2015 was derived from the CMIE Prowess 4.0 database software. For the various statistical analyses necessary for this study, statistical software, SPSS 21.0 edition, is used. The existence of a relationship between working capital management and profitability, average receivable period, inventory conversion period, average payment period, and cash conversion cycle, which expresses working capital efficiency, has been investigated. Profitability and the number of days of accounts payables and inventory are found to have a negative relationship, but profitability and the number of days of accounts receivables have a positive relationship.

(Mrs.J.Dhivya, 2017) The cement industry in India is the world's second-largest consumer of the material. Cement firms have seen an 85 percent increase in net profit. With this enormous achievement, India's cement industry has contributed nearly 8% to the country's economic growth. ACC Limited is India's largest cement and concrete producer. With 17 modern cement factories, more than 40 ready mix concrete plants, 21 sales offices, and some zonal offices, ACC's activities are spread throughout the country. ACC has a distinguished track record of achievement in the areas of creative research, product development, and specialized consultancy. The research is focused on the ACC LIMITED's financial performance. The main goal is to examine the cement industry's financial performance, with main objectives also assessing the industry's profitability, liquidity, and operational position. The analysis is conducted using secondary data. The information was gathered from the company's annual report and balance sheet. The data was analyzed using tools such as ratio analysis and trend analysis. The study's findings mean that the company's liquidity and solvency are in good shape.

(Damor, 2012) The cement industry plays an important role in a country's growth and development. It provides the necessary infrastructure for the country's economic growth. Villages are home to more than 60% of our country's inhabitants. Roads, buildings, and other infrastructures provide opportunities for the large rural population to improve their economic status. There are many cement manufacturing companies that produce higher-quality cement. As a result, in the cement industry, there is a need for comparison. The profitability analysis of the cement industry provides a good picture of the company's ability to generate profit and its management. This "profitability analysis" paper covers a wide range of topics such as gross profit, net profit, return on investment, and return on capital employed, among others.

(M. Devi, 2017) After China, India has the world's second-largest cement industry. It contributes significantly to the employment, infrastructure, and housing sectors. By the financial year 2025, production capacity is expected to exceed 550-600 million tones per annum (MTPA). The authorchose two organizations for this research. Ultra Tech Cement is India's biggest cement company and one of the world's top cement producers. India Cement is the oldest and biggest cement manufacturing company in Tamil Nadu. They began producing cement in 1949 at their Sankar Nagar plant, which was capable of producing one lakh tons of cement per year. As a result, a comparative analysis was conducted. The Ultratech Cement Company's short-term solvency situation must be improved.

(**shah**, **2017**) The current research looked at the issues and future prospects of a few cement companies in India. For the inquiry, only secondary data was gathered from annual reports of cement industries and industry profiles. The study spans five years, from 2010-11 to 2014-15. This research focused solely on the company's financial issues. Statistical approaches such as Mean, S.D. (Standard Deviation), and F ANOVA are used to analyze accounting ratios.

(Sabarmati, 2016) The purpose of this paper is to investigate the impact of working capital management (WCM) on profitability of the Indian cement industry. It focuses on the effect of working capital on performance, taking into account a variety of factors that influence working capital management. The study, which is based on secondary data, is restricted to 24 Cement Industries from the Bombay Stock Exchange. Regression analysis was used to test six independent variables (CR, QR, WCTR, DTR, FATR, and ITR) and one dependent variable (ROI). The study's results show that WCM has a significant effect on selected predictor variables such as (CR, QR) on Profitability (ROI) and has a significant impact on WCM on P chosen by the cement industry in India for the study period.

(AL-Dalayeen, 2016) The Indian cement industry is the world's second largest, employing overa million people across the country. Because India's construction industry is heavily reliant on the cement industry, it contributes to the Indian economy. The financial performance of five main cement companies in India is examined in this paper. The data was collected from annual reports of cement firms from 2005-06 to 2014-15 and analyzed using one-way ANOVA as a statistical tool. The data analysis reveals that there is a considerable difference in the gross profit ratio, net profit ratio, current ratio, simple ratio, and debt equity ratio among chosen cement companies in India.

CHAPTER-3

RESEARCH METHODOLOY

3.1 OBJECTIVE

This paper aims to evaluate the financial performance of selected cement company i.e. ACC and ULTRATECH for the period from 2016 to 2020. The following are the objectives of the study:

1. To analyze the profitability position of both the companies.

2. To analyze the liquidity position of both the companies.

3. To appraise the long-term solvency of the selected companies.

4. To help in comparative analysis that is inter firm and intra firm comparison.

3.2 RESEARCH HYPOTHESIS

There is no significant difference in financial performance of selected cement company.

3.3 SCOPE

The current research has a very wide and broad scope. The scope of this report is restricted to profitability analysis, liquidity analysis, short-term financial strength analysis through working capital management, and long-term financial strength analysis through solvency ratios analysis. The current research focuses specifically on monetary issues. The present study did not cover non-monetary factors that could have a direct effect on the financial output of the cement industry and selected cement firms. Other financial issues such as capital budgeting, the effect ofsocial, economical , and political conditions on the cement industry, the impact of government policies on trade and industry, and so on are not covered in this report.

3.4 LIMITATION

1. The cement industry was studied using secondary data from published reports and journal articles from 2016 to 2020. The information gathered from the above sources may not contain all of the necessary details. As a result, the current research would take into account all of the shortcomings that are inherent in the secondary data from financial reports.

2. The sample size for the current study is very small. Only two cement companies are included in the sample. Therefore, the limitation of the small sample is also applicable to the present study.

3. Different companies use the different business processes. The process of manufacturing may also be different. For the purpose of this study, it is assumed that all the companies engaged in cement production use the same business process. But in actual practice different companies adopt different business process therefore the conclusion derived from the present study may not be that accurate.

CHAPTER-4

DATA REPRESENTATION & ANALYSIS

4.1 Data representation & Analysis

4.1.1 MEANING OF RATIO AND ACCOUNTING RATIO

Accounting ratio may be expressed as an arithmetical relationship between two accounting variables.

RATIO' is an arithmetical expression of relationship between two interdependent or related items. Ratios, when calculated on the basis of accounting information are called **ACCOUNTING RATIOS.**

4.1.2METHOD OF EXPRESSING ACCOUNTING RATIO

The analysis of financial statements can be presented by one of the following methods:

1. TERMS OF NUMBERS (Rates or in time)

According to this method, relationship between two figures is presented in terms of rates or in time ratio. For example, sales are Rs.100000 and stock is Rs. 20000, then it will be said that stock turnover is 5 times [100000/20000]

2. PERCENTAGE

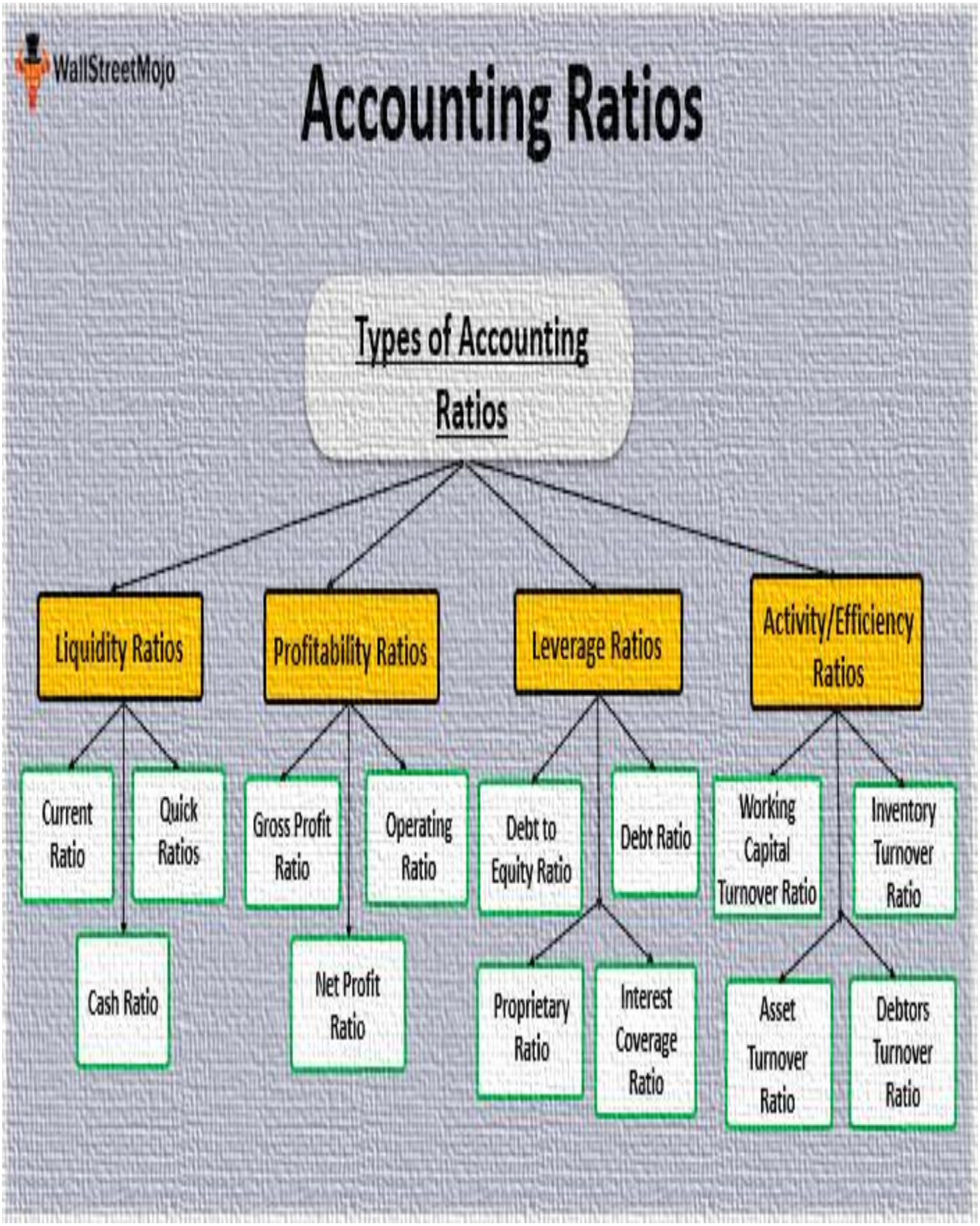
If the quotient obtained by dividing one item by another is multiplied by one hundred, it becomesthe 'percentage' form of expression. Fr example, if sale is 400000 and gross profit is 120000 then

Gross profit ratio will be 30% $120000/400000 \times 100$

1. PURE RATIO

In this form the relationship between two figures is derived by the simple division of onenumber by another. For example – If current asset is Rs. 800000 and current liability is Rs 400000, the relationship can be presented as 2:1[80000/40000]

4.1.3 CLASSIFICATION OF ACCOUNTING RATIOS:



Classification of accounting ratios depends upon the objectives for which they are calculated. It may also depend upon availability of data, analysis of financial statements is made with a view to ascertain the efficiency and financial soundness of the company accounting ratio must be classified on the basis of profitability ratios, activity or performance or turnover ratios and financial ratios (i.e., liquidity ratios and solvency ratios).

1. LIQUIDITY RATIOS

Liquidity refers to the ability f a concern to meet its current obligations as and when they becomedue. It is essential of smooth conduct of business activities because if a concern has a poor liquidity position, it may not be able to make timely payments to the creditors and in effect will not be in a position to purchase goods or services on favorable terms. Liquidity ratios are calculated to measure the short-term financial soundness of the business. This ratio shows the ability of a business to pay off its short-term obligations i.e. current liabilities and short term provisions. This ratio is also an effective source to ascertain whether the working capital has been effectively utilized. Following ratios are calculated to determine the short-term liquidity of the business.

1.1 CURRENT RATIO

This ratio measures the relationship between current assets and current liabilities. This ratio judges whether the current assets are sufficient to meet the current liabilities of the business. Thisratio is calculated on the basis of following formula.

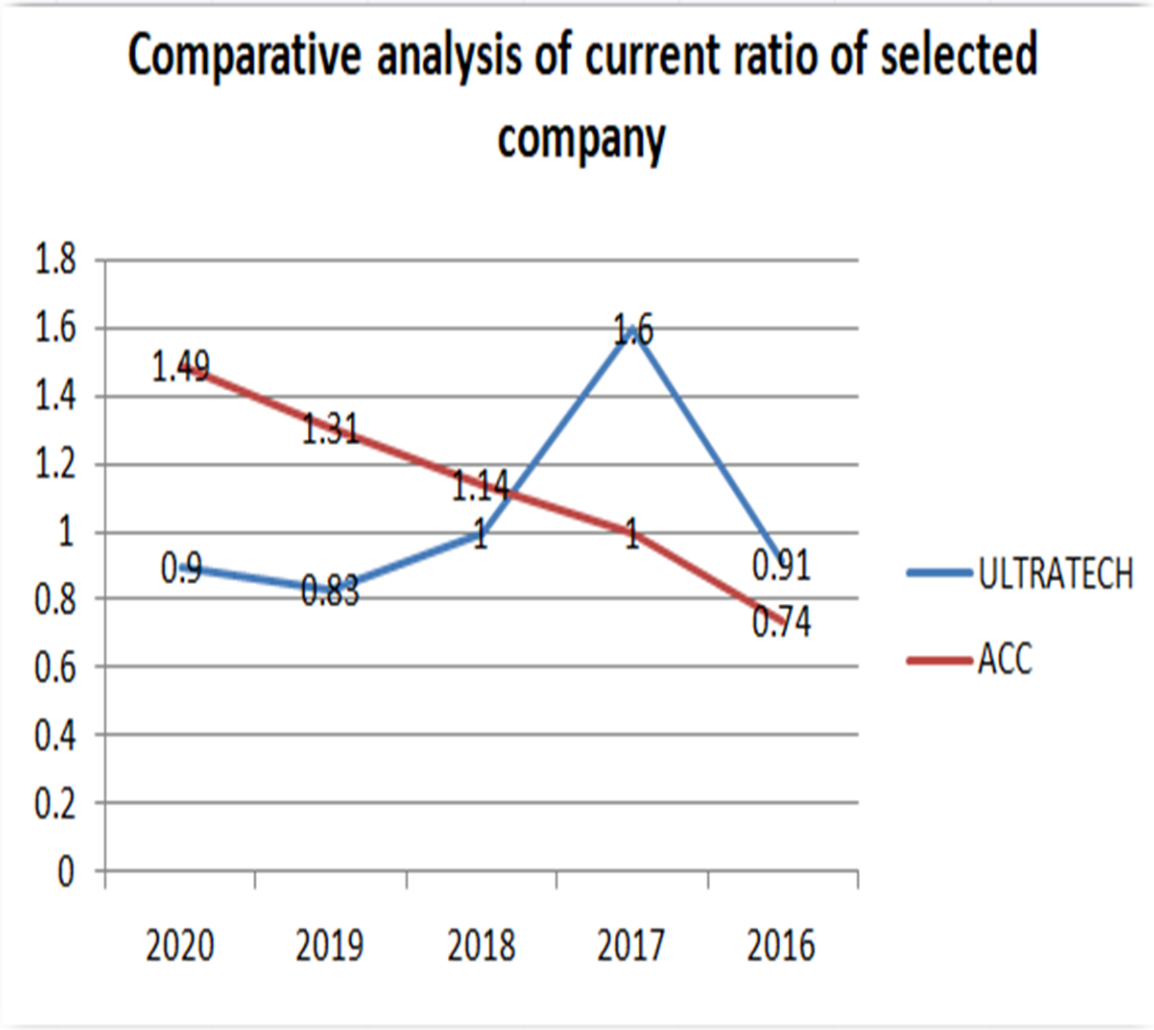
$$\text{Current ratio} = \frac{\text{Current Asset}}{\text{Current liability}}$$

Significance/Rational

According to accounting principles current ratio 2:1 is considered an ideal ratio (bench mark) of the business. Current ratio is required to evaluate the ability of a business enterprise to meet its short-term financial obligation in time. It helps to assess the short-term financial position of the business. Higher the ratio, the greater will be the margin of safety and better will be the short-term solvency position of the business. If current ratio is less than its benchmark, then it indicates a lack of liquidity and shortage of working capital.

Comparative Analysis of Current Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	0.9	0.83	1	1.6	0.91
ACC	1.49	1.31	1.14	1	0.74

.



Intra firm: -

Ultratech

The short-term solvency position of the firm remains stable as the current ratio increased initially from 0.91 in 2016 to 1 in 2018 but then it declined to 0.9 in 2020.

Acc

The current ratio of the firm remained below the benchmark that is 2:1. But the increasing trend from 0.74 to 1.49 from year 2016 to 2020shows that the margin of safety of the firm has increased consistently and their short-term solvency position has also improved

Inter-firm: -

The short-term solvency position of ACC has been improving since 5 years since the current ratio has been regularly increasing from 0.74 to 1.49. On the other hand, the short- t e r m solvency position of Ultratech remained stable since it increased initially in year 2017 but then came to same value in year 2020.

1.2 QUICK RATIO

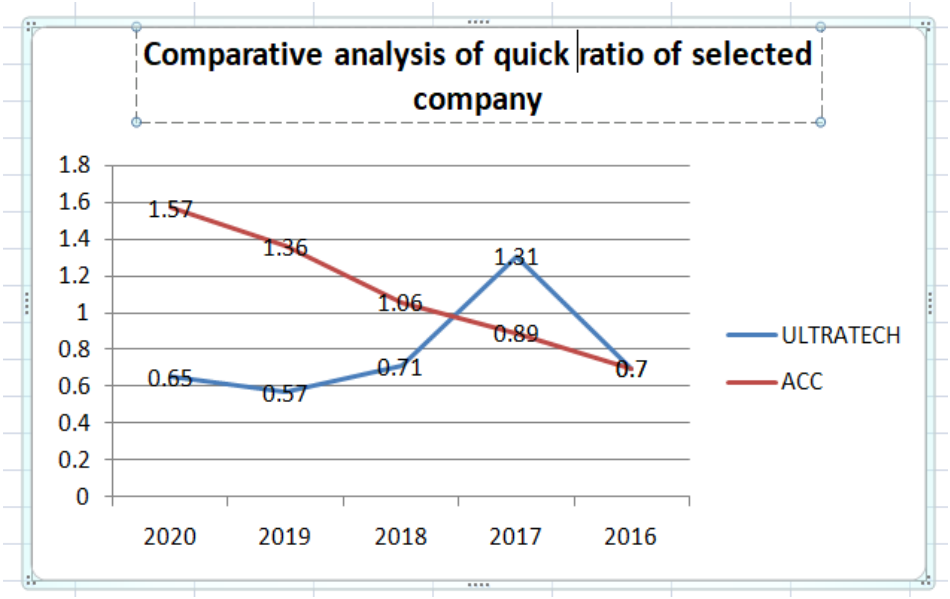
This ratio establishes relationship between liquid assets and current liabilities. This ratio is calculated for the better test of the short-term financial position of the company as compared to current ratio because in quick ratio, we take only those assets which can be easily and readily converted into cash. It can be calculated from the following formula.

$$\text{Quick ratio} = \frac{\text{Liquid Asset}}{\text{Current liability}}$$

Significance/Rational

Generally, the benchmark of liquid ratio is 1:1 and it is said to be satisfactory, which means liquidassets are just equal to current liabilities. Hence, there can be no possibility of default in paymentof current liability by the business concern. Higher ratio shows the better capacity of the businessto meet its current obligations.

Comparative Analysis of quick Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	0.65	0.57	0.71	1.31	0.7
ACC	1.57	1.36	1.06	0.89	0.7



Interpretation:

Intra-firm:-

Ultratech

The quick ratio was highest in year 2017 i.e. 1.31 Which is higher than its benchmark which shows that the firm's short term solvency position was better than satisfactory in this year. But in other 4 years the short term solvency position was below satisfactory level.

Acc

The quick ratio of company has increased from 0.7 to 1.57 from year 2016 to 2020 which shows that company has regularly improved their capacity to meet their short-term obligations.

Inter-firm: -

The quick ratio of ACC of satisfactory as it increased regularly in past 5 years and was above thebenchmark in year 2020.

But the performance of Ultra tech was below satisfactory level as it increased in year 2017 andwas even above benchmark but then declined every year continuously.

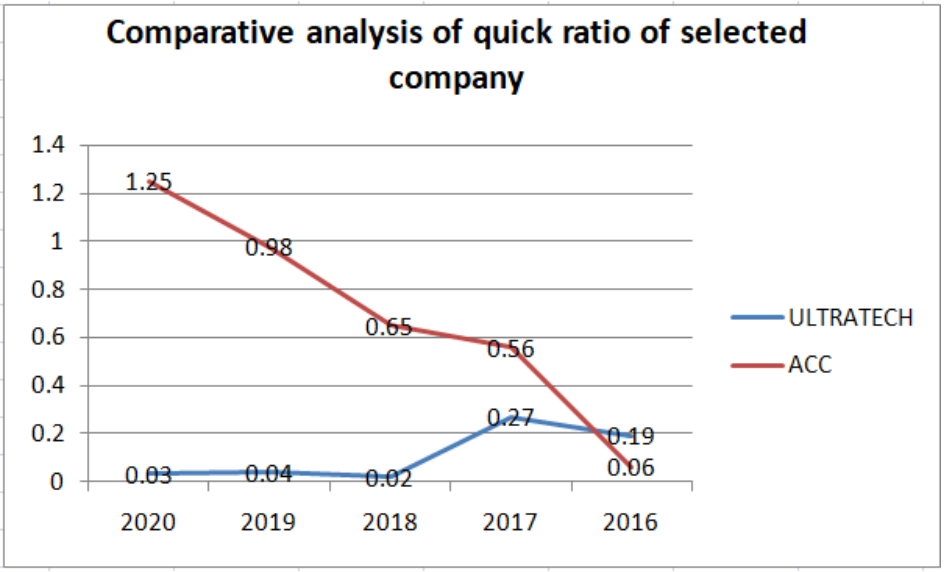
1.3 ABSOLUTE LIQUID RATIO

This ratio is also known as 'SUPER QUICK RATIO' and establishes relationship betweenabsolute liquid assets and current liability. It is calculated by using following formula

$$\text{Absolute liquid ratio:-}\frac{cash\ and\ bank\ blance}{current\ liability}$$

This ratio is calculated to analyze the short term solvency or financial position of the firm. Anabsolute liquid ratio of 0.5:1 is considered as ideal ratio.

Comparative Analysis of Absolute liquid Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	0.03	0.04	0.02	0.27	0.19
ACC	1.25	0.98	0.65	0.56	0.06



Interpretation:

Intra-firm:-

Ultratech

The super quick ratio initially increased from 0.19 to 0.27 in year 2016 to 0.27 in 2017 but thenit decreased continuously and reached 0.03 in 2020. This shows that the financial position of company has retarded.

ACC

The super quick ratio of company has increased from 0.06 to 1.25 from year 2016 to 2020 which is above than the ideal ratio this shows that the financial position of company has continuously improved.

Inter-firm: -

The financial position of Ultratech remained unassertive as its super quick ratio remained less than benchmark. On the other hand, the financial position of ACC has shown positive growth as its super quick ratio has increased every year and reached 1.25 which was above than the ideal ratio

1.4 CASH RATIO:

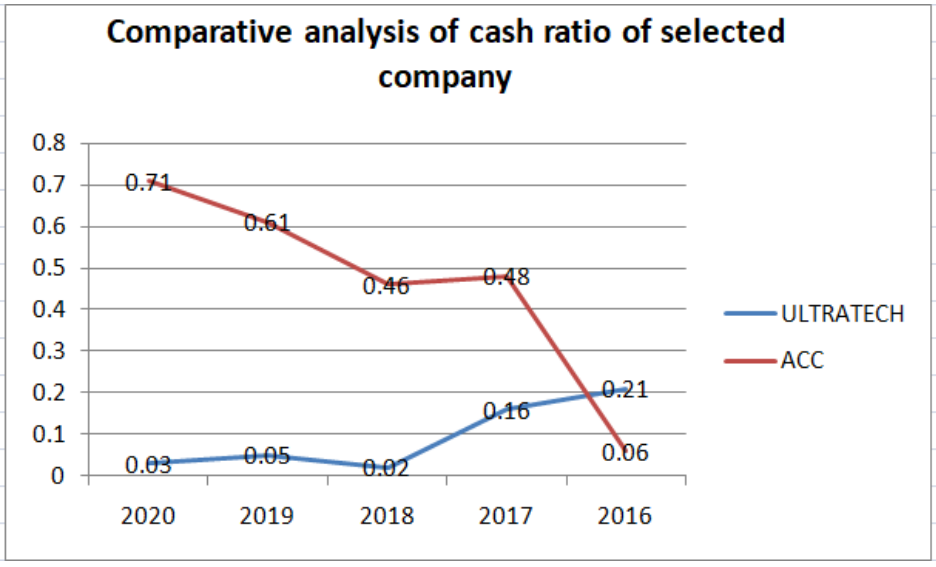
The cash ratio is a measure of a company's liquidity and it is defined as the ratio of company's cash and bank balance to its current assets. Following is the formula for calculating cash ratio

$$\text{Cash ratio} = \frac{(\ \ cash\ and\ bank\ blance)}{Crrent\ Asset}$$

Significance/Rational

The cash ratio is a liquidity ratio that assesses a company's ability to repay short-term debts with liquid assets. Higher cash coverage ratio indicates that the business is more liquid and can fundits debt more easily. This ratio is especially important to creditors because they want to ensure that their loans will be repaid.

Comparative Analysis of Cash Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	0.03	0.05	0.02	0.16	0.21
ACC	0.71	0.61	0.46	0.48	0.06



Interpretation:

Intra-firm:-

Ultratech

The cash ratio has decreased from 0.21 in 2016 to 0.03 in 2020 which indicates that thecompany's ability to meet its short-term debts have decreased.

ACC

The cash ratio of company has increased from 0.06 to 0.71 from year 2016 to 2020 which showsthat company's ability to meet its short-term debts have increased.

Inter-firm:-

The cash ratio of Ultratech has decreased every year on the other hand the cash ratio of Acc has increased every year which shows that ACC is more liquid than Ultratech and Acc is capable of funding its debts properly.

2 PROFITABILITY RATIOS

Rearing profits is one of the major objectives of every business concern because efficiency of any business is measured by profitability. A firm must earn sufficient profits in relation to the capital employed by it. Profitability is a main element for survival of every business and this ratio helps in explaining the overall efficiency of the business concern. ". On the whole profitability of a business enterprise is an important measurement of its operational efficiency, which, to owners a measure of worth of their investments; to the creditors, the margin of safety; to employees, a base of proper wages and facilities; to customers, a hint

to demand for price cuts and better quality and finally to an enterprise, an easy source of finance for expansion. These ratios are generally calculated in the terms of percentage. Some important profitability ratios are explained below.

2.1GROSS PROFIT RATIO

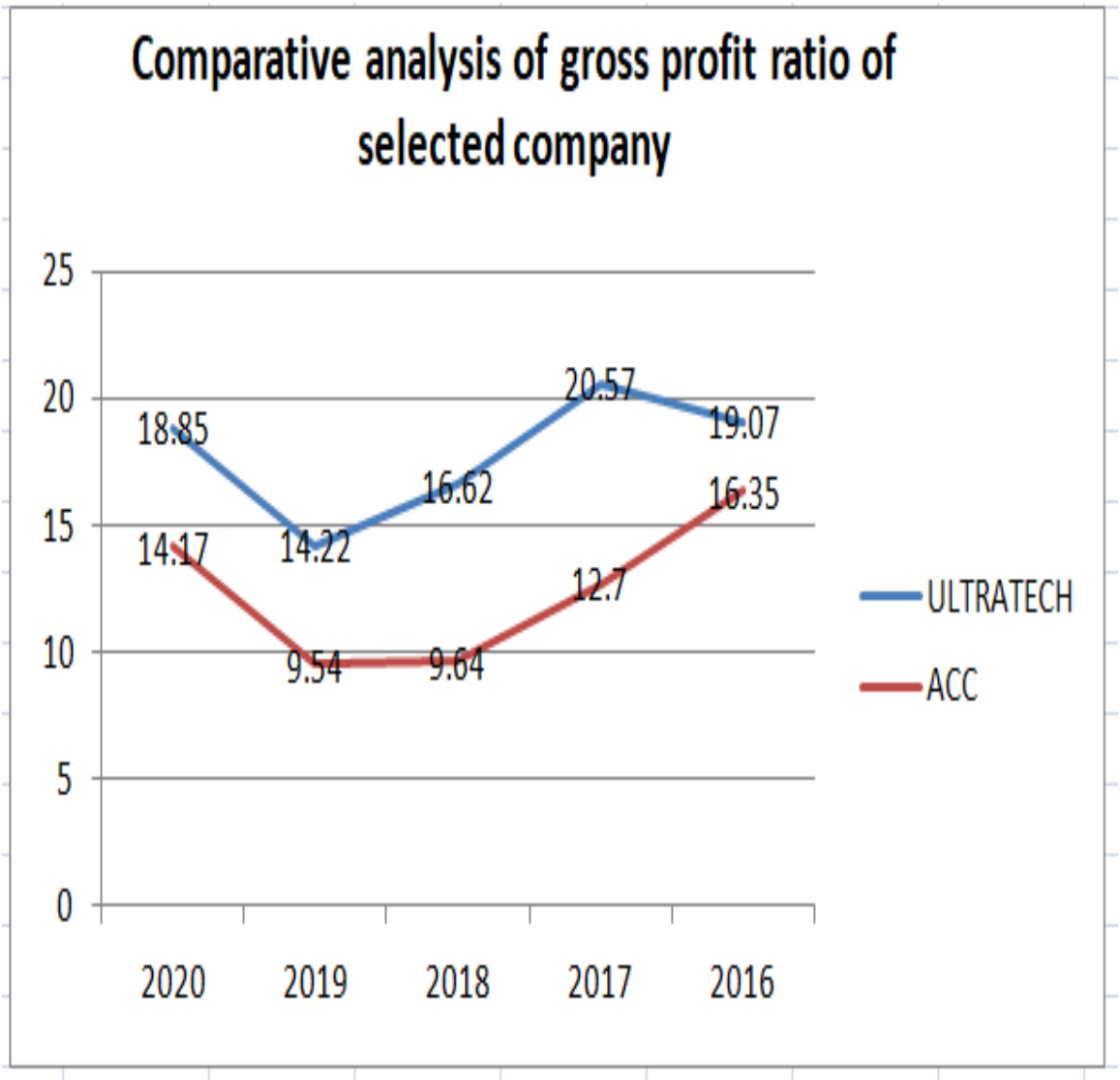
This ratio empresses the relationship of gross profit to the net revenue from operations. This ratioshows the margin of profit on net revenue from operation. It is calculated with the help of following formula.

$$\text{GROSS PROFIT RATIO}=\frac{gross\ profit*}{R.F.O}100$$

Significance/Rational

Gross profit ratio shows the margin of property on revenue from operations. It helps to determine the efficiency of trading activities and facilities the management to estimate margin of profit which would be left over to meet the expenses other than direct expenses. That ratio is reliable guide for fining selling prices. Higher the ratio, better is the position of a business concern, where as a decline in the ratio should be given due attention and should be investigated property. If gross profit ratio is tower than the organization's own standards, then it will affect the financial position of that concern which can prove a danger to the business.

Comparative Analysis of Gross Profit Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	18.85	14.22	16.62	20.57	19.07
ACC	14.17	9.54	9.64	12.7	16.35



Interpretation:

Intra-firm:-

Ultratech

The gross ratio of company has decreased from 19.07 in 2016 to 14.22 in 2019 and then increased to 18.85 in 2020, this shows that efficiency of the company remains same after some ups and downs.

Acc

The gross ratio of company initially decreased from 16.35 in 2016 to 9.54 in 2019 which shows that the efficiency of company has decreased. But then it increased again to 14.17 in 2020 so the efficiency of company has increased again but it is far lower than ideal ratio.

Inter-firm

For both Ultratech and ACC the ratio initially increased but then came to same value this shows that there was negligible difference in the efficiency of company.

Although Ultratech had better performance than ACC.

2.2 NET PROFIT RATIO

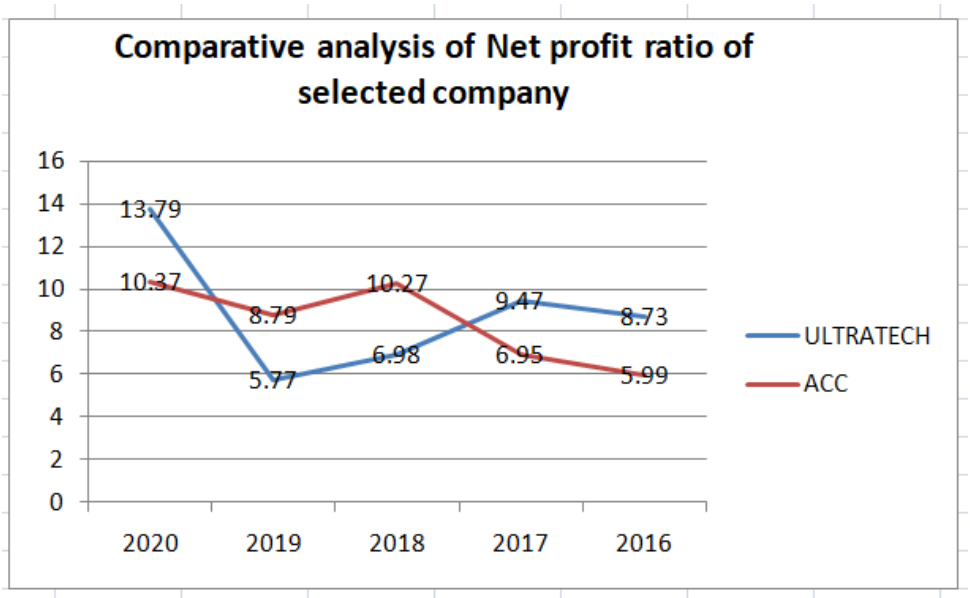
Net profit ratio establishes relationship between net profit and revenue from operations. We ascertain net profit after deducting indirect expenses and adding indirect incomes from gross profit. In other ways, net profit generally refers to the net profit after tan. It is calculated by the following formula.

$$\text{Net Profit ratio} = \frac{\text{Net profit}}{\text{R.F.O}} * 100$$

Significance/Rational

Net profit ratio shows the net result of operational activities of the business and it shows the net profits margin in the relation to revenue from operations. This ratio is more significant from investor's point of view because it reflects the overall efficiency of the business. Higher the ratio,better and secured the position of the firm.

Comparative Analysis of Net Profit Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	13.79	5.77	6.98	9.47	8.73
ACC	10.37	8.79	10.27	6.95	5.99



Interpretation:

Intra-firm:-

Ultratech

The net profit ratio of company was 8.73 in 2016 and 13.79 in 2020 which shows that overall efficiency of company has increased although there was decline in ratio in the year 2018 and 2019 but it increased again in 2020.

ACC

The net profit ratio of company just doubled from 2016 to 2018 that is from 5.99 to 10.27it shows that company's overall efficiency has increased. And it remained same in 2020 despite of some decline in year 2019.

Inter firm

The net profit ratio of both the companies has increased but the performance of Ultratech was better than ACC.

2.3 OPERATING NET PROFIT RATIO

This ratio establishes relationship between operating net profit and revenue from operations. Thisratio is calculated to know the operational efficiency of the business. We use the following formula for calculating operating profit.

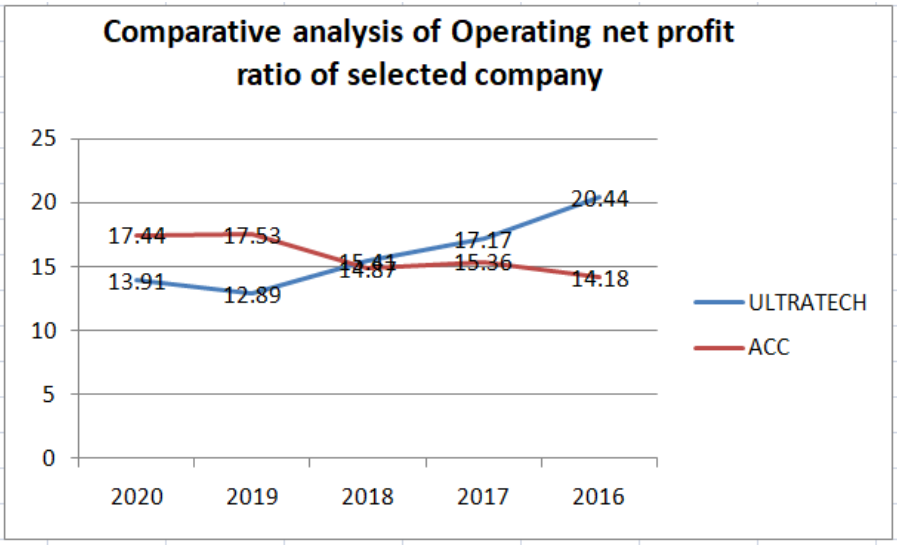
$$\text{Operating Profit ratio} = \frac{\text{Operating profit}}{\text{R.F.O}} * 100$$

Significance: -

This ratio shows the entire operating activities of a business. Decrease in this ratio indicates managerial inefficiency and excessive operating expenses. In same way, increase in the ratio shows the better performance of business or managerial efficiency. It is very useful for inter firm as well as intra firm comparison.

Comparative Analysis of Operating net profit Ratio of Selected Companies

YEAR	2020	2019	2018	2017	2016
ULTRATECH	13.91	12.89	15.41	17.17	20.44
ACC	17.44	17.53	14.87	15.36	14.18



Interpretation:

Intra-firm:-

Ultratech

The operating net profit ratio of company has decreased from 20.44 in 2016 to 13.91 in 2020.It shows that operating expenses of company has increased and managerial efficiency has decreased.

ACC

The operating net profit ratio of company has changed from 14.18 to 17.44 from year 2016 to 2020. This shows that managerial efficiency of company has increased over time and operating expenses of company have also decreased.

Inter-firm: -

The operating net profit ratio of Ultratech has decreased over 5 years on the other hand the operating net profit ratio of ACC has increased this implies that ACC has more managerial efficiency than Ultratech and operating expenses of ACC are also less than Ultratech.

3.TURNOVER RATIOS

This ratio measures the efficiency of business regarding utilizing or managing available resources of the company. Since, these ratios relate to the use of assets for profits through turnover that is why, they are called turnover ratios. In this ratio, we study the relationship between two variables, out of which one is from statement of P/L and another from balance sheet. That is why, it is called composite ratio. These ratios are also called as 'activity ratios' or 'performances ratio'. The main objective of this ratio is to judge the work performance of the enterprise and effectiveness of managerial decisions. In other words, these ratios help to evaluate how well facilities and services available at the disposal of the firm are being used or to measure the effectiveness with which a firm uses the resources as its disposal and implements its purchase, sales and are expressed in integers or times or rate of turning over or rotation.

Higher turnover ratio means better utilization of assets which reflects higher efficiency and profitability. The results of these ratios are expressed in times rather than in percentage. Moreover, turnover ratios are generally calculated on the basis of revenue from operations or cost of revenue from operations.

3.1 INVENTORY TURNOVER RATIO

This ratio indicates no. Of times inventory is replaced during the year it shows the relationship between cost of revenue from operation and average inventory. This ratio is also called as merchandised turnover ratio. This ratio can be calculated by following formula

$$\text{Inventory turnover ratio} = \frac{\text{Cost of goods sold}}{\text{Average Inventory}}$$

Significance/Rational

The main objective of ratio is to judge the frequency of conversion of stock of finished goods into revenue from operation so that is the reason; liquidity can also be measured with the help of this ratio.

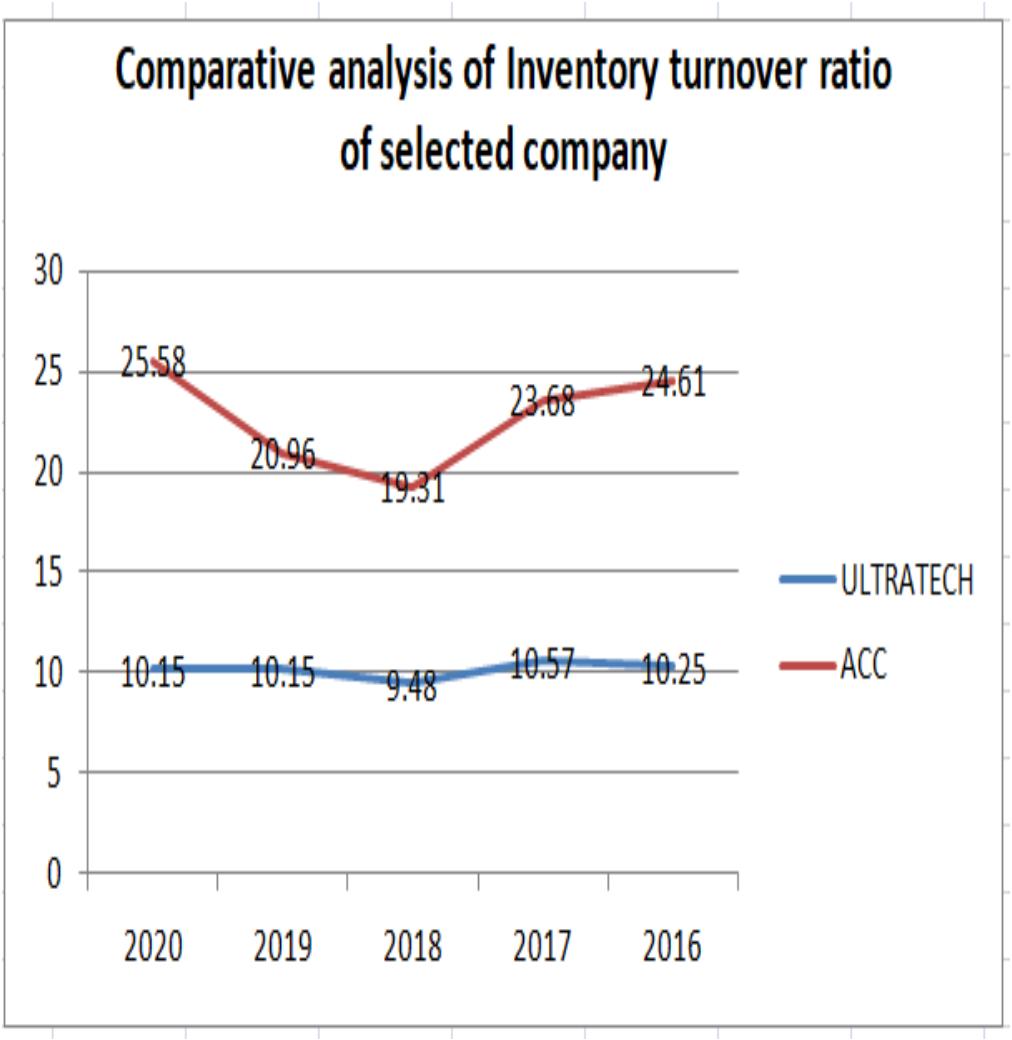
Higher the ratio, the better will be the position of the business wherever lower turnover ratio indicates that the business is not selling its stock quickly, it is kept ideal in the go down.

It should also be remembered that it is not necessary that a high inventory turnover ratio is always good because it may be due to sale of goods at a low margin of profit and due to over trading. It creates the shortage of working capital also.

Hence, there should be an optimum inventory turnover ratio for the purpose of adequate workingcapital to have reasonable profit margin for the business.

Usually inventory turnover ratio between 5 and 10 is considered good for most of the industries as it indicates that the selling and restocking of inventory is done every 1-2 months.

Comparative Analysis of Inventory Turnover Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	10.15	10.15	9.48	10.57	10.25
ACC	25.58	20.96	19.31	23.68	24.61



Interpretation:

Intra-firm:-

Ultratech

The inventory turnover ratio of company was 10.15 in 2020 from 10.25 in 2016 despite of some up and downs over years. But having this ratio is considered as good as it is neither too high nor too low. This indicates that the company is selling inventory within reasonable time.

ACC

The inventory turnover ratio of company has decreased from 24.61 to 19.31 from 2016 to 2018 then increased to 25.58 in 2020. The ratio of company is higher than the ideal ratio that is 5 to 10which shows that the company is selling their inventory at low margin of profit.

Inter-firm: -

The position of Ultratech is better than ACC as the ratio of Ultratech is close to good inventory ratio which shows that inventory is sold and restocked under reasonable time on the other hand ratio of ACC is extensively high than the ideal ratio.

3.2Trade Receivable Turnover Ratio

This ratio establishes the relationship between trade receivables and credit revenue from operations. This ratio is also known as debtor turnover ratio. It shows the speed with which debtor and bill receivables are converted into cash. This ratio tells the liquidity of

$$\text{Trade receivable turnover ratio} = \frac{\text{Net credit sales}}{\text{Average Receivables}}$$

trade receivables of a business concern. This ratio is calculated with the help of following formula

Note:

1. Credit revenue from operation is given separately or it may be found out through difference between total revenue from operation and cash revenue from operation.
2. Credit revenue from operation may also be calculated through debtor's account
3. In case of newly started business debtor, bill Receivables in the beginning is not available so debtor and bill receivables at the end will be supposed to be the average trade receivables.

Significance/ Rational

This ratio is very helpful for knowing the efficiency with which debts are collected during the year. It will be in the interest of the business, if the ratio is higher which will indicate that debts are collected quickly. It will reduce the risk bad debts which will result in lower expenses of collection. So, higher the ratio indicates that credit policy of the business concern is efficient.

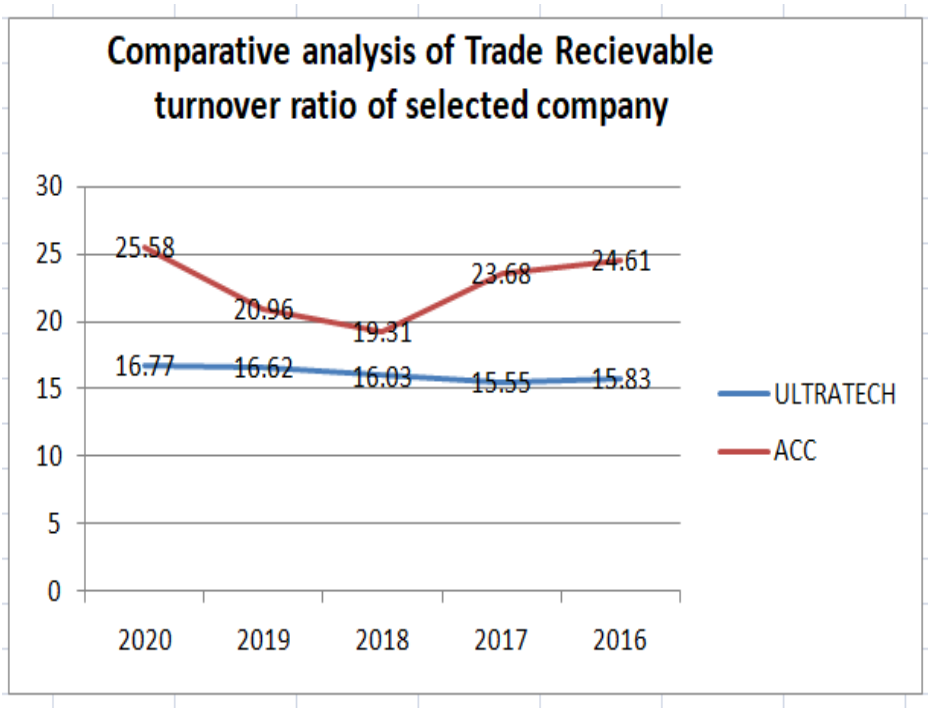
No ideal standard of this ratio is fixed. So business concern should establish its own standard andcan be evaluated by comparing trade receivable turnover ratio of one year with other.

NOTE: Trade receivables turnover ratio is also helpful to know the debt collection period which can becalculated by the following formula

$$\text{Debt collection period} = \text{Average Receivables*}/\text{Net Credit sale}$$

(365 days or 12 months)

Comparative Analysis of Inventory Turnover Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	16.77	16.62	16.03	15.55	15.83
ACC	25.58	20.96	19.31	23.68	24.61



Interpretation:

Intra-firm:-

Ultratech

The trade receivable turnover ratio of company has increased from 15.83 in 2016 to 16.77 in 2020 this shows that company's efficiency with which debts are collected is improved over years.

ACC

The trade receivable turnover ratio initially decreased from 24.16 in 2016 to 20.96 in 2019 and then increased to 25.58 in 2020this shows that the company is collecting its debts quickly than previous years.

Inter-firm: -

The trade receivable turnover ratio of ACC is more than Ultratech this shows that ACC is more efficient than Ultratech and is collecting its debts more quickly.

3.3 Working Capital Turnover Ratio

This ratio shows the no. Of times working capital is turned over in a stated period. This ratio measures the relationship between net working capital and net revenue from operation. This ratio indicates the efficiency in the utilization of short term funds in making the revenue from operations. The following formula is used to measure this ratio

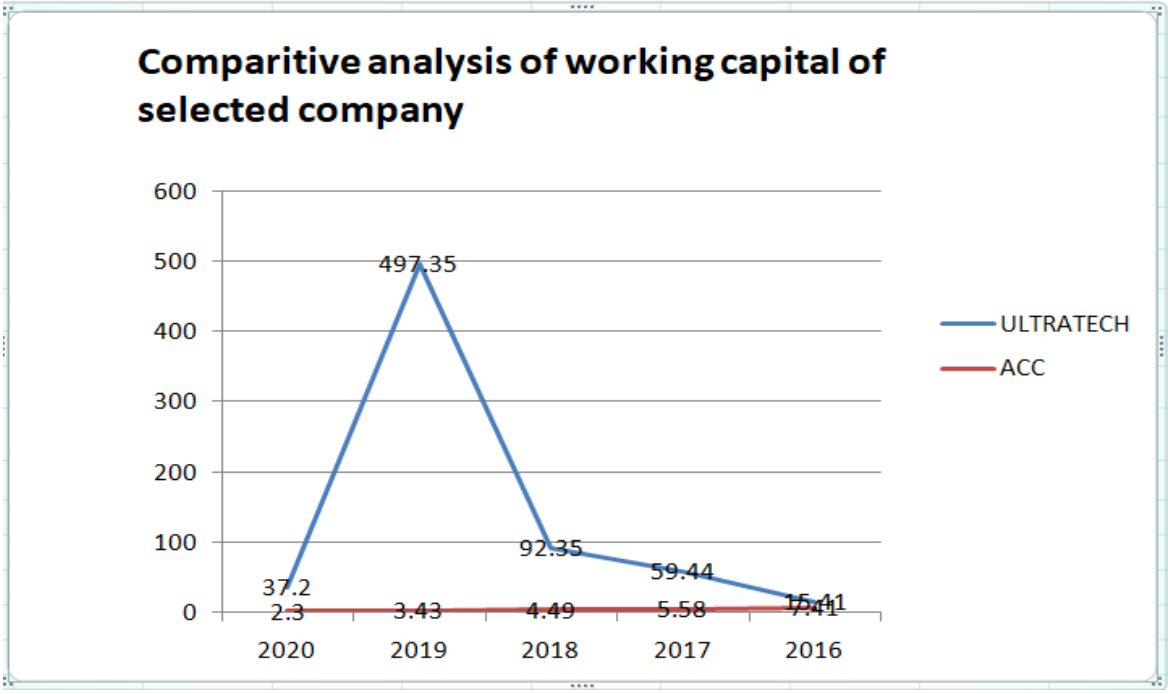
$$\text{Working capital turnover ratio} = \frac{net\ sales}{working\ capital}$$

Significance/ Rationale-

This ratio is very significant for non-manufacturing concerns where working capital is more than the fixed asset. It reflects the efficiency in the utilization of working capital in generating revenue. This ratio must be average. If this ratio is very high, it shows overtrading and the business concern is doing its business with very little working capital. On the other hand, a very low ratio indicates under trading and the business concern is keeping excessive working capital than the require dhows the utilization of total current assets rather than any particular asset like inventory

.

Comparative Analysis of working capital turnover ratio of selected company					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	37.2	497.35	92.35	59.44	15.41
ACC	2.3	3.43	4.49	5.58	7.41



Interpretation:

Intra-firm:-

Ultratech

The ratio has increased from 15.41 in 2016 to 497.35 in 2019 and then decreased to 37.2 in 2020 this shows that the company was overtrading in the years in which ratio was excessively high and then company improved themselves in utilizing their working capital effectively.

ACC

The working capital turnover ratio of company has decreased from 7.41 in 2016 to 2.3 in 2020 this shows that company's efficiency is utilizing their short-term funds have decreased.

Inter-firm: -

Both ACC and Ultratech didn't performed well as Ultratech ratio is extensively high and ACC's ratio is extremely low which shows that one is overtrading and other is under trading.

4. SOLVENCY RATIOS

This ratio acts like tool with management to analyze the ability of the business enterprise to survive in the long run. Solvency means the ability of the business to repay its outside liabilities. Solvency ratios measure the relationship between internal equities to the test the long-term solvency of a company. For this purpose, following ratios can be calculated.

4.1DEBT TO EQUITY RATIO:

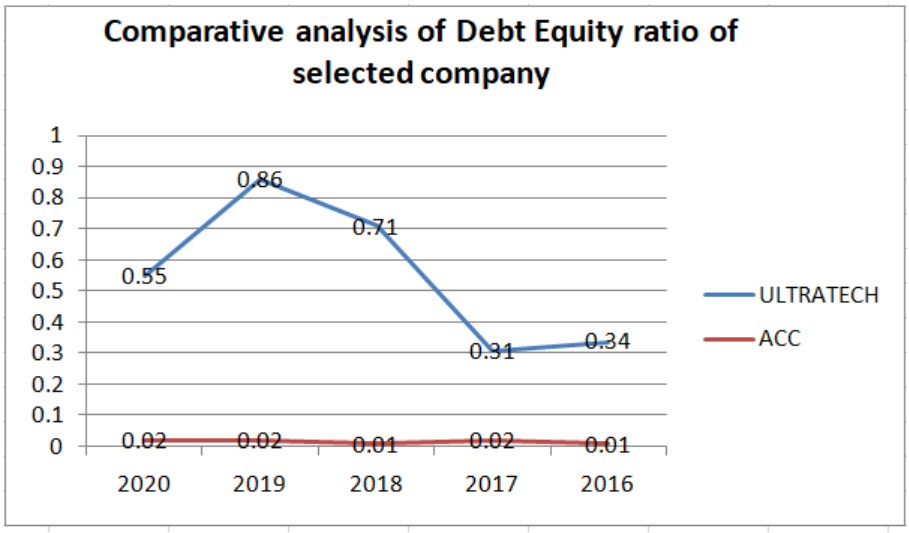
This ratio is calculated to judge the long-term financial position of the business. This ratio establishes relationship between borrowed fund and owner's capital. This ratio is also known as external/ internal equity ratio. This ratio can be calculated by the following formula.

$$\text{Debt to Equity ratio} = \frac{long\ \ term\ borrowing\ /debts}{shareholder\ fund}$$

Significance/Rational

Generally, debt equity ratio 2:1 is considered safe. But in modern time, debt ratio 1:1 is preferred safe. A high debt equity ratio is a sign of danger because it indicates that more funds are invested in the business by the long-term lenders or the owners are employing relatively less money of their own. The lower debt equity ratio better will be the long-term solvency position of the business. However, it provides safety margin and protection to the creditors.

Comparative Analysis of Debt equity Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	0.55	0.86	0.71	0.31	0.34
ACC	0.02	0.02	0.01	0.02	0.01



Interpretation:

Intra-firm: -

Ultratech

The debt-to-equity ratio has changed from 0.34 in 2016 to 0.55 in 2020 despite of some ups and downs in between. Overall, we can say that long term solvency position is not improved as the ratio has increased.

ACC

The debt-to-equity ratio of company has changed from 0.01 to 0.02 over years this shows thatlong term solvency position of company remained more or less same.

Inter-firm: -

ACC has comparatively lower ratio than Ultratech which implies that ACC has better long-termsolvency position than Ultratech and ACC is employing more capital of its own.

4.2 TOTAL ASSETS TO DEBT RATIO

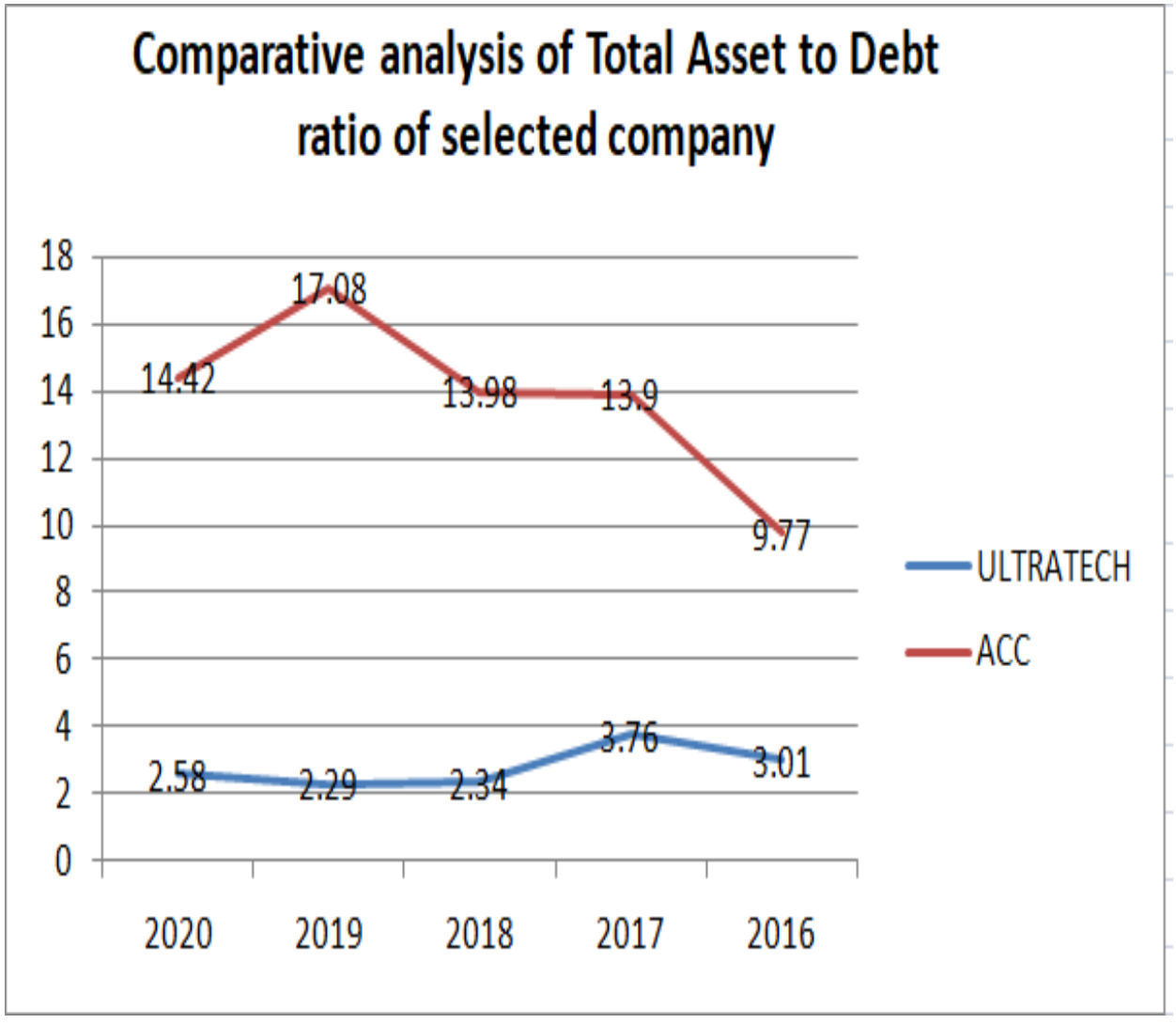
This ratio represents the relationship between total assets and long-term debts. This ratio can becalculated from the following formula.

$$\text{Total assets to debt ratio} = \frac{Total\ assets}{Long\ term\ debt}$$

Significance/Rational

This ratio is of greater importance to the creditors and investors in a business because the primary objective of computing the ratio is to know the rate of external funds in financing. A higher ratio is a healthy sign because it provides security to the lenders for providing long termloans to the business. On the other hand, the low ratio is even alarming for creditors and indicating a risky position due to insufficient assets for long term obligations in business dependslargely on external loan for its existence. Hence, a fine balance ratio is desirable for the company.

Comparative Analysis of Total asset to Debt Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	2.58	2.29	2.34	3.76	3.01
ACC	14.42	17.08	13.98	13.9	9.77



Interpretation:

Intra-firm: -

Ultratech

The total asset to debt ratio has reduced from 3.01 in 2016 to 2.58 in 2020 this shows that therewas marginal reduction in security provided to long term lenders.

ACC

The ratio has changed from 9.77 in 2016 to 14.42 in 2020 this shows that the company hasimproved themselves in providing security to long term lenders.

Inter-firm: -

The ACC has performed better than Ultratech as it succeeds in providing more security to their long-term lenders which is a healthy sign for any business concern.

4.3 PROPRIETARY RATIO

This ratio shows the relationship between proprietor's fund and total assets. This ratio can be calculated from the following formula: -

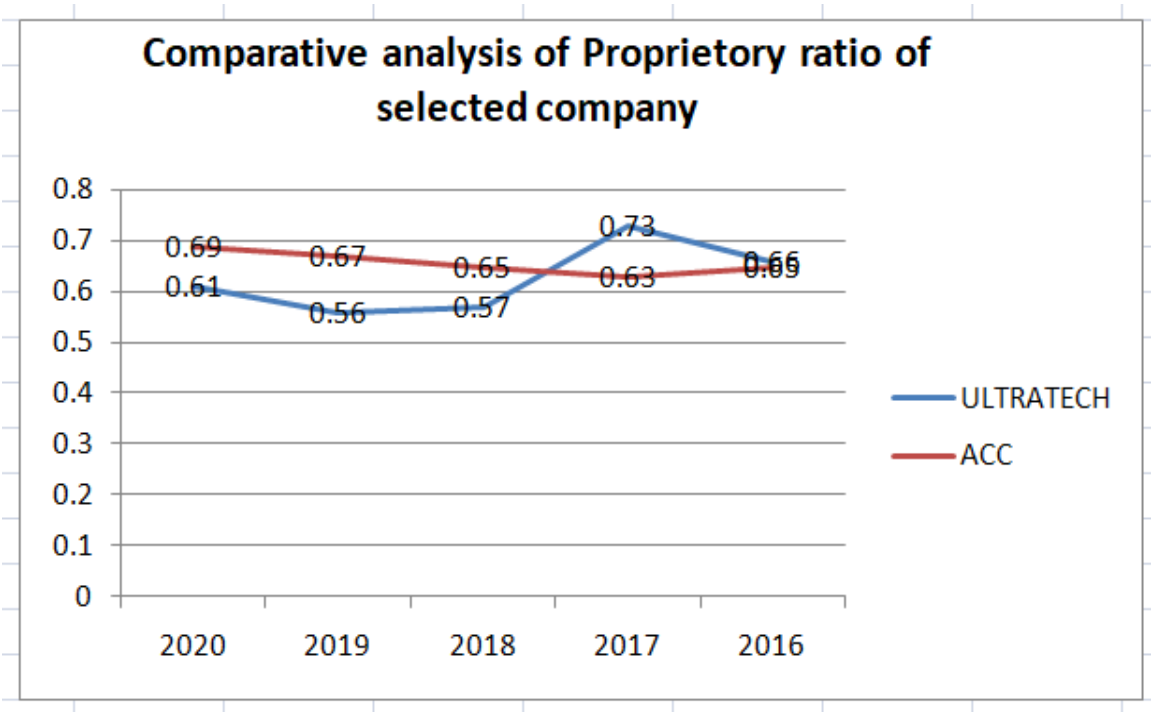
$$\text{Proprietary} = \frac{Shareholder\ fund}{Total\ assets}$$

Significance/Rational

This ratio shows the financial position of the company, it is of great important to the investors because a high percentage of shareholders fund shows that there is relatively little danger of winding up. Higher the ratio the greater long-term stability of the company.

A lower ratio is not preferred because may suffer a huge loss in the event of company's liquidation. Therefore, a proprietary ratio must be above 50% and a ratio even at this point is the sign of alarming.

Comparative Analysis Proprietary Ratio of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	0.61	0.56	0.57	0.73	0.66
ACC	0.69	0.67	0.65	0.63	0.65



Interpretation:

Intra-firm:-

Ultratech

The proprietary ratio of company remained more or less same in 2016 and 2020 i.e. 0.6 thisshows that company long term stability remained more or less same over these 5 years.

ACC

The ratio changed from 0.65 in 2016 to .69 in 2020 implies there is very less improvement incompany's long term stability position.

Inter-firm:-

Both ACC and Ultratech have performed same as their ratios are same. Both have experiencedsome up and downs but could not succeed in improving their position.

4.2 PROFITABILITY RATIOS BASED ON INVESTMENTS

The overall profitability or efficiency of the business can be measured in the terms of profits related to investments made in the business. The main ratios measuring overall profitability are as follows:

4.2.1 RETURN ON INVESTMENT OR RETURN ON CAPITAL EMPLOYED OR YELD ON CAPITAL RETURN

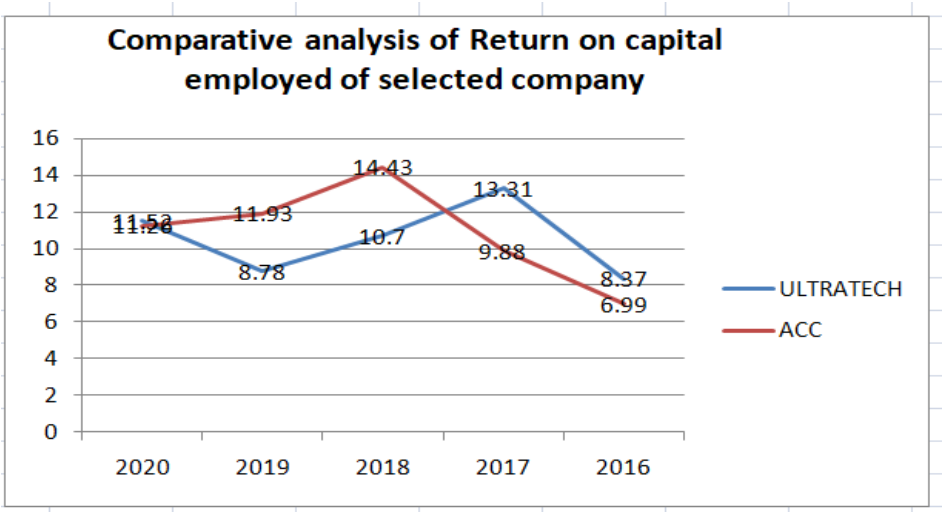
This ratio measures the relationship between profit before interest & tan & capital employed by abusiness enterprise. This is one of the most important ratios of measuring of overall utilizations of funds by business concern. This ratio is generally expressed in terms of percentage. Higher theratio, the better will be the position of the business. This ratio can be calculated by following formula.

$$\text{ROI} = \frac{Net\ profit\ before\ interest\ And\ tax}{Capital\ Employed} * 100$$

Significance/ Rational

This ratio is helping in judging the overall efficiency & profitability of an enterprise. This ratio isalso considered good for inter firm & intra firm comparison

Comparative Analysis of Return on capital employed of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	11.52	8.78	10.7	13.31	8.37
ACC	11.26	11.93	14.43	9.88	6.99



Interpretation:

Intra-firm:-

Ultratech

The ratio has changed from 8.37 in 2016 to 11.52 in 2020 despite of some up and downs but thisshows that overall efficiency and profitability of company has increased.

ACC

The ratio has changed from 6.99 in 2016 to 11.26 in 2020 which shows that overall efficiencyand profitability of company has improved.

Inter-firm: -

Ultratech has improved from 8.37 to 11.52 whereas ACC has improved from 6.99 to 11.26 sothis implies that ACC has performed better than Ultratech.

4.2.2 RETURN ON EQUITY (ROE)

Return on equity capital is very important from the view of equity shareholders because dividendon equity shares depend upon the profit available for equity shareholders. This ratio is also known as 'RETURN ON OWNERS EQUITY' and can be calculated by following formula

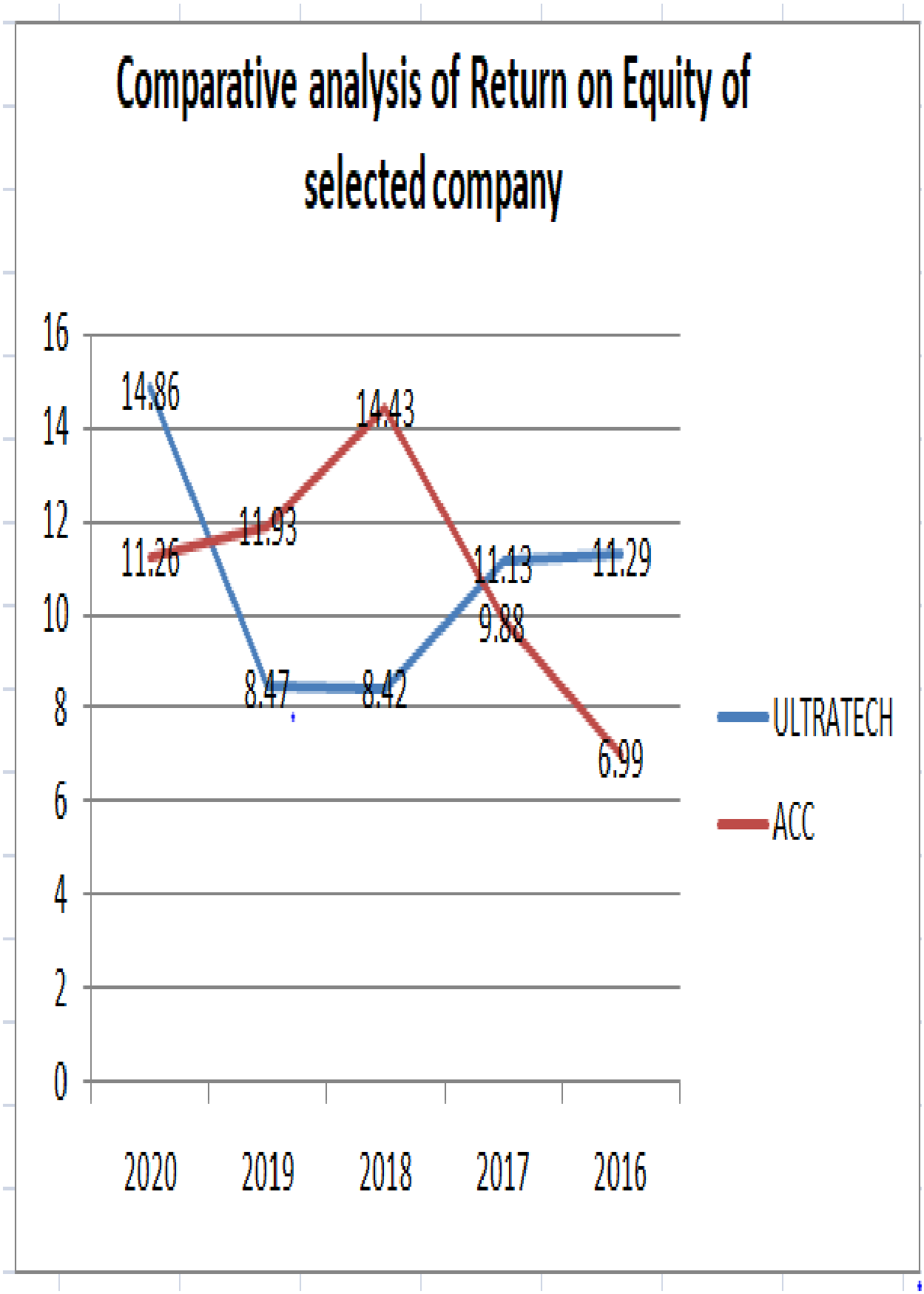
$$\text{RETURN ON EQUITY} = \frac{Net\ profit\ after\ Interest\ and\ Tax}{Equity\ share\ capital + reserves\ and\ surplus} * 100$$

Significance/ Rational

The return on investment (ROI) is a metric that calculates both profit and efficiency. A rising ROE means that a corporation is earning more income by consuming less capital. It also reveals how well a company's management handles shareholder assets.

A return on equity (ROE) is an indicator of management's ability to produce revenue from the equity allocated to it, similar to return on capital. ROEs of 15–20 percent are generally regarded as satisfactory. In addition to other financial ratios, ROE is a consideration in stock valuation.

Comparative Analysis of Return on Equity of Selected Companies					
YEAR	2020	2019	2018	2017	2016
ULTRATECH	14.86	8.47	8.42	11.13	11.29
ACC	11.26	11.93	14.43	9.88	6.99


Comparative analysis of Return on Equity of selected company
16
14
12
10
8
6
4
2
0
14.86
11.26
11.93
14.43
8.47
8.42
11.13
9.88
11.29
6.99
2020
2019
2018
2017
2016
ULTRATECH
ACC

Interpretation:

Intra-firm:-

Ultratech

The ratio has changed from 11.29 in 2016 to 14.86 in 2020 this shows that investors capital isreinvested effectively.

ACC

The ratio has changed from 6.99 in 2016 to 11.26 in 2020 this implies that the company hasimproved themselves in reinvesting the investor's capitals effectively.

Inter-firm:-

The return on equity ratio of Ultratech is higher than ACC which implies that a company is earning more income by consuming less capital. It also reveals how well a company's management handles shareholders capital.

4.3 Hypothesis Testing

VARIABLE	DF	t Stat	P(T<=t) two-tail	Result
Current Ratio	8	-0.46175303	0.65655509	Not Significant
Quick Ratio	8	-1.594979212	0.149383192	Not Significant
Absolute liquid ratio	5	-2.83863882	0.036304419	Significant
Cash Ratio	5	-3.15743797	0.025167521	Significant
Gross Profit Ratio (%)	8	3.131450391	0.013984611	Significant
Net Profit Ratio (%)	7	0.290762528	0.389829442	Not Significant
Net Operating Profit Ratio %	6	0.058796922	0.955023213	Not Significant
Inventory Turnover Ratio	4	-10.7456943	0.000425154	Significant
Trade Receivable Turnover Ratio	4	-5.59346767	0.005013284	Significant
working capital Turnover Ratio	4	3.621136622	0.022334667	Significant
Debt Equity Ratio	4	5.089988629	0.007031512	Significant
Proprietors Ratio	5	-0.969252053	0.376935247	Not Significant
Total Assets to Debt Ratio	4	-9.177915659	0.000782639	Significant
Return On Capital Employed (%)	7	-0.237548969	0.819033843	Not Significant
Return On Equity (%)	8	-0.037614534	0.970916708	Not Significant

Chapter - 5

Results & Discussion

5.1 Major Findings

1. Ultratech cement and Acc cement has strong liquidity position.
2. Acc cement is very much efficient in utilizing its assets. It has the lowest level of inventory days (on an average 17 days).
3. The long-term stability of both companies remained more or less same over these 5 years. Thisimplies that there is very less improvement in company's long term stability position.
4. The companies earn adequate profit during the study although the performance ofULTRATECH was far better than ACC.
5. From the analysis it has been cleared that the short-term solvency position of ULTRATECHLTD. is not satisfactory during the period under study.

5.2 Discussions & Suggestions

1. Investors should analyze the financial statements first in order to make investment decision.
2. Companies should focus more in efficiency and asset utilizations.
3. A rational investor should invest in Ultratech cement ltd. and Acc ltd. first than they shouldinvest in any other company.
4. A company can earn more profit by increasing its sales and controlling its cost.

5. Management is able to identify weak points and enforce corrective measures in order to progress more.

5.3 Conclusion

In India the cement sector is one of the most important manufacturing industries. They are assisting in the construction of the country's infrastructure. Cement companies make a significant contribution to India's economy. These businesses have created employment opportunities. These companies' goods are fully consumed in India. Furthermore, they are exporting their commodity to other nations. They are gaining valuable foreign currency for the nation in this manner. An investor should first examine the financial statements before investing in these cement firms. They should be aware of the accounting climate as well as industry standards. Following that, they should assess the corporations' past and future results.

REFRENCES

1. AL-Dalayeen, A. K. (2016). Financial Performance of Cement Companies- A Critical Appraisal. *Research Journal of Finance and Accounting.*
2. Bansal, D. S. (2013). Determinants of Working Capital in Cement Industry- A case study of ACC Ltd.
3. Baran, D., Pastýr, A., & Baranová, D. (2016). Financial Analysis of a Selected Company.
4. *Research Papers Faculty of Materials Science and Technology Slovak University of Technology, 24* (37), 73-92.
5. Bhayani, S. J. (2010). Determinant of Profitabilityin Indian Cement Industry: An Economic Analysis.
6. Damor, D. K. (2012). Profitability Analysis of Cement Industries. *SUMEDHA Journal of Management.*
7. Dalen, D., Kuzey, C., & Uyar, A. (2013). Measuring firm performance using financial ratios: A decision tree approach. *Expert systems with applications, 40* (10), 3970-3983.
8. EL-Maude, J. G.-R. (2016). Capital Structure and Firm Performance in the Nigerian Cement Industry.
9. Hasanaj, P., & Kuqi, B. (2019). Analysis of Financial Statements: The Importance of Financial Indicators in Enterprise. *Humanities and Social Science Research, 2* (2).
10. Houghton, K. A., & Woodcliff, D. R. (1987). Financial Ratios: the prediction of corporate 'success' and Failure. *Journal of Business Finance & Accounting, 14* (4), 537-554.

ANNEXURE

ACC	Previous Years »				
Consolidated Balance Sheet	---------- in Rs. Cr. ------ ----------				
	Dec 20	Dec-19	Dec-18	Dec-17	Dec-16
	12 MThs	**12mths**	**12mths**	**12mths**	**12mths**

EQUITIES AND LIABILITIES					
SHAREHOLDER'S FUNDS					
Equity Share Capital	187.99	187.99	187.99	187.99	187.99
Total Share Capital	187.99	187.99	187.99	187.99	187.99
Reserves and Surplus	12,511.14	11,355.78	10,343.91	9,167.86	8,453.53
Total Reserves and Surplus	12,511.14	11,355.78	10,343.91	9,167.86	8,453.53

Total Shareholders Funds	12,699.13	11,543.77	10,531.90	9,355.85	8,641.52
Minority Interest	3.24	3.16	3.03	2.88	2.78
NON-CURRENT LIABILITIES					
Long Term Borrowings	83.98	0	0	0	0
Deferred Tax Liabilities [Net]	394.79	655.72	674.57	551.56	559.35
Long Term Provisions	214.83	235.1	140.29	142.79	131.7
Total Non-Current Liabilities	693.6	890.82	814.86	694.35	691.05
CURRENT LIABILITIES					
Trade Payables	1,422.23	1,474.98	1,926.26	1,813.74	1,260.20
Other Current Liabilities	3,366.16	3,199.86	2,752.60	2,927.73	2,183.94
Short Term Provisions	15.87	23.39	27.3	51.19	607.04
Total Current Liabilities	4,804.26	4,698.23	4,706.16	4,792.66	4,051.18
Total Capital And Liabilities	18,200.23	17,135.98	16,055.95	14,845.74	13,386.53
ASSETS					
NON-CURRENT ASSETS					
Tangible Assets	6,508.38	6,976.89	7,035.18	7,224.46	7,486.42

Intangible Assets	175.87	34.27	37.42	40.03	13.32
Capital Work-In-Progress	548.11	445.67	397.78	269.25	261.03
Fixed Assets	7,232.36	7,456.83	7,470.38	7,533.74	7,760.77
Non-Current Investments	129.27	116.18	104.1	94.86	88.13
Long Term Loans and Advances	135.91	143.76	169.14	222.59	984.94
Other Non-Current Assets	2,243.87	1,869.07	1,612.32	1,324.06	483.05
Total Non-Current Assets	9,751.60	9,601.41	9,371.51	9,190.82	9,316.89
CURRENT ASSETS					
Current Investments	0	0	0	0	1,598.87
Inventories	901.27	1,141.93	1,679.39	1,404.78	1,224.63
Trade Receivables	451.41	626.65	867.37	665.97	466.35
Cash And Cash Equivalents	6,005.70	4,647.73	3,096.98	2,728.55	278.4
Short Term Loans And Advances	58.99	29.02	77.3	41.4	440.43
OtherCurrentAssets	1,031.26	1,089.24	963.4	814.22	60.96
Total Current Assets	8,448.63	7,534.57	6,684.44	5,654.92	4,069.64
Total Assets	18,200.23	17,135.98	16,055.95	14,845.74	13,386.53

UltraTech Cement	Previous years				
Consolidated balance sheet	…….. In Cr…….. ……				
	Mar20	Mar19	Mar18	Mar17	Mar16
	12mths	12mths	12mths	12mths	12mths

EQUITIES AND LIABILITIES					
SHAREHOLDER'S FUNDS					
Equity Share Capital	288.63	274.64	274.61	274.51	274.43
Total Share Capital	288.63	274.64	274.61	274.51	274.43
Reserves and Surplus	38,791.02	28,064.65	26,106.55	24,117.38	21,671.20

Total Reserves and Surplus	38,791.02	28,064.65	26,106.55	24,117.38	21,671.20
Employees Stock Options	35.83	23	0	0	0
Total Shareholders' Funds	39,115.48	28,362.29	26,381.16	24,391.89	21,945.63
Equity Share Application Money	0	0.65	0	0	0
Share Capital Suspense	0	5,387.71	0	0	0
Minority Interest	7.52	12.15	16.02	9.71	15.45
NON-CURRENT LIABILITIES					
Long Term Borrowings	17,367.52	20,650.38	15,863.47	6,370.84	4,896.59
Deferred Tax Liabilities [Net]	4,911.99	6,411.42	3,182.70	2,782.37	2,441.08
Other Long Term Liabilities	1,062.13	6.35	34.84	45.97	16.29
Long Term Provisions	241.74	173.23	156.89	289.51	270.03
Total Non-Current Liabilities	23,583.38	27,241.38	19,237.90	9,488.69	7,623.99
CURRENT LIABILITIES					
Short Term Borrowings	3,985.09	3,668.40	2,763.44	1,079.18	2,475.79
Trade Payables	3,501.43	3,159.70	2,384.87	1,848.64	1,717.25
Other Current Liabilities	8,596.17	8 ,111.32	5,871.09	5,232.44	7,256.48

Short Term Provisions	548.06	593.83	496.04	168.35	168.72
Total Current Liabilities	16,630.75	15,533.25	11,515.44	8,328.61	11,618.24
Total Capital And Liabilities	79,337.13	76,537.43	57,150.52	42,218.90	41,203.31
ASSETS					
NON-CURRENT ASSETS					
Tangible Assets	45,112.83	44,643.29	35,637.59	24,431.55	23,881.82
Intangible Assets	5,617.07	5,777.99	3,041.41	387.09	321.36
Capital Work-In-Progress	909.52	1,148.63	1,510.30	920.85	1,468.01
Intangible Assets Under Development	10.07	4.69	0.91	0.63	1.08
Fixed Assets	51,649.49	51,574.60	40,190.21	25,740.12	25,672.27
Non-Current Investments	1,685.00	1,404.84	1,497.78	1,279.50	2,730.12
Deferred Tax Assets [Net]	5.98	12.06	9.43	9.79	10.2
Long Term Loans And Advances	1,231.67	1,156.29	127	67.34	79.96
Other Non-Current Assets	3,505.13	3,212.06	2,828.49	711.37	1,070.66

Total Non-Current Assets	64,329.76	63,583.19	45,689.21	28,893.23	30,669.45
CURRENT ASSETS					
Current Investments	4,243.69	1,516.49	3,949.12	5,411.01	2,365.06
Inventories	4,148.31	4,098.96	3,267.59	2,400.64	2,454.58
Trade Receivables	2,238.29	2,787.03	2,220.63	1,757.09	1,928.21
Cash And Cash Equivalents	539.21	739.68	219.07	2,248.78	2,266.96
Short Term Loans and Advances	197.73	197.78	111.02	123.95	117.81
OtherCurrentAssets	3,640.14	3,614.30	1,693.88	1,384.20	1,401.24
Total Current Assets	15,007.37	12,954.24	11,461.31	13,325.67	10,533.86
Total Assets	79,337.13	76,537.43	57,150.52	42,218.90	41,203

BIBLIOGRAPHY

BOOK PREFERRED: -

Financial management

By Dr. F. C. Sharma, Rachit Mittal

2020

MAGAZINE: -

- Business Today
- Business World

NEWSPAPERS: -

- The time of India
- Economics times
- Bloomberg quint
- Money control

WEB SITE: -

www.scribd.com

www.google.com

www.wikipedia.com

www.moneycontrol.com

www.acclimited.com

www.ultratechcement.com


Thank you

Ankh

Local name:- Ikh
Scientific name:
Saccharum officinarum
Family:- Poeae

Identifying characters :

1. The sugarcane is roughly cylindrical.
2. It is composed of many distinct nodes and internodes.
3. The ground portion plant bears the leaves and flowers.

Economic uses :

1. Cane sugar is used in the preparation sweets, syrup, Jam, Jelly etc.
2. Industrial alcohol, synthetic rubber also, produced from cane sugar.
3. There are 3 by product of sugar industry are bagasses, molasses, and pressmud.
4. The pressmud is used for the manufacturing of chocolate and gum

Local name : Dhan, chaul

Scientific name :
Oryza sativa
Family : Poaceae

Identifying characters :

1. The plants is tall (1-1.8 m)
2. It has long, slender, leaves (50-100 cm) and 2.5 cm broad.
3. The inflorescence is spikelet type.
4. Fruit is caryopsis type.

Economic uses :

1. The whole plant body used as main food of cattle.
2. The boiled seed used as a main food of huge amount of people, as 'roti', 'chapati', 'Pulli', 'Dosa', Vat' etc.
3. From husk of paddy and the superficial layer manufactured the high quality of rice bran oil.
4. The dust of the seed grain used as a instant starch for cotton clothes.

ACKNOWLEDGEMENT

In performing our project copy, we had to take the help and guideline to some respected sir, who deserve our greatest gratitude. The completion of this project copy gives us much pleasure. we would like to ~~show~~ my gratitude of Dr. Jibon kumar Pal and Mr. Sujit pal.

A PROJECT COPY ON ECONOMICALLY IMPORTANT PLANTS

ROLL NO: 220340900018

REG. NO: 202201048338 OF 2022-2023

CONCLUSION :

Industrial fermenters are indispensable tools in bioprocessing, enabling the large-scale production of valuable of valuable bioproducts through fermentation processes. Their sophisticated design, precise control system, and robust construction make them essential components of modern biotechnological industries, driving innovation and advancement in various fields.

The educational visit provided students with a comprehensive understanding of industrial fermenter operations and downstream processing techniques. It offered valuable insights into the complexities of large-scale bioprocessing and the straingent quality control measures essential for the production of high-quality bioproducts. Overall, the experience served to bridge the gap between theoritical knowledge and real-world applications, enriching the learning experience for all participants. This tour promises to be an enlightening journey into the heart of bioprocessing technology.

19.6.24

learned about the methods utilized to concentrate the purified product and removed excess water, including evaporation, ultrafiltration and spray drying. They gained insights into the importance of achieving optimal concentration levels for product stability and storage.

4. Formulation and Packaging : In this segment, participants were delved into the formulation and packaging processes. They discovered how purified substance are formulated into final products, such as pharmaceutical drugs or biotechnology solutions. Additionally, they learned about packaging considerations, including sterility, shelf-life and regulatory compliance.

5. Quality Control and Assurance : Our tour concluded with a focus on quality control and assurance measures implemented throughout downstream processing. Participants understand the significance of regiorous testing protocols to ensure product safety, efficacy, and consistency. They observed quality assurance checks, including analytical testing, microbial monitoring and compliance with regulatory standards.

2. Separation and purification : Various separation techniques such as chromatography filtration and precipitation were showcased, illustrating how they are employed to isolate and purify the desired product from the complex mixture of fermentation byproducts.

3. Product formulation : The final stage of downstream processing involved product formulation, where the purified product is final dosage form, ready for distribution or further processing

KEY STEPS OF DOWNSTREAM PROCESSING OPERATIONS :

1. Clarification and separation : Our journey was commenced at the clarification and separation unit. There participants observed the initial steps where raw materials were processed to remove impurities and separated desired compounents from the mixture. Techniques such as centrifugation, filtration and chromatography were demonstrated, showcasing their role in achieving purity.

2. Purification Techniques : Next, participants explored the purification techniques employed to refine the separated components further. They witness the use of chromatography columns, membrane filtration systems and other advanced methods aimed at isolating specific molecules with precision and efficiency.

3. Concentration and Drying : Moving forward, the tour proceed to the concentration and drying section. Participants

1. Pharmaceutical : Production of antibiotics, vaccines, therapeutic proteins and other pharmaceutical products.
2. Food and Beverage : fermentation of food products such as beer, wine, chees, yogurd and soy sauce.
3. Biotechnology : Production of enzyme, biofuels, industrial chemicals and biopolymers.
4. Environmental : Bioremediation processes for waste water treatment and pollutant degradation.

DOWNSTREAM PROCESSING OPERATIONS

Downstream processing is a crucial step in biotechnology and pharmaceutical industries, where raw materials are transformed into purified products. This tour provided insights into various techniques and technology employed in downstream processing, highlighting their significance in producing high-quality products for various applications.

Following the fermenter tour, the group proceeded to the downstream processing area, where the guide elucidated the steps involved in purifying and isolating the desired products from the fermentation broth. key aspects covered included -

1. Harvesting : Techniques for harvesting the microbial biomass or target products from the fermentation broth were demonstrated including centrifugation, filtration and cell disruption methods.

Chemical sterilization to sterilize the vessel and associated components before each batch.

FERMENTATION PROCESS

The fermentation process carried out in industrial fermenters typically involves the following steps —

1. Inoculation : The fermentation broth is inoculated with the desired microbial strain or cells capable of producing the target bioproduct.
2. Growth and Metabolism : Under controlled condition of temperature, pH, agitation and aeration, the microorganisms grow and metabolize the nutrient present in the fermentation broth, leading to the production of the desired bioproduct.
3. Monitoring and Control : Throughout the fermentation process, key parameters such as biomass concentration, product concentration, pH, temperature and dissolved oxygen levels are continuously monitored and controlled to optimize product yield and quality.
4. Harvesting : Once the fermentation process is complete and the desired product has been produced, the fermentation broth is harvested from the fermenter for downstream processing. Harvesting methods may include filtration, centrifugation or other separation techniques to separate the biomass or product from the broth.

APPLICATION

Industrial fermenters find applications across various industries including :

and capable of withstanding high pressure and temperatures. The vessel may vary in size, ranging from a few literes to several thousand liters, depending on the scale of production.

2. Agitation System : Agitation is essential to ensure uniform mixing of nutrients, gases and microorganisms within the fermentation broth. Industrial fermenter employ agitation systems such as impellers, baffles or spargers to facilitate efficient mass transfer and mixing.

3. Temperature control : Precise temperature control is critical for maintaining optimal growth condition for the microorganisms involved in the fermentation process. Industrial fermenters are equipped with heating and cooling systems, along with temperature sensors and controllers to regulate and monitor temperature throughout the fermentation cycle.

4. pH control : pH plays a crucial role in microbial growth and product formation. Industrial fermenters feature pH monitoring and control systems to maintain the desired pH level by adding acid & base as necessary.

5. Aeration and Oxygenation : Microbial growth in fermentation processes often requires adequate oxygen supply. Industrial fermenters are equipped with aeration systems, such as spargers or diffusers to introduce oxygen into the fermentation broth and promote aerobic condition.

6. Sterilization : Ensuring sterility within the fermenter is essential to prevent contamination and maintain product purity. Industrial fermenters employ methods such as autoclaving steam sterilization or

INDUSTRIAL FERMENTER :

An industrial fermenter, also known as a bioreactor, is a large-scale vessel used for the cultivation of microorganism or cell to produce various bioproducts through fermentation processes. These bioproducts include pharmaceuticals, enzymes, biofuels and a wide range of other biotechnology products. Industrial fermenters are essential components of bioprocessing facilities and play a crucial role in the production of numerous commercial products.

The guide explained the fermentation process, emphasizing the controlled conditions necessary for optimal microbial growth and product formation. key aspects highlighted during the tour included.

1. Scale : The fermenter showcased was an impressive example of large-scale bioprocessing, with a capasity of fifteen liter. This scored to understand the industrial scale at which fermentation process operate.

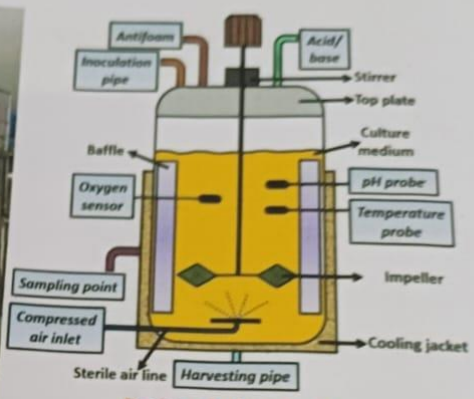
2. Aseptic Technique : Strict aseptic techniques were observed throughout the facility, with the guide explaining the critical importance of maintaining sterility to prevent contamination & ensure product quality.

3. Process Control : Detailed insights were provided into the monitoring and control systems employed to regulate parameters such as temperature, PH, oxygen levels and agitation speed, essential for maximizing product yeild and quality.

COMPONENTS AND DESIGN OF INDUSTRIAL FERMENTER :-

. Vessel Structure : Industrial fermenters are typically construct of form stainless steel or other materials resistant to corrosion

(a) Figure of Industrial fermenter



(b) Diagram of Industrial fermenter

An Educational Visit to an Industrial Fermenter And Downstream Processing Operation

Date - 24/01/2024

Location - IIT Kharagpur, Kharagpur, West Bengal, 721302

Attendees - There were sixty students with three teachers and one non-teaching staff.

Purpose :

The purpose of the visit was to provide students with practical insights into industrial fermenter operations and downstream processing techniques used in the biotechnology and pharmaceutical industries.

Overview :

The visit commenced with an introduction to the facility and its significance in industrial bioprocessing. The guide emphasized the importance of fermentation in producing various bioproducts, including pharmaceuticals, enzymes and biofuels.

Figure: At a glance our 6th sem group with teachers and guide

THE UNIVERSITY OF BURDWAN

B.Sc (Honours) Semester VI

Practical Examination

Subject - Botany (Honours)

Course : DSE - 4

Practical Project - An Educational Visit to an Industrial Fermenter and Downstream Processing Operations

Roll No - 210340900044

Reg. No - 202101055929 of 2021-22

Session : 2023 - 2024

Conclusion

we are collected different angiosperms belonging to the various families at college surrounding area. we have studied different morphological characters and their economic importance. we have also recorded the climatic factors like - temperature, humidity, sunshine of these area. we are very fortunate to improve our knowledge through the study of plants in nature as well as forum experience.

02/11/24

Pinus

Local name: pinus

Scientific name:
pinus sp

Family: Pinaceae

- Identifying characters:
  1. It is a evergreen, branched, trunk containing stem.
  2. The stem contain needle type of leaves.
  3. The clusture of male cone bourne at the tip of long shoots covered by entophylly.
  4. Female cone bourne singly at long shoots.
  5. The male cone contains lots of wings pollen grains and showing shower of sulphur.

0. Economic Uses:
  1. The woods used for house building, water channels, water troughs, wooden spades, match ~~but~~ box etc.
  2. The bark is used for tanning purpose, yeilding a dye which is used for dying Tassar silk into yellow shade.
  3. It is believed to produce resin and terpentine.

Segun

Local name - Segum

Scientific name :-
Tectona grandis
Family : Verbenaceae

Identifying Characters :

1. It is large deciduous tree, branches are four seeded.
2. The leaves are borne in opposite manners.
3. They are long, petiolate, eliptical, rough and globous.
4. The flowers are small, white, pentamerous.

Economic Uses :

1. The teak wood used for ship buildings boats masts.
2. The teak wood is prized for high quality furnitures carbinate work, bowls, toys, bodies, herrmonium etc.
3. The leaves are used as a plants for thatching the leaves yeild a red dye.
4. Flowers and young fruits are used for diuretic.

Local name: Nayanthara

Scientific name:
Catharanthus roseus

Identifying characters:

1. The leaves are ovate, oblong, glossy, petiolate, concealate, entire with mucronate apex.
2. Odour is characteristic and taste is slight bitter.
3. It is an evergreen.
4. It grows up to 60 cm.

Economic uses:

1. It effectively lowers the high blood pressure
2. It is widely used the treatment of lung cancer.
3. Due to the antidiabatic property, it regulates blood sugar level and prevents diabetics.
4. It prevents inflammatory and effectively cures many skin diseases.
5. It is considered during malaria to get rid of it.

Local name : Sorse

Scientific name :
Brassica campestris
Family – Brassicaceae.

Identifying characters :

1. The plant height is 1-2 meters.
2. The lower are deeply lobed, while the upper leaves are narrow.
3. The inflorescence type is raceme.
4. Leaves are pale green with hair on the leaf margin.
5. Seeds are reddish brown to dark brown in colour.

Economic Uses :

1. Rape seed and mustard oil is used as cooking medium.
2. Seeds is used as condiment in the preparation of vegetable and curries.
3. Oil cake is used to main food of cattle.
4. Split seed and oil is used for pickling.

coffee

Local name : Cofi

Scientific name : coffea arabica

family : Rubiaceae

Identifying characters :

1. coffee plants is shrub or small tree.
2. The phyllotaxy is opposite decussate.
3. The flower is tetramerous, no. of petal 4, no. of sepal 4.
4. The inflorescence is racemose.
5. Fruit type is berry.

Economic uses :

1. Coffee leaves are use to ~~prepare~~ prepare beverage.
2. It is used in the treatment of cases of poisonic caused by alcohol and morphin.
3. It is has therapatic value in the treatment of bronchial asthmas.
4. The parchment cover of coffee beans is used as fuel and fertilizer.

Local name: Mouri

Scientific name:
Foeniculum vulgare

Family: Apiaceae

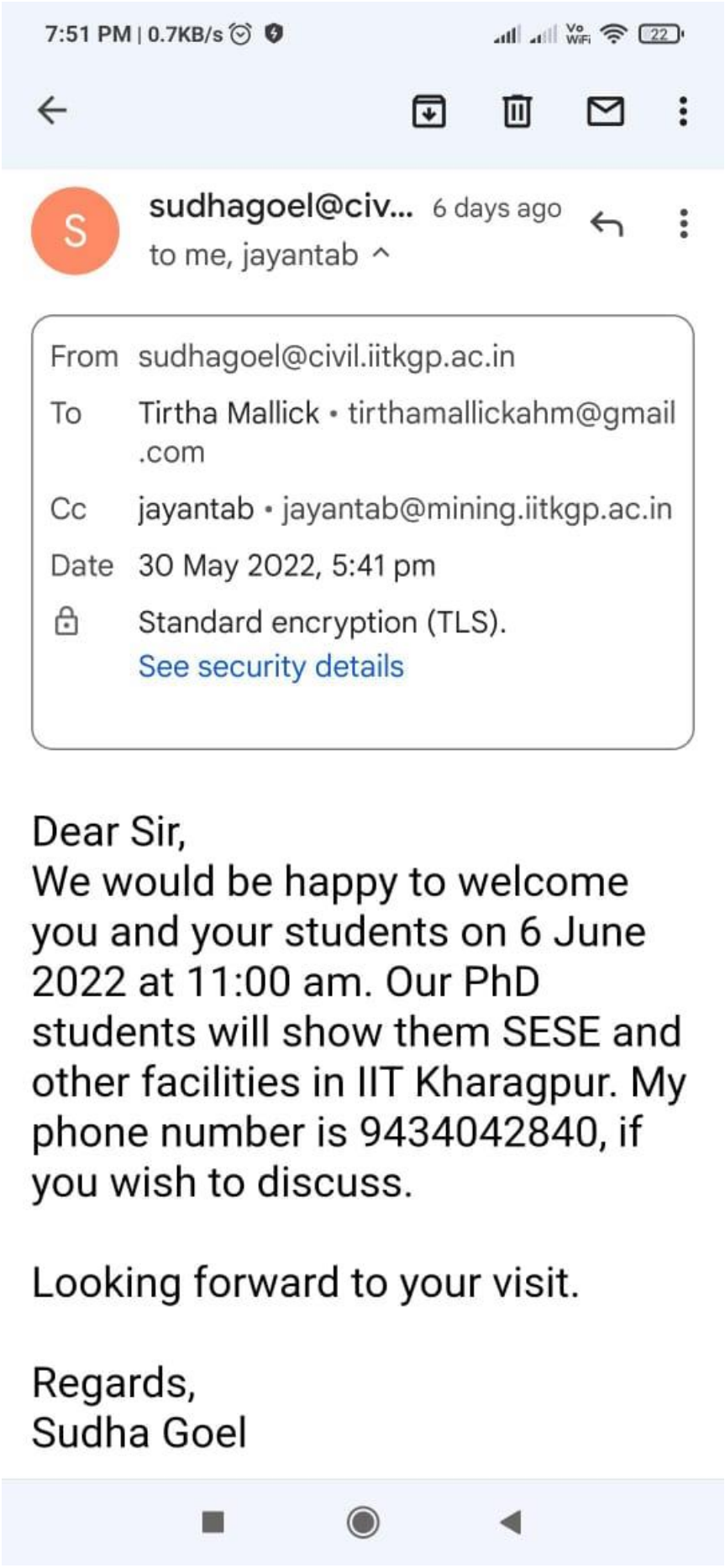
Identifying characters:

1. Fennel plant herb, erect, and grows up to 1.5m tall with hollow stems.
2. Leaves are finely dissected.
3. Inflorescence is compound umbell-type.
4. Fruit is cayopsis type.

Economic Uses:

1. The fruit are used as spice and condiment.
2. The fruits are also used as medicinally as carminative and stimulent.
3. They also used for flavouring soups, bread rolls.
4. The fennel oil is used in perfumery and as a flavouring agent

Permission letter



7:51 PM | 0.7KB/s

sudhagoel@civ... 6 days ago
to me, jayantab

From sudhagoel@civil.iitkgp.ac.in
To Tirtha Mallick • tirthamallickahm@gmail.com
Cc jayantab • jayantab@mining.iitkgp.ac.in
Date 30 May 2022, 5:41 pm
Standard encryption (TLS).
See security details

Dear Sir,
We would be happy to welcome you and your students on 6 June 2022 at 11:00 am. Our PhD students will show them SESE and other facilities in IIT Kharagpur. My phone number is 9434042840, if you wish to discuss.

Looking forward to your visit.

Regards,
Sudha Goel

Permission letter

THE UNIVERSITY OF BURDWAN

NETAJI MAHAVIDYALAYA

B.A. (HONS) I YEAR – 1ST SEM.

NAME : BANASHRI MAJHI

SUB : ENVIRONMENTAL STUDIES

PROJECT NAME : NATURAL DISASTERS AND THEIR SOLUTION

Roll : 220140900090

Reg. no : 202201046808

Year : 2022-2023

পুকুরের বাস্তুতন্ত্রের অধ্যয়ন (Study of Pond Ecosystem)

ভূমিকা

বিজ্ঞানী A.G Tansley 1935 সালে ইকোসিস্টেম কথাটি প্রথম ব্যবহার করেন। বাস্তুতন্ত্র একটি ক্রিয়াত্মকীয় একক যেখানে পারিপার্শ্বিক পরিবেশের অন্তর্গত জীবজ ও অজীবজ উপাদানগুলির মধ্যে পারস্পরিক আন্তঃসম্পর্ক ও আন্তঃক্রিয়া সম্পন্ন হয়ে প্রাকৃতিক উপাদান, গ্যাসীয় উপাদান শক্তির বিনিময় হয়।

বাস্তুতন্ত্রকে দুইভাগে ভাগ করা যায়, যথা—

ⓐ স্থলজ বাস্তুতন্ত্র.

ⓑ জলজ বাস্তুতন্ত্র.

স্থলজ বাস্তুতন্ত্রকে দুই ভাগে ভাগ করা যায়, যথা—

ⓐ মিষ্টি জলের বাস্তুতন্ত্র.

ⓑ লবনাক্ত জলের বাস্তুতন্ত্র.

মিষ্টি জলের বাস্তুতন্ত্রকে আবার দুই ভাগে ভাগ করা যায়, যথা—

ⓐ স্থির জলের বাস্তুতন্ত্র

ⓑ প্রবাহ জলের বাস্তুতন্ত্র.

পুকুর হল স্থির জলের বাস্তুতন্ত্র, বিভিন্ন বাস্তুতন্ত্রের মধ্যে পুকুরের বাস্তুতন্ত্র অধ্যয়ন খুব প্রয়োজনীয়, কারণ এটি আমাদের বসতির আশেপাশেই পাওয়া যায়, আবার তুলনামূলক ছোটো এবং তথ্য সংগ্রহ করাও খুব সহজ। পুকুর হল একটি নির্দিষ্ট সীমানাযুক্ত কিন্তু আকৃতিবিহীন স্থির জলাধার, এখানে বৃষ্টি ও ভৌমজল ছাড়াই জল সরবরাহ হয়। পুকুর হল একটি স্বয়ংসম্পূর্ণ ও অনন্য স্বাদুজলের বাস্তুতন্ত্র, এটি হল প্রথম একটি স্থির জলের সামান্য গভীর যার গভীরতা খুব কম, (গভীরতা 6m কম), মাটি মৃত্তিকা ও প্রাণীর বসবাস, পুকুরের বাস্তুতন্ত্র অধ্যয়ন করলে বিভিন্ন ধরনের সজীব এবং নির্জীব পুকুরের একটি সুনির্দিষ্ট খাদ্যশৃঙ্খল দেখা যায়, যথা— উৎপাদক, খাদক, বিয়োজক, ও তার আন্তঃক্রিয়া সম্পর্কে জানা যায়।

পুকুর হল সৌরশক্তির দ্বারা চালিত একটি আদর্শ বাস্তুতন্ত্র, বিভিন্ন উদ্ভিদ, প্রাণী ও অজীব হল ওই বাস্তুতন্ত্রের সজীব অংশ, খাদ্যশৃঙ্খল, ছাউনি, সূর্যালোক হল নির্জীব অংশ।

মানুষের জলের চাহিদার একটি বড়ো অংশ পুকুর পূরণ করে থাকে, এছাড়াও পুকুরের জল কাপড় কাচার জন্য, গবাদি পশুর স্নান করানোর জন্য ব্যবহৃত হয়, একটা বড়ো ভূমিকা পালন করে থাকে, পুকুরে যে মাছ চাষ করা হয়, সেটি মানুষের খাদ্যের চাহিদা ও অর্থনৈতিক চাহিদা পূরণ করে –

পুকুর থেকে বিভিন্ন প্রাণী, যথা—

(a) গুগলি, (b) ঝিনুক, (c) শামুক, (d) ব্যাঙ, (e) কচ্ছপ, (f) বিভিন্ন ধরণের পোকা পাওয়া যায়,

পাশ্চিমবঙ্গের প্রাচীন অর্থনীতিতে পুকুরের অবদান অপরিসীম,

প্রকল্পটির গুরুত্ব

পুকুর যেহেতু জলজ বাস্তুতন্ত্রের একটি আদর্শ উদাহরণ, তাই পুকুরের বাস্তুতন্ত্রে বিভিন্ন ধরণের খাদ্যশৃঙ্খল, খাদ্যজালক ইত্যাদি অধ্যয়ন করা যায়, এছাড়াও পুকুরের বাস্তুতন্ত্রে বিভিন্ন ধরণের বাস্তুতন্ত্রের বিভিন্ন ধরণের বাস্তুতান্ত্রিক গঠন বিন্যাস সম্পর্কে ভালো ধারণা পাওয়া যায়, কিন্তু বর্তমানে পুকুরের জলে অত্যধিক হারে ব্যবহার করা হচ্ছে, যেমন– কাপড় কাচা, গবাদী পশুর স্নান করানো, গোবর আবর্জনাও মল মূত্র ইত্যাদি নিক্ষেপের ফলে পুকুর প্রায়ই দূষিত হয়ে থাকছে, তাই এর ফলে এই জল মানুষের ব্যবহারের পক্ষে এবং মাছ চাষের অযোগ্য হয়ে থাকছে, এছাড়াও বর্তমানে মানুষের চাপে আজকাল প্রচুর পুকুরকে ভরাট করে ফেলা হচ্ছে, এছাড়াও পুকুরগুলি ভরাট করার ফলে লোকালয়গুলিতে অকাল হয়ে কৃত্রিম বন্যার সৃষ্টি হচ্ছে, এবং এই ধরণের রোগের সৃষ্টি ঘটছে, পুকুরের বাস্তুতন্ত্র অধ্যয়ন করলে এই বিষয়গুলি বিশদভাবে জানা যায়, এই সমস্যাগুলি নিবারণের জন্য যথাসম্ভব পদক্ষেপ গুলি গ্রহণ করার জন্য মানুষকে সচেতন করা যায়,

প্রকল্পটির উদ্দেশ্য

পুকুরের বাস্তুতন্ত্রে অধ্যয়নের বিভিন্ন গুরুত্বপূর্ণ উদ্দেশ্যগুলি হলো—

1) একটি জলজ বাস্তুতন্ত্রের অধ্যয়ন করে তার বিভিন্ন সজীব এবং

নির্জীব উপাদান ও তাদের অন্তঃক্রিয়া সম্পর্কে জ্ঞানলাভ করা যায়।

২) পুকুরের বাস্তুতন্ত্রে বিভিন্ন ধরনের বাস্তুতন্ত্রের খাদ্যশৃঙ্খল ও খাদ্যপিরামিড সম্পর্কে জ্ঞানলাভ করা যায়।

৩) পুকুরের জলে বসবাসকারী বিভিন্ন ধরনের উদ্ভিদ, প্রাণী ও জীবপ্রকৃতি ও তাদের বিবর্তন সম্পর্কে জ্ঞানলাভ করা যায়।

৪) বিভিন্ন জনজীবন বিশ্লেষণ করে গ্রামীন অঞ্চলের মানুষের জীবনে পুকুরের ভূমিকা সম্পর্কে অভিহিত করা যায়।

৫) পুকুরের জলদূষণের কারণ অনুসন্ধান করা ও সেই সমস্যার সমাধানে যথাসম্ভব চেষ্টা করা।

স্থির জলে বাস্তুতন্ত্রের বৈশিষ্ট্যসমূহ

বিভিন্ন নদনদী ও সামুদ্রিক বাস্তুতন্ত্রের থেকে স্থির জলে স্বাদু জলের বাস্তুতন্ত্র এক বিশেষ স্বতন্ত্র দেখা যায়। তার প্রধান বৈশিষ্ট্য হল—

i. এখানে জলের প্রবাহ খুবই সীমিত বলে এক জায়গার জল অন্য জায়গায় খুব বেশি মাত্রায় প্রবাহিত হয়।

ii. জলের মধ্যে ঢেউয়ের উপস্থিতি দেখা যায়।

iii. অত্যধিক শীত ও অত্যধিক গ্রীষ্মে উপর ও নীচের জলের জলের মধ্যে মিশ্রণ দেখা যায় না, কারণ অন্তর্বীবন দেখা যায় না।

iv. গ্রীষ্মকালে ও শীতকালে নীচের তলের জলে অক্সিজেনের নির্দিষ্টতা দেখা যায়।

এখানে প্রচুর প্রচুর সংখ্যায় মূলযুক্ত ও মূলবিহীন উদ্ভিদ পুকুরের জলে প্রচুর প্রজাতি দেখা যায়। এখানে অমেরুদণ্ডী প্রাণী থেকে শুরু করে মাছ, উভচর, স্তন্যপায়ী সববিরনের প্রাণী দেখা যায়।

তথ্য সংগ্রহের স্থান

পুকুরের বাস্তুতন্ত্র অধ্যয়নের জন্য আমাদের বিভিন্ন নিকটবর্তী পুকুর দুই - তিন সপ্তাহ ধরে মোট (10-15) দিন অধ্যয়ন করা হয়েছে-

পুকুরের নাম : মল্লিক পুকুর

অবস্থান : বারিয়া হাইস্কুলের উত্তরদিক,

পর্যবেক্ষণের তারিখ :

অধ্যয়নের উপকরণ এবং পদ্ধতিসমূহ

উপকরণ

জলজ উদ্ভিদ সংগ্রহের জন্য প্ল্যাংটন নেট, বিভিন্ন রঙের প্লাস্টিকের ক্যারিবেগ, সেন্টিমিটার, আতস কাঁচ, চিমটা, ক্যামেরা, খাতা ও পেন,

পদ্ধতি

- প্রথমে নিজেদের বাড়ির আশেপাশে এমন একটি পুকুরের নির্বাচন করা হল যেটিতে বাস্তুতন্ত্রের বিভিন্ন অজীব ও সজীব সব রকমের উপাদানই বর্তমান এই পুকুরের নির্বাচন করে সপ্তাহে তিন দিন করে মোট ও সপ্তাহ ধরে প্রতিদিন ২ঘন্টা করে অধ্যয়ন করা হল, সেখানে যে উপাদানগুলি দেখতে পাওয়া যায় সেগুলি খাতায় লিপি বদ্ধ করা হল, বিভিন্ন বড়ো উদ্ভিদ ও প্রাণীদের সংগ্রহ করে তাদের বিবরণ লিখে নেওয়া হল, বিভিন্ন ক্ষুদ্র উদ্ভিদ ও প্রাণীদের সংগ্রহ করে সেগুলি ফানাক্ত করনের জন্য আনা হল,

• বিভিন্ন ধরনের ঝড়ো উদ্ভিদ ও প্রাণীদের চিহ্ন তুলে নেওয়া হল, যেসব উদ্ভিদ ও প্রাণীদের সরাসরি জানাশুকরণ সম্ভব হল সেগুলি সম্পর্কে সেখানেই Notebook এ লেখা হল, যেগুলি ক্ষুদ্র সেগুলি ল্যাবরেটারিতে নিয়ে অধ্যাপক / অধ্যাপিকাদের সাহায্যে জানাশুকরণ করে তাদের সম্পর্কে বিবরণ লিখে নেওয়া হল।

বিভিন্ন উদ্ভিদ ও প্রাণীদের সাঠিক বিজ্ঞানসম্মত নাম, তাদের প্রকৃতি জানার জন্য বিভিন্ন উদ্ভিদ ও প্রাণীবিদ্যা পুস্তকের সাহায্যে নেওয়া হল।

সংগৃহীত তথ্যাবলি:

পুকুরের বাস্তুতন্ত্র অধ্যয়ন করার সময় উপাদান পাওয়া গেল, যথা —

☑ নির্জীব উপাদান

এগুলি হল পুকুরের বাস্তুতন্ত্রের প্রাণবিহীন উপাদান,

☑ জৈব

কার্বোহাইড্রেট, প্রোটিন, ফ্যাট, হিউমাস, অ্যামাইনো অ্যাসিড,

☑ অজৈব

জল, কার্বোহাইড্রেট, অক্সিজেন, হাইড্রোজেন, ফসফরাস, ক্যালসিয়াম, সোডিয়াম, পটাশিয়াম ইত্যাদি, এগুলি সবিরণত পুকুরের মাটি পাকে, জলে আছে।

☑ জৈব

জলের আলো, উষ্ণতা, জলের স্বচ্ছতা, জলের চাপ জলের তরঙ্গ ইত্যাদি,

পুকুরের বাস্তুতন্ত্রের বিভিন্ন উপাদানের উপস্থিতি ও তার ভূমিকা নির্ভর করে, জলের তাপমাত্রা, বায়ুর তীব্রতা, আলোর তীব্রতা, আবহাওয়া, ও পুকুরের উপস্থিতি জৈব পদার্থের প্রকৃতির উপর নির্ভর করে,

সজীব উপাদান

পুকুরের বাস্তুতন্ত্রের সাথে যুক্ত উপাদান, এগুলি আবার বিভিন্ন রকমের হয়, তা নিচে আলোচনা করা হল, যথা—

a. উৎপাদক

পুকুরের উপস্থিত সবুজ ক্লোরোফিলযুক্ত, স্বয়ংভোজ এর উপস্থিতিতে ক্লোরোফিলের সাহায্যে জল ও কার্বনডাই অক্সাইডের মধ্যে বিক্রিয়া করে কার্বোহাইড্রেট জাতীয় খাদ্য উৎপাদন করে থাকে, তাই পুকুরের বিভিন্ন ধরনের উদ্ভিদ বর্তমান, এগুলি হল—

ফাইটোপ্ল্যাংটন এগুলি হল পুকুরের জলে ভাসমান ক্ষুদ্র ক্ষুদ্র অনুবীক্ষনিক উদ্ভিদ, এদের মধ্যে প্রধান হল— অতি ক্ষুদ্র কোষাল জাতীয় উদ্ভিদ, এদের পুকুরের জলে উপরিভাগে প্রচুর পরিমানে দেখা যায়, এদের প্রাধান্যে অনেক সময় পুকুরের জল সবুজ দেখায়, এই প্রকারের মধ্যে ফাইটোপ্ল্যাংটন উপস্থিত তাদের প্রধান হল— ল্যামাইডোমোনাস ক্লোরেলা, অ্যালগি, অ্যাসিলেটারিয়া, ইউগ্লিনা।

অনুসূত্রযুক্ত কোষাল এই প্রকারে বিভিন্ন ধরনের অনুসূত্রযুক্ত কোষাল দেখা যায়, এগুলি হল খুব সরু, প্রচুর অংশ জুড়ে বিস্তৃত থাকে, এই কোষালগুলি হল— স্পাইরোগাইরা, অ্যাপোলোনিয়ান ইত্যাদি,

পুকুরের উপরিভাগে ভাসমান বড়ো উদ্ভিদ এরা পুকুরের জলে উপরিভাগে ভাসমান বড়ো উদ্ভিদগুলির মূলগুলি পুকুরের পাঁকে প্রোথিত অবস্থায় থাকে, অথবা পুকুরের ধারের কর্দমাক্ত মাটিতে জন্মায়, পাতার অবস্থান থাকে, কান্ডে কাঁটা থাকে,

যথা— পদ্ম (Nelumbo)
শালুক (Nagmpha)

তথ্য বিশ্লেষন ও আলোচনা

পুকুরের বাস্তুতন্ত্র হল একটি আদর্শ বাস্তুতন্ত্র, এই বাস্তুতন্ত্রে সূর্য হল সমস্ত শক্তির উৎস, উৎপাদকরা এই শক্তিকে গ্রহণ করে খাদ্য উৎপাদন করে, যা প্রথম শ্রেণীর খাদক গ্রহন করে, তাদের দ্বিতীয় শ্রেনীর খাদকরা গ্রহন করে, আবার তৃতীয় শ্রেনীর খাদক খাদ্য হিসেবে গ্রহন করে এবং একটি সুস্থির খাদ্যজাল গঠন করে, যা পুকুরের বাস্তুতন্ত্রকে আদর্শ বাস্তুতন্ত্রে রূপান্তরিত করেছে। কিন্তু গ্রীষ্মকালে যখন পুকুরে জল কমে যায়, তখন বিভিন্ন কারনে জল দূষিত হয়ে পড়ে, এর ফলে যারা পুকুরের জলের উপর নির্ভরশীল তাদের কষ্ট হয়, তাই গ্রামের লোকেদের ভালো করে বুঝতে হবে পৃথিবীর মিঠে জলের পরিমান কমে এসেছে, তাই জলকে সংরক্ষণ করা খুবই জরুরি এবং এই জল যাতে দূষিত না হয়, সেদিকে নজর রাখতে হবে।

সুপারিশ

1. গ্রামের লোকেদের বুঝতে হবে পৃথিবী আজ জলসংকটের সামনে তাই জল অপচয় করা যাবে না,
2. সরাসরি পুকুরের জলে গরু স্নান করানো যাবে না,
3. পুকুরে গাড়ি ধোয়া জল যাতে না মেশে সেইদিকে অবশ্যই লক্ষ্য রাখতে হবে।
4. পুকুরে সাবান জল ফেলার পরিমান ধীরে ধীরে কমাতে হবে।

সিদ্ধান্ত

উদ্ভিদের নাম	অবস্থান	খাদ্যশৃঙ্খলের অবস্থান
(ক) মাইক্রো		
i. ফাইটোপ্লাংটন ii. ডায়াটম	জলের মধ্যে	উৎপাদক
(খ) ম্যাক্রো		
i. শুশুনি	জলের ধারে	উৎপাদক
ii. কলমি	জলের ধারে	উৎপাদক
iii. শালুক	জলের ধারে	উৎপাদক
iv. ঝাঁঝি	জলের ধারে	উৎপাদক

পুকুরের সবুজ উদ্ভিদ বিভিন্ন অজৈব উপাদান সংগ্রহ করে সৌরশক্তির সাহায্যে উৎপাদন করে। জলজ কীটপতঙ্গরা উৎপাদকের তৈরী খাদ্য ভক্ষণ করে এবং ছোটো মাছেরা জলজ কীটপতঙ্গগুলিকে খাদ্য হিসেবে গ্রহণ করে। পুকুরের জলে দুধরনের উৎপাদক পেয়েছিলাম যার মধ্যে একটি মাইক্রোস্কোপের সাহায্যে চিহ্নিত করেছিলাম, আর বাকিগুলি খালি চোখে দেখতে পেয়েছিলাম, এদের মধ্যে কিছু গাছ জলের গভীরে বসবাস করে, যেগুলি মাছের খাদ্য হিসেবে ব্যবহৃত হয় এবং বড়ো গাছগুলি জলে Do (Dissolue O_2) এর মান বজায় রাখে। আমরা এই কিছু জলজ প্রাণীগুলোর অবস্থানও দেখতে পাই।

NETAJI MAHAVIDYALAYA (AR/AM13/AGH)

AFFILIATED TO THE UNIVERSITY OF BURDWAN

ENVIRONMENT STUDIES PROJECT

AECC-1

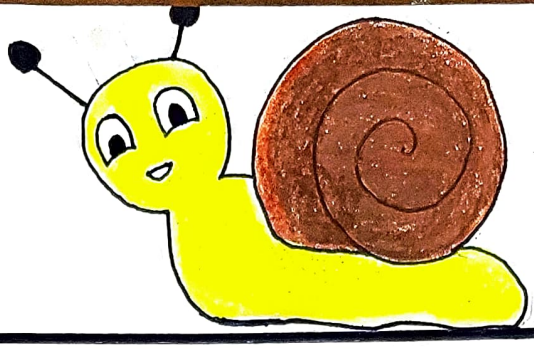
POND ECOSYSTEM

NAME - CHANDRIMA DHARA

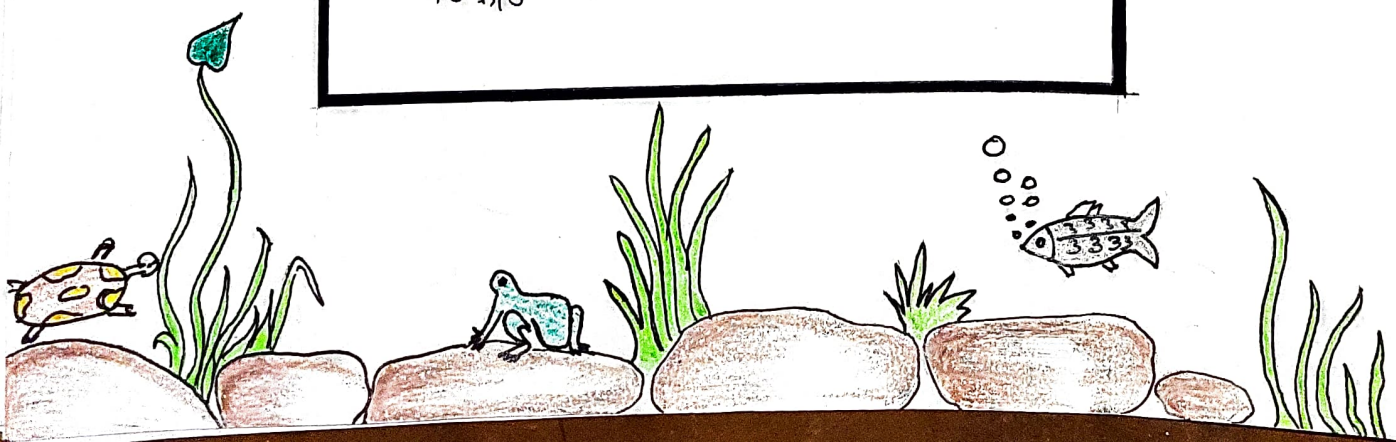
ROLL NO - 220140900124

REG NO - 2022011046345

YEAR - 2022 - 2023



সূচীপত্র



পুকুরের বাস্তুতন্ত্র অধ্যয়ন—

ভূমিকা:— বিজ্ঞানী A.G. Tansley 1935 সালে "ইকোসিস্টেম" কথাটি প্রথম ব্যবহার করেন। বাস্তুতন্ত্র একটি ক্রিয়ামূলক একক যে ক্ষেত্রে পারিপার্শ্বিক পরিবেশের অন্তর্গত জীবজ ও অজীবজ উপাদান গুলির মধ্যে পারস্পরিক আন্তঃ সম্পর্ক এবং আন্তঃ ক্রিয়া সম্পন্ন হয়ে সৃষ্টি উপাদান, গ্যাসীয় উপাদান, খাদ্যের বিনিময় হয়।

বাস্তুতন্ত্রকে আবাসনত দুইভাগে ভাগ করা হয়। যথা:— i. জলজ বাস্তুতন্ত্র এবং ii. স্থলজ বাস্তুতন্ত্র।

জলজ বাস্তুতন্ত্রকে দুটি ভাগে ভাগ করা হয়। যথা:— মিষ্টি জলের বাস্তুতন্ত্র এবং লবনাক্ত জলের বাস্তুতন্ত্র। মিষ্টি জলের বাস্তুতন্ত্রকে আবার দুই ভাগে ভাগ করা যায়। যথা:- স্থির জলের বাস্তুতন্ত্র এবং প্রবাহ জলের বাস্তুতন্ত্র। পুকুর হল স্থির জলের বাস্তুতন্ত্র। বিভিন্ন বাস্তুতন্ত্রের মধ্যে পুকুরের বাস্তুতন্ত্র অধ্যয়ন খুবই প্রয়োজনীয়। কারণ এটি আমাদের বসতির আশেপাশেই পাওয়া যায়, আকারে তুলনামূলক ছোট এবং তথ্য সংগ্রহ করাও সহজ। পুকুর হল একটি নিচিষ্ট সীমানাযুক্ত কিন্তু নিচিষ্ট আকৃতি বিহীন স্থির জলাধার। এখানে বৃষ্টির জল ও ভৌমজল উভয়েই সঞ্চিত হয়। পুকুর হল একটি খুলা সম্পূর্ন ও আদর্শ স্বাদু জলের বাস্তুতন্ত্র। এটি হল এমন একটি স্থির জলের সঠিক আধার যার গভীরতা খুব কম (গভীরতা 6 মিটারের কম) এতে বিভিন্ন প্রজাতির উদ্ভিদ ও প্রাণীর বসবাস। পুকুরের বাস্তুতন্ত্র অধ্যয়ন করলে বিভিন্ন বিভিন্ন সজীব ও নির্জীব উপাদান ও তার আন্তঃ ক্রিয়া সম্পর্কে জানা যায়।

পুকুর হল প্রাকৃতিক ভাবে চালিত একটি আদর্শ বাস্তুতন্ত্র। বিভিন্ন উদ্ভিদ, প্রাণী ও অনুজীব হল এই বাস্তুতন্ত্রের সজীব অংশ, ও মাটি, লবন, কার্বন ডাইঅক্সাইড হল নির্জীব অংশ।

মানুষের জলের চাহিদার একটি বড় অংশ পূরণ করে থাকে, এছাড়া পুকুরের জল চাষের কাজে, কাপড় কাচার জন্য, গবাদি পশুর স্নান করানোর জন্য ও একটি বড় ভূমিকা পালন করে থাকে, পুকুরে যে মাছ চাষ করা হয়ে থাকে তাই মানুষের খাদ্যের চাহিদা ও অর্থনৈতিক চাহিদা পূরন করে। পুকুর থেকে বিভিন্ন প্রাণী যথা- গুগলি, শামুক, ঝিনুক, ব্যাঙ, কচ্ছপ, কাঁকড়া ইত্যাদি পাওয়া যায়, পরিসংখ্যানের প্রমান অর্থনীতিতে পুকুরের অবদান অপরিসীম।

প্রকল্পটির উদ্দেশ্য :—

পুকুরের বাস্তুতন্ত্র অধ্যয়নের বিভিন্ন গুরুত্বপূর্ণ উদ্দেশ্যগুলি হল—

1. একটি জলজ বাস্তুতন্ত্রের অধ্যয়ন করে তার বিভিন্ন প্রাণীর ও নিষ্প্রাণীর উপাদান ও তাদের আন্তক্রিয়া সম্পর্কে জ্ঞান লাভ করা।

2. পুকুরের বাস্তুতন্ত্রের বিভিন্ন ধরনের খাদ্যশৃঙ্খল ও খাদ্য পিরামিড সম্পর্কে জ্ঞান লাভ করা।

3. পুকুরের জলে বসবাসকারী বিভিন্ন উদ্ভিদ, প্রাণী ও জীব প্রকৃতি ও তাদের ভূমিকা সম্পর্কে জানা যায়।

4. বিভিন্ন জনজীবন বিশ্লেষ করে গ্রামীন অঞ্চলের মানুষের জীবনে পুকুরের ভূমিকা সম্পর্কে অবহিত হওয়া।

5. পুকুরের জল দূষন শুরু কারণ অনুসন্ধানে করা ও সেই সমস্যার সমাধানে সম্ভব সচেষ্ট হওয়া।

প্রকল্পটির উদ্দেশ্য :—

পুকুরের বাস্তুতন্ত্র অধ্যয়নের বিভিন্ন গুরুত্বপূর্ণ উদ্দেশ্যগুলি হল—

1. একটি জলজ বাস্তুতন্ত্রের অধ্যয়ন করে তার বিভিন্ন সজীব ও নির্জীব উপাদান ও তাদের আন্তক্রিয়া সম্পর্কে জ্ঞান লাভ করা।

2. পুকুরের বাস্তুতন্ত্রের বিভিন্ন স্তরের খাদ্যজাল ও খাদ্য পিরামিড সম্পর্কে জ্ঞান লাভ করা।

3. পুকুরের জলে বসবাসকারী বিভিন্ন উদ্ভিদ, প্রাণী ও জীব প্রকৃতি ও তাদের ভূমিকা সম্পর্কে জানা যায়।

4. বিভিন্ন জনজীবন বিশেষ করে গ্রামীন অঞ্চলের মানুষের জীবনে পুকুরের ভূমিকা সম্পর্কে অবহিত হওয়া।

5. পুকুরের জল দূষন প্রতিরোধ অনুসন্ধানে করা ও সেই সমস্যার সমাধানে সমাজের সচেষ্ট হওয়া।

স্থির জলের বাস্তুতন্ত্রের বৈশিষ্ট্য —

বিভিন্ন নদনদী ও সামুদ্রিক বাস্তুতন্ত্র থেকে স্থির জলে স্বাদুজলের বাস্তুতন্ত্রে একাধিক স্বাতন্ত্র্য দেখা যায় এর প্রধান বৈশিষ্ট্যগুলি হল নিম্নরূপঃ

1. এখানে জলের প্রবাহ খুব সীমিত, ফলে এক জায়গার জল অন্য জায়গায় খুব কম গতিতে প্রবাহিত হয়।

2. জলের মধ্যে ঢেউয়ের উপস্থিতি দেখা যায় না।

3. অত্যাধিক শীতে বা অত্যাধিক গ্রীষ্মে উপর ও নীচের তলের জলের মধ্যে মিশ্রন দেখা যায় না, কারণ এখানে তাপীয় স্তরীভবন দেখা যায় না।

4. গ্রীষ্মকালে ও শীতকালে নীচের তলের জলের অক্সিজেনের নিশ্চিততা দেখা যায়।

5. এখানে প্রচুর সংখ্যায় মূলযুক্ত ও মূলবিহীন উদ্ভিদ পুকুরের জলে প্রচুর প্রজাতির দেখা যায়। এখানে আদ্য প্রানী থেকে শুরু করে মাছ, উভচর, সরীসৃপ, স্তন্যপায়ী সব ধরনের প্রানী দেখা যায়।

তথ্য সংগ্রহের স্থান (Location of the Study): —

পুকুরের বাস্তুতন্ত্র অধ্যয়ন এর জন্য আমাদের বাড়ির নিকটবর্তী পুকুরের দুই তিন সপ্তাহ ধরে মোট 10-12 দিন অধ্যয়ন করা হয়েছে —

পুকুরের নাম - বাঁধা পুকুর

পুকুরের অবস্থান - কামারপুকুর জেলা ব্যাঙ্কের বাঁদিকে ডাক।

সমীক্ষণের তারিখ -

অধ্যায়নের উপকরণ ও পদ্ধতি

উপকরণ :- জলজ উদ্ভিদের সংগ্রহের জন্য প্ল্যাংটন নেট বিভিন্ন আকারের প্লাস্টিক নির্মিত খুচ্ছ জার, প্লাস্টিকের ক্যারিব্যাগ, পেট্রিডিশ, আতস কাঁচ, চিমটা, ক্যামেরা, খাতা ও পেন।

পদ্ধতি :- প্রথমে নিজেদের বাড়ির আশেপাশের এমন একটা পুকুর নির্বাচন করা হয় যেটিতে বাস্তুতন্ত্রে বিভিন্ন নির্জীব ও অজীব অর বিভিন্ন উপাদানই বর্তমান। এই পুকুর নির্বাচন করে সপ্তাহে তিনদিন করে মোট তিন সপ্তাহ ধরে প্রতিদিন ২ ঘন্টা ধরে অধ্যয়ন করা হল। এখানে যে উপাদানগুলি দেখতে পাওয়া গেল সেগুলি খাতায় লিপিবদ্ধ করা হল। বিভিন্ন বড় উদ্ভিদ ও প্রাণীদের সংগ্রহ করে তাদের বিবরণ লিখে নেওয়া হল। বিভিন্ন ক্ষুদ্র উদ্ভিদ ও প্রাণীদের সংগ্রহ করে জারে ভরে সেগুলি সনাক্তকরণের জন্য আনা হল। পুকুরের বিভিন্ন স্থানের বড় উদ্ভিদের ও প্রাণীদের চিত্র তুলে নেওয়া হল। যে যে উদ্ভিদ ও প্রাণীদের সংগ্রহ সনাক্তকরণ সম্ভব হল সেগুলি খুবই ক্ষুদ্র তাদেরকে সেখানেই নোটবুকে লিখে নেওয়া বা সেগুলি খুবই ক্ষুদ্র সেগুলি Laboratory তে নিয়ে গিয়ে অধ্যাপক / অধ্যাপিকাদের সাহায্যে সনাক্ত করণ করে তাদের সম্পর্কে বিবরণ লিখে নেওয়া হল।

বিভিন্ন উদ্ভিদ বা প্রাণীদের সঠিক বিজ্ঞানসম্মত নাম তাদের প্রকৃতি জানার জন্য বিভিন্ন উদ্ভিদ বিদ্যা ও প্রাণী বিদ্যা পুস্তকের সাহায্যে নেওয়া হল।

সংগৃহীত তথ্যাবলীর ফলাফল —

পুকুরের বাস্তুতন্ত্র অধ্যায়ন করার সময় বিভিন্ন উপাদান লক্ষ্য করা হয়, যথা —

নির্জীব উপাদান (Abiotic Substamce) :—

এগুলি হল পুকুরের বাস্তুতন্ত্রের প্রানবিহীন উপাদান —

a. জৈব :— কার্বোহাইড্রেট, প্রোটিন, ফ্যাট, হিউমাস, অ্যামাইনো অ্যাসিড।

b. অজৈব :— জল, কার্বন-ডাই অক্সাইড, অক্সিজেন, হাইড্রোজেন, নাইট্রোজেন, ফসফরাস, ক্যালসিয়াম, সোডিয়াম, পটাসিয়াম ইত্যাদি, এগুলি সাধারনত পুকুরের মাটি, পাঁকে এবং পুকুরের জলে আছে।

c. ভৌত :— জলের আলো, উষ্ণতা, জলের স্বচ্ছতা, জলের চাপ, জলের তরঙ্গ ইত্যাদি।

পুকুরের বাস্তুতন্ত্রে বিভিন্ন উপাদানের উপস্থিতি ও তার ভূমিকা নির্ভর করে। পুকুরের জলের তাপমাত্রা, রাত্রির দৈর্ঘ্য, আলোর তীব্রতা, আবহাওয়া ও পুকুরের উপস্থিত জৈব পদার্থের প্রকৃতির উপর নির্ভর করে।

সজীব উপাদান (Biotic Substamce) :—

পুকুরের বাস্তুতন্ত্রের প্রানযুক্ত উপাদান, এগুলি আবার বিভিন্ন রকম, যথা :—

উৎপাদক (Producer) :—

পুকুরে উপস্থিত সবুজ ক্লোরোফিলযুক্ত সূর্যালোকের উপস্থিতিতে ক্লোরোফিলের সাহায্যে জল ও কার্বন-ডাই-অক্সাইড-এর মধ্যে বিক্রিয়া করে কার্বোহাইড্রেট জাতীয় খাদ্য উৎপাদন করে থাকে, এই পুকুরের বিভিন্ন রকমের উদ্ভিদ বর্তমান, এগুলি হল —

a. ফাইটোপ্ল্যাঙ্কটন (Phytoplankton) :— এগুলি হল পুকুরের জলে ভাসমান ক্ষুদ্র ক্ষুদ্র আণুবীক্ষনিক উদ্ভিদ, এদের মধ্যে প্রধান হল ডায়াটম ক্ষুদ্র শেবাল জাতীয় উদ্ভিদ, এদের পুকুরের জলের উপরিতলে প্রচুর পরিমানে দেখা যায়, এদের পুকুরের জলের উপরিতলে প্রচুর পরিমানে দেখা যায়, এদের প্রাচুর্য এ অনেক সময় পুকুরের জল সবুজ দেখায়, এই পুকুরের যে যে ফাইটোপ্ল্যাঙ্কটন উপাস্থিত তাদের মধ্যে প্রধান হল, ক্লামাইডোমোনাস, ক্লোরেল্লা, অ্যানাবিনা, অ্যাডিনোসিরিয়া, ইউগ্লিনা,

b. অনুসূত্রযুক্ত শেবাল (Filamentous algae) :— এই পুকুরে বিভিন্ন ধরনের অনুসূত্রযুক্ত শেবাল দেখা যায়, এগুলি হল খুব সরু, লম্বা এবং প্রচুর তাতুল জুড়ে বিস্তৃত থাকে, এই শেবাল গুলি হল : স্পাইরোগাইরা, অডোগোনিয়াম, কারা ইত্যাদি,

c. পুকুরের উপরিতলে ভাসমান বড় উদ্ভিদ (Emergent Plants) :— এরা পুকুরের জলের উপরিতলে ভাসমান বড় উদ্ভিদ, এই উদ্ভিদগুলির মূলগুলি পুকুরের পাঁকে প্রোথিত অবস্থায় থাকে বা পুকুরের ধারের কর্দমাক্ত মাটিতে জন্মায়, পাতায় মোমের আবস্থান থাকে, কান্ড কাঁটা থাকে, যথা :— পদ্ম (Nelumbo), শালুক (Nymphea).

d. উভচর উদ্ভিদ :— এরা পুকুরের জলের কর্দমাক্ত মৃত্তিকায় জন্মায়, অনেক সময় স্থলে ও জন্মায়, তাই কারণে ইহাদের উভচর উদ্ভিদ বলে, এর মূল পুকুরের মৃত্তিকায় প্রোথিত অবস্থায় থাকে, এবং কান্ড নলাকার, কাঁটা ও নরম, পাতায় মোমের আস্তরন থাকে, অনেকসময় কান্ড মৃত্তিকার তলান্তরালে বৃদ্ধি পায়, এবং কান্ড থেকে মূল বের হয়, ও কান্ড মূলযুক্ত হয়, যথা :— মুকুনি (Mansilaa) কলমি (Ipomea)

e. পুকুরের জলে নিমজ্জিত উদ্ভিদ (Submerged Plants) :— এদের মধ্যে যাদের মূল কাদার মধ্যে প্রোথিত অবস্থায় থাকে, তাগুলি হল ভ্যালিসনেরিয়া (Valismaria) এবং যাদের মূল পাঁকে প্রোথিত অবস্থায় না থেকে সম্পূর্নরূপে জলে নিমজ্জিত অবস্থায় থাকে, তাগুলি হল Ulticalaria, Ceratophyllam.

f. পুকুরের জলের উপরিতলে সম্পূর্নরূপে ভাসমান বড় উদ্ভিদ :— এগুলি জলের উপরিতলে সম্পূর্নরূপে ভাসমান উদ্ভিদ, পাতা ও কান্ড জলের উপরিতলে ও মূল জলের নীচে ভাসমান অবস্থায় থাকে, যথা :— Pistia, Lemma, Wolffia.

খাদক (Consumers) :— এরা খাদ্যের জন্য প্রত্যক্ষ ও পরোক্ষ উদ্ভিদের উপর নির্ভরশীল, পুকুরে বিভিন্ন ধরনের খাদ্যশৃঙ্খলের রূপ দেখা যায়, পুকুরে বিভিন্ন শ্রেণীর খাদক দেখা যায়, যেমন —

a. প্রথম শ্রেণীর খাদক বা হার্বিভোরাস :— এই জেলে স্বাধীনভাবে ভাসমান ক্ষুদ্র ক্ষুদ্র আণুবিক্ষনিক প্রাণী, ইহারা প্ল্যাংটনকে খাদ্য হিসাবে গ্রহন করে। ইহাদের জু-প্ল্যাঙ্কটন বলে।

b. কার্নিভোরাস বা মাংসাশী :— ইহারা পুকুরের জলে বড় আকারের প্রাণী, ইহারা বিভিন্ন শ্রেণীর হয়, যেমন :— 1. দ্বিতীয় শ্রেণির খাদক - ছোট মাছ → প্রথম শ্রেণির খাদক হিসাবে।
2. তৃতীয় শ্রেণীর খাদক → বড় মাছ → দ্বিতীয় শ্রেণির খাদক হিসাবে।

c. নেকটন (Nekton) :— এরা জলের মধ্যে স্বাধীনভাবে সাঁতার কেটে ঘুরে বেড়াতে পারে। এবং জলের স্রোতের বিপরীত দিকেও সাঁতার কাটতে পারে। এদের মধ্যে উল্লেখযোগ্য হল : জল মাকড়সা (Water-Spiders), ব্যাঙাচি, বিভিন্ন ধরনের মাছ, জলজ সাপ, কচ্ছপ, কাঁকড়া ইত্যাদি,

d. পেরিফাইটন (Periphyton) :— এই ধরনের প্রাণীগুলি বিভিন্ন উদ্ভিদ যাদের মূলগুলি মাটিতে প্রোথিত অবস্থায় থাকে, তাদের কান্ডের চারপাশে বা পাতার নীচের তল বরাবর করে, এগুলির মধ্যে উল্লেখযোগ্য হল বিভিন্ন ধরনের পুঁথালি, শামুক এবং হাইড্রো এবং কৃমি জাতীয় প্রাণী,

e. বেনথস (Benthos) :— এগুলি পুকুরের তলের কাদার উপরে কাদার মধ্যে হামাগুড়ি দিয়ে চলাচল করে, অথবা কাদার মধ্যে গর্ত করে বসবাস করে। এগুলির মধ্যে উল্লেখযোগ্য হল— বিনুক, শামুক, কেঁচো ইত্যাদি,

3. বিয়োজক (Decomposers/micro Consumers) :— এগুলি পুকুরের ইকোসিস্টেমের অন্যখাদক অথবা মৃতজীবি, এগুলির মধ্যে উল্লেখযোগ্য হল ব্যাকটেরিয়া, মোল্ড এবং আরশি-নোমাইসিটিস। এগুলি পুকুরের তামসিক ইকোসিস্টেম-এ দেখা যায়, পুকুরের কাদামাটি তলদেশে এদের অবস্থান বেশি দেখা যায়, পুকুরে জলায় মৃত উদ্ভিদ ও প্রাণীর জৈব দেহকে বিয়োজিত করে অজৈব যৌগে পরিনত করে নিজেদের খাদ্যবীহিন করে এবং জীব দেহের প্রোটোপ্লাজমের মূল উপাদানগুলিকে পরিবেশে ফিরিয়ে দিয়ে পরিবেশের ভারসাম্য রক্ষা করে,

অধ্যয়নে প্রাপ্ত উদ্ভিদের তালিকাঃ—

1. ডায়াটম জাতীয় উদ্ভিদ : Naviculla sp, cyclotella sp.
2. নীলাভ সবুজ শৈবাল : Microcystie sp, oscillatoria sp.
3. সবুজ শৈবাল : cosmarium sp, staurastreum sp.
4. মূলহীন ভাসমান উদ্ভিদ : Wolffia sp.
5. শালুক : Nymphaea. Pubeseens
6. মূলযুক্ত ভাসমান উদ্ভিদ : পদ্ম : Nelumbo mucifera
7. কচুরিপানা : Eicchornia Crassipes.
8. টোপাপানা : Pistia stratiotes.
9. ক্ষুদেপানা : Lemma Minor এবং Lemna Mator
10. পুকুরের পাড়ে জন্মানো উদ্ভিদ :
    - কচু : colocasia Esculenta
    - শুশনি : Marsilea quadrifolia
    - কলমি : Ipomea sp.
11. পুকুরের জলে নিমজ্জিত উদ্ভিদ : Vallisneria sp.

    Elodea sp.

অধ্যয়নে প্রাপ্ত প্রাণীদের তালিকাঃ—

1. আদ্যপ্রাণী : Verticella sp
2. নিডারিয়া : Hydra sp.
3. চ্যাপ্টাকৃমি : Planaria sp
4. অঙ্গুরিমাল প্রাণী, যেমন-
    - কেঁচো : Dera sp, Autophorus sp, Branchiura sp, Tubifex sp.
    - জোঁক : Glossophonia sp.

5. সন্ধিপদী প্রাণী, যেমন —

ক্রাস্টেসিয়া : cyclops sp. Daphnia sp, Moin crabs.

6. পতঙ্গ শ্রেণীর প্রাণী, যেমন —

কোরিক্সিড, নাউকোরিড, বেলোস্টোমিড, জাতীয় পতঙ্গ, এফিমেরা বর্গের মেফ্লাই,

7. বিভিন্ন প্রাণীর লার্ভা, যেমন — কিউলেক্স মশা ও chaoborus sp, এর লার্ভা, Dysticus sp এবং Lactorophes এর লার্ভা, ক্যাডিস ফ্লাই এর লার্ভা, কাইরোনোমাসের লার্ভা, ফড়িং এর নিম্ফ।

8. কম্বোজ জাতীয় প্রাণী, যেমন:— Pila globosa (শামুক)

9. মৎস্য শ্রেণীর প্রাণী, যেমন - রুই Labeo rohita

কাতলা Catla Catla

মৃগেল cirrhibus testudineus

কৈ মাছ Anabus testudineus

ল্যাটা মাছ channa punch

পুঁটি Punties sp.

সিলভার কার্প Hypophthalmicthys molithrix.

10. উভচর শ্রেণীর প্রাণী, যেমন — কুনোব্যাঙ Bufo melanostictus.

সোনা ব্যাঙ Rana tigrina.

11. সরীসৃপ শ্রেণীর প্রাণী, যেমন — জলঢোঁড়া - Natrix Piscator.

কচ্ছপ - Lissemys punctata.

12. পাখী, যেমন - পানডুব - Padiceps ruficollis

পানকৌড়ি - Phalachrocorax niger.

বক - Bataurus stellaris.

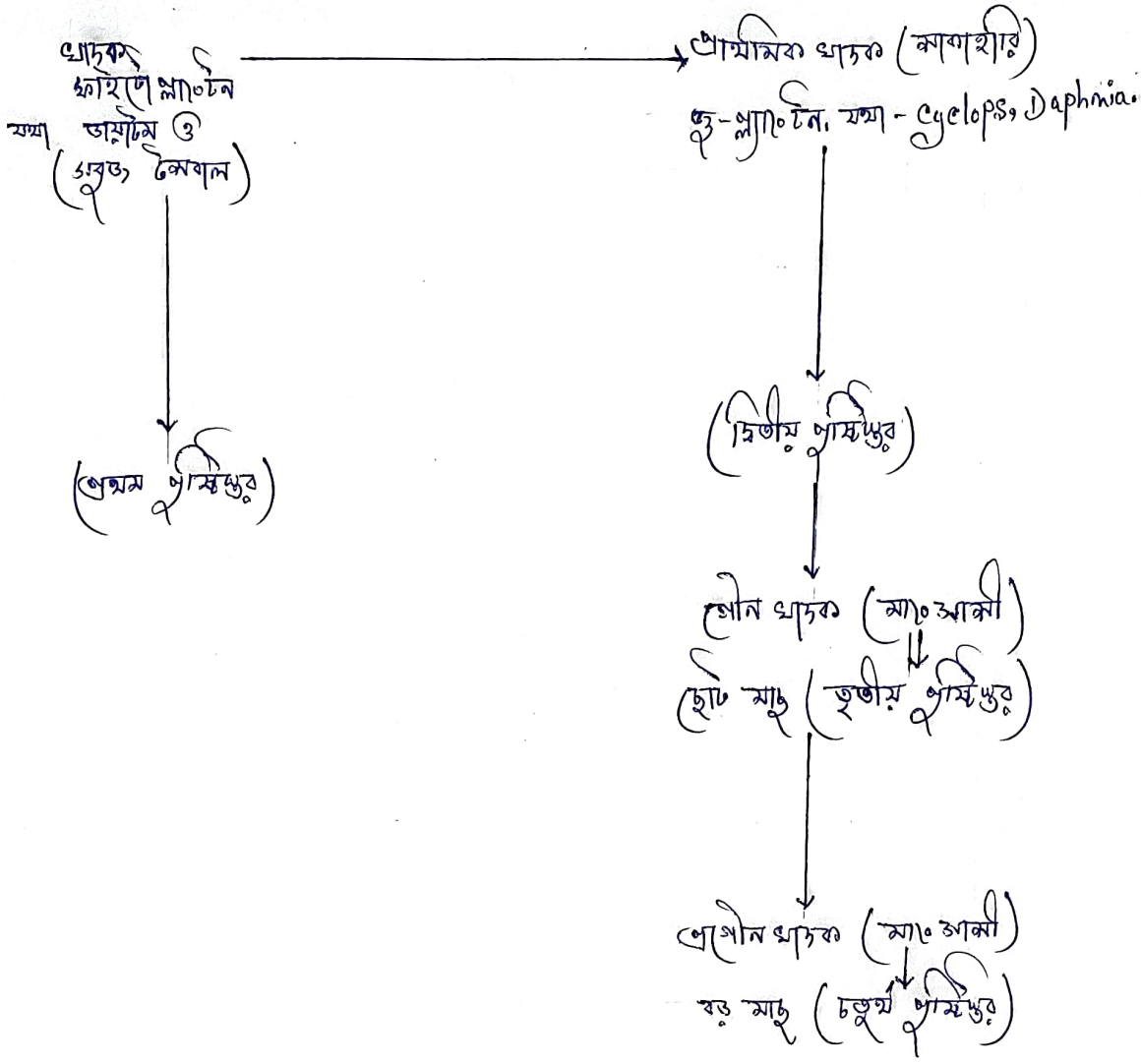
হাঁস - Anas phatyrhynchos.

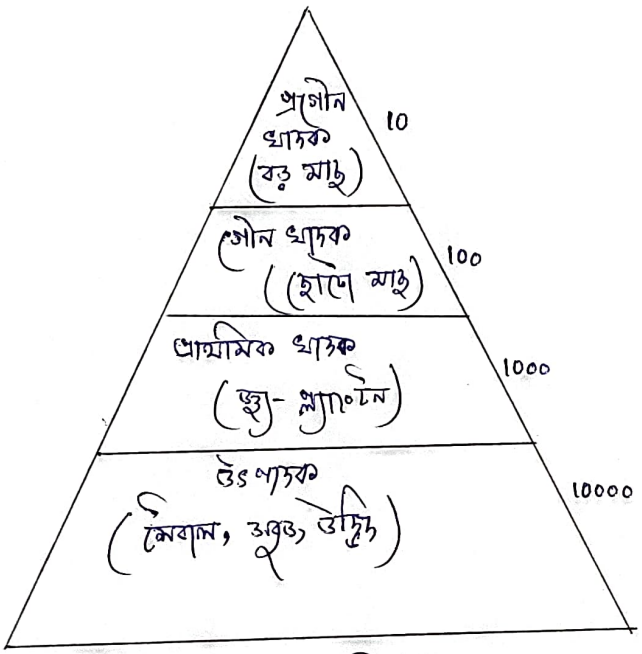
পাতারি হাঁস Anas chessa

ছোট মাছরাঙা Alcedo atthis.

তথ্য বিশ্লেষণ ও আলোচনা (Analysis and Discussion):—

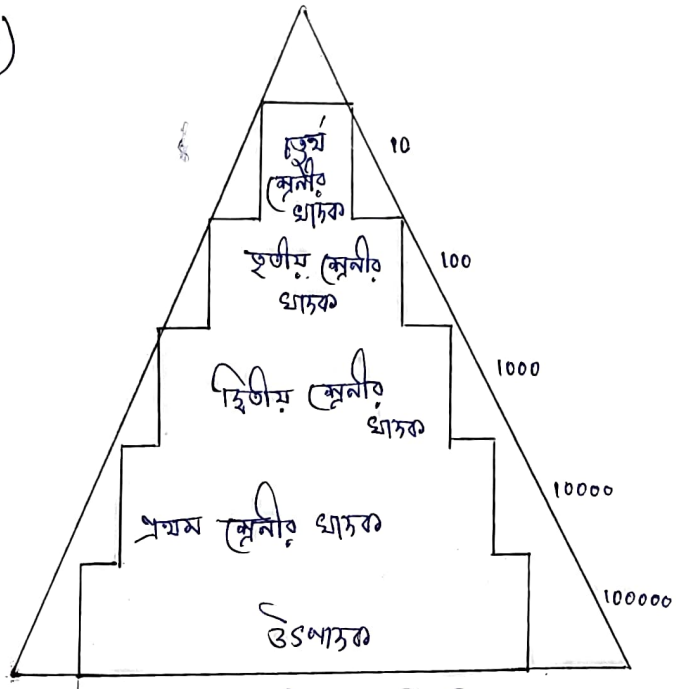
পুকুরের বাস্তুতন্ত্র অধ্যয়ন করলে শক্তি ও পদার্থের এবং খাদ্য স্তরের স্থানান্তরের বিষয়টি খুব ভালোভাবে জানা যায়। প্রত্যেক বাস্তুতন্ত্রে বিভিন্ন জীবেরা একে অপরের সঙ্গে তাদের পুষ্টি চাহিদার সঙ্গে যুক্ত থাকে অর্থাৎ খাদ্যশৃঙ্খলে গঠন করে থাকে। খাদ্য শৃঙ্খল বলতে বোঝায় যে পদ্ধতিতে খাদ্যশক্তি উৎপাদক থেকে ক্রম-পর্যায়ে খাদ্য ও খাদিত সম্পর্কে বিভিন্ন প্রাণীগোষ্ঠীর মধ্যে প্রবাহিত হয়, সেই শক্তি প্রবাহের ক্রমিক পর্যায়ক্রমকে খাদ্যশৃঙ্খল বলে। এখানে শক্তির প্রাথমিক উৎস হল সূর্য। কিন্তু সূর্য থেকে আগত শক্তি সকল জীবেরা সরাসরি গ্রহণ করতে পারে না। কেবলমাত্র সবুজ উদ্ভিদেরা তাদের ক্লোরোফিলের সাহায্যে এই শক্তিকে আহরণ করে জল ও কার্বন-ডাই-অক্সাইডের বিক্রিয়া ঘটিয়ে শর্করা জাতীয় খাদ্য উৎপাদন করে। তার মধ্যে রাসায়নিক শক্তিরূপে আবদ্ধ করে। সবুজ উদ্ভিদেরা বাস্তুতন্ত্রে উৎপাদকের ভূমিকা পালন করে। সবুজ উদ্ভিদের কাছ থেকে প্রাথমিক খাদকরা শক্তি আহরণ করে। এবং পরবর্তীকালে গৌণ খাদক ও প্রগৌণ খাদ্যশৃঙ্খলের মাধ্যমে তারা শক্তি পেয়ে থাকে। পুকুরের খাদ্যশৃঙ্খলের মাধ্যমে 4-5 টি খাদ্যস্তর থাকে। পুকুরের বাস্তুতন্ত্রে শিকারি খাদ্যশৃঙ্খলের একটি আদর্শ উদাহরণ দেখা যায় এখানে ফাইটোপ্ল্যাংটন ও উদ্ভিদেরা হল উৎপাদক, জুপ্ল্যাংটন হল প্রাথমিক খাদক। এই জু-প্ল্যাংটনদের খেয়ে বিভিন্ন পোকামাকড় ও ছোট মাছরা তাদের জীবনধারণ করে। অর্থাৎ এরা গৌণ খাদকের ভূমিকা পালন করে। এই পোকামাকড় ও ছোট মাছদের খেয়ে বড় মাছেরা জীবন যাপন করে। এছাড়া পুকুরের বাস্তুতন্ত্রে বিভিন্ন খাদ্যস্তরে উপস্থিত জীবদের সংখ্যার মধ্যে একটি নির্দিষ্ট বাস্তুতান্ত্রিক সম্পর্ক দেখা যায়, সংখ্যার ভিত্তিতে প্রত্যেক খাদ্যস্তরের জীবদের সাজালে এটি একটি পিরামিডের আকার পায়। এই পিরামিডের বিশ্লেষণ করলে দেখা যায় যে উৎপাদক শ্রেণীর জীব যথা- শ্যাওলা শৈবাল, সবুজ উদ্ভিদ অর্থাৎ উৎপাদকের সংখ্যা প্রাথমিক খাদকের তুলনায় অনেক বেশি। আবার প্রাথমিক বা খাদকের তুলনায় গৌণ খাদকের সংখ্যা অনেক কম। পরবর্তী খাদক অর্থাৎ প্রগৌণ খাদকের সংখ্যা গৌণ খাদকের তুলনায় কম।





খাদ্যের খাদ্যতন্ত্রের সংখ্যার পিরামিড।

শক্তি
(K·Cal/m²/year)



পুকুরের বাস্তুতন্ত্রে শক্তি গতিপথ পিরামিড

সিদ্ধান্ত (Conclusion) :— পুকুরের বাস্তুতন্ত্র অধ্যয়ন করে জানা গেল যে এটি একটি অ্যাকর্ষ বাস্তুতন্ত্র কারণ এতে বাস্তুতন্ত্রের অন্যান্য কৃত্রিম উপাদান অসম্পূর্ণ রূপে বর্তমান।

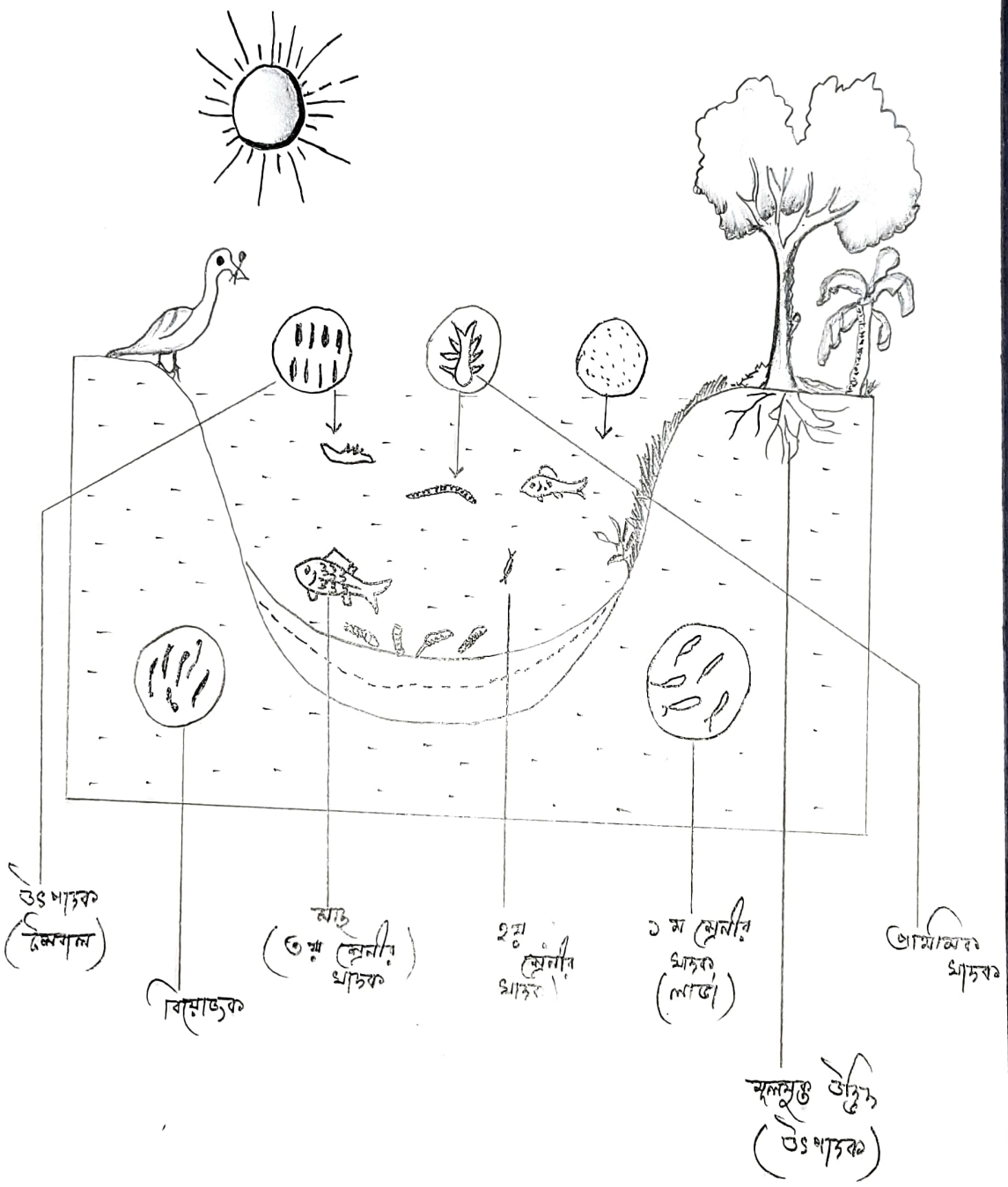
i. পুকুরের বাস্তুতন্ত্র একটি অ্যাকর্ষ বাস্তুতন্ত্র, এখানে বাস্তুতন্ত্রের অকৃত্রিম উপাদান বর্তমান, এবং এরা অন্তঃক্রিয়ার ফলে একে অপরের অনুরূপ শক্তির ও বস্তুর উপাদান প্রদান করে।

ii. পুকুরের বাস্তুতন্ত্রের বিভিন্ন উদ্ভিদ, প্রাণী ও বিয়োজক সম্পর্কে বিস্তারিত জ্ঞানলাভ করা গেল, পুকুরের বাস্তুতন্ত্রে এদের ভূমিকাও জানা গেল।

iii. প্রমীন অক্সিজেন পুকুরের ব্যাকটেরিয়া ও অণুজীবিক উপযোগিতা সম্পর্কেও একটি অভিজ্ঞতা বিনিময় লাভ করা গেল।

iv. পুকুরের জলে অবস্থিত উদ্ভিদ ও প্রাণীর উপস্থিতি লক্ষ্য করা গেল।

পুকুরের বাস্তুতন্ত্র



বিশেষ পত্র নির্ভর ক্ষেত্রসমীক্ষাভিত্তিক প্রকল্প পত্র

বিশেষ পত্রঃ কথাসাহিত্য

বিষয়ঃ বিশ্বের কবি রবীন্দ্রনাথ ঠাকুর ও শান্তিনিকেতনঃ একটি সমীক্ষাভিত্তিক আলোচনা

নামঃ মানব মান্না

এম.এ চতুর্থ সেমিস্টার

রোল- BUR BENG 2020 নাম্বার- 424

রেজিস্ট্রেশন নাম্বার- 201701048177 অফ-2017-18

পত্র- 400

শিক্ষাবর্ষ- 2020-2022

বর্ধমান বিশ্ববিদ্যালয়

গোলাপবাগ, বর্ধমান

পিন- 713104

সূচিপত্র

প্রশ্নমালা :-

১) কোন স্থান নির্বাচন করা হয়েছে?
২) উক্ত স্থানটি কেন নির্বাচন করা হয়েছে?
৩) স্থানটি কোথায় অবস্থিত?
৪) স্থানটি অতীতে কী অবস্থা অবস্থানে ছিল না বর্তমানে তার বদল ঘটেছে?
৫) বর্তমানে স্থানটি পুরনো নামেই আছে না বদলেছে?
৬) স্থানটির বিশিষ্টতা কী?
৭) অতীত-বর্তমান অনুযায়ী ঐ বিশিষ্ট স্থানটির স্থানচিত্র অনুযায়ী সঠিক অবস্থান কী?
৮) উক্ত স্থানে বর্তমানে কী কী আছে?
৯) ওখান বসেই কি কবির বা সাহিত্যিক বিশিষ্ট লেখা বা লেখাগুলি লিখেছিলেন না তার স্মৃতিস্বরূপ সংরক্ষনের জন্য ওখানে আনা হয়েছে?
১০) উক্ত স্থানে লেখা নির্মান ছাড়া আর বাকি যা গেছে সেগুলি কি আগেও ছিল না পরে রাখা হয়েছে.
১১) বর্তমানে সেগুলি কী অবস্থায় আছে?
১২) সাহিত্যিকের ব্যবহৃত বিশেষ কিছু সামগ্রী রাখা আছে কিনা?
১৩) সেগুলি কী কী?
১৪) সেগুলির অতীতে কী মূল্য ছিল?
১৫) সেগুলির বর্তমানে গুরুত্ব কী, কেমন ও কতখানি?
১৬) সংরক্ষিত বা অরক্ষিত সামগ্রীগুলির অতীতের নিরিখে বর্তমানে কোনো বিশেষ পরিবর্তন ঘটেছে কিনা; যদি ঘটে থাকে তাহলে তা কী এবং কতখানি?
১৭) আর সামগ্রীগুলি এবং স্থানটি কতখানি সুরক্ষিত বা সংরক্ষিত আছে বর্তমানে - কেমন নয়তো যে ভবিষ্যতে নষ্ট হয়ে যাবার সম্ভাবনা প্রবল?
১৮) ঐ স্থান বসে সাহিত্যিকের সঙ্গে কোনো বিশেষ ব্যক্তিত্বের সাক্ষাৎ হয়েছিল কিনা? যদি হয়ে থাকে সেই সাক্ষাৎকারের কোনো নমুনা আছে কিনা,
১৯) ওখান বসে কী কী রচনা রচনা করেছিলেন বিশেষত উপন্যাস ও ছোটগল্প?

— এটি একটি নমুনা স্বরূপ প্রশ্নমালা. সমস্ত চলতি ভাষাতে এই প্রশ্নমালা ও তার ছকের অনুযায়ী সব তথ্য সংগ্রহ করা সম্ভবপর হয়নি তাই একটি বা প্রশ্ন বদলাতে হয়েছে, প্রয়োজনানুযায়ী এতে নেই এমন প্রশ্ন ও তথ্যও সংগ্রহ করতে হয়েছে আবার কিছু প্রশ্ন বাদ দিতেও হয়েছে; তবেই চলতি ভাষাটি সম্পূর্ণ করতে পারা সম্ভবপর হয়েছে।

প্রথম অধ্যায়

ভূমিকা

ক্ষেত্র সমীক্ষার জন্য আমরা মহর্ষি দেবেন্দ্রনাথ ঠাকুরের স্থাপিত ও কবিগুরু রবীন্দ্রনাথ ঠাকুরের স্মৃতি বিজড়িত বোলপুর শান্তিনিকেতন কে নির্বাচন করেছি. মানবজাতির কাছে মহাকালের এক শ্রেষ্ঠ দান রবীন্দ্রনাথ ঠাকুর। কিন্তু রবীন্দ্রনাথ এমনই এক প্রতিভা যিনি সর্বযুগে সর্বকাল ধরে প্রাসঙ্গিক, চির নবীন ও চিরন্তন রূপে শাশ্বত, শিল্প, সাহিত্য, সংস্কৃতির অন্যতম মাইলস্টোন রবীন্দ্রনাথ ঠাকুর শুধুমাত্র সাহিত্যেই নয় রাজনীতি, সমাজ কল্যাণ, দর্শন এমনকি শিক্ষাক্ষেত্রেও বিশ্বে তার স্বাক্ষর রেখে গেছেন।

শান্তিনিকেতন পশ্চিমবঙ্গের বীরভূম জেলার বোলপুর শহরের নিকট অবস্থিত একটি আশ্রম ও শিক্ষাকেন্দ্র। ১৮৬৩ খ্রিস্টাব্দে রবীন্দ্রনাথ ঠাকুরের পিতা মহর্ষি দেবেন্দ্রনাথ ঠাকুর নিভৃতে ঈশ্বরচিন্তা ও ধর্মালোচনার জন্য বোলপুর শহরের উত্তরে ভুবনডাঙ্গা গ্রামে এই আশ্রম প্রতিষ্ঠা করেন. ১৯০১ সালে রবীন্দ্রনাথ শান্তিনিকেতনে ব্রহ্মবিদ্যালয় প্রতিষ্ঠা করেন যা কালক্রমে বিশ্বভারতী বিশ্ববিদ্যালয়ের রূপ নেয়। ১৯১৮ সালের ২৩ ডিসেম্বর বিশ্বভারতীর ভিত্তি প্রস্তর স্থাপন করেন. স্বয়ং রবীন্দ্রনাথ, রবীন্দ্রনাথ তার জীবনের দ্বিতীয়ার্ধের অধিকাংশ সময় শান্তিনিকেতন আশ্রমে অতিবাহিত করেছিলেন। তার সাহিত্য ও সৃষ্টিকর্মে এই আশ্রম সংলগ্ন প্রাকৃতিক পরিবেশের উপস্থিতি সমুজ্জ্বল। শান্তিনিকেতনে নিজের ও অন্যান্য আশ্রমিকদের বসবাসের জন্য রবীন্দ্রনাথ অনিন্দ্য স্থাপত্য সৌন্দর্যমণ্ডিত একাধিক ভবন নির্মাণ করিয়েছিলেন। পরবর্তী কালে আশ্রম নিবাসী বিভিন্ন শিল্পী ও ভাস্করদের সৃষ্টিকর্মে সজ্জিত হয়ে এই আশ্রম একটি গুরুত্বপূর্ণ পর্যটন স্থল হয়ে ওঠে।

দ্বিতীয় অধ্যায়

স্থানটির সম্যক পরিচিতি

শান্তিনিকেতন হল পশ্চিমবঙ্গের বীরভূম জেলার, বোলপুর মহকুমার, বোলপুর মহকুমার অন্তর্গত, বিশ্বকবি রবীন্দ্রনাথ ঠাকুরের স্মৃতি ঘেরা, সাহিত্য-সংস্কৃতির স্থান হল এই শান্তিনিকেতন, এখন কার শান্তিনিকেতনের পূর্ব নাম ছিল ভুবনডাঙা, বর্তমান শান্তিনিকেতন এর থেকে ১০ কিলোমিটার দূরে এক গ্রাম ছিল রায়পুর, এই গ্রামের জমিদার ভুবন মোহন সিনহা ছিলেন ব্রাহ্ম ধর্মে দীক্ষিত, ধর্ম প্রচারের উদ্দেশ্যে তিনি কবির বাবা দেবেন্দ্রনাথ ঠাকুরকে আমন্ত্রণ জানান। দেবেন্দ্রনাথ বাবু মেঠো রাস্তা দিয়ে পালকিতে করে বন্ধুর বাড়ি যাবার সময় একজোড়া ছাতিম গাছের নীচে বিশ্রাম নিয়ে প্রাণের আরাম, মনের আনন্দ ও আত্মার শান্তি পেয়েছিলেন, এবং পাশাপাশি বীরভূমের লাল মাটির অঞ্চল, মাঝে মাঝে কিছু তাল ও খেজুর গাছের সারি, দেবেন্দ্রনাথ ঠাকুর প্রাথমিক ইচ্ছা জেগেছিল এই ছাতিমতলাকে কেন্দ্র করে একটা জায়গা পেলে একটা তপোবন করবেন। বন্ধুর কাছে জায় বিস্তারিত খবর নিয়ে জানতে পারলেন এই চারপাশের জায়গাটির মালিক ভুবন মোহন সিনহা, তাই জায়গাটির নাম ছিল ভুবনডাঙা, বর্তমানে পার্শ্ববর্তী ভুবনডাঙা রয়েছে।

জমিদার বাবু ছিলেন বিচক্ষণ মানুষ, তিনি জানেন বীরভূম রাঢ়বঙ্গের বেলা, সেখানে উন্নয়ন নেই, তাই তিনি দেবেন্দ্রনাথ ঠাকুরকে কুড়ি বিঘা জমি দান করতে চাইলেন কিন্তু দেবেন্দ্রনাথ বাবু দান নিতে চাইলেন না। তখন ভুবনমোহন বাবু ১ টাকার বিনিময়ে ২০ বিঘা জমি স্থায়ী দেবেন্দ্রনাথ ঠাকুরের নামে দলিল করে দিলেন। দেবেন্দ্রনাথ ঠাকুর সেখানে একটি একতলা বাড়ি বানালেন এবং বাড়িটির নাম দিলেন শান্তিনিকেতন, এবং এই নামটিকে কেন্দ্র করে ধীরে ধীরে জায়গাটির নাম হল শান্তিনিকেতন। শান্তিনিকেতন আশ্রমের প্রতিষ্ঠাতা কবির বাবা মহর্ষি দেবেন্দ্রনাথ ঠাকুর।

তৃতীয় অধ্যায়

রবীন্দ্রনাথের সাহিত্য কর্মে শান্তিনিকেতন

শান্তিনিকেতনে মিলন ও সাহিত্যের মেলবন্ধন তৈরী হয়েছিল, রবীন্দ্রনাথ তথাকথিত শিক্ষাব্যবস্থার প্রতি আস্থা না রেখেই বোলপুরে শান্তিনিকেতন স্কুল প্রতিষ্ঠা করেন, তিনি চেয়েছিলেন ছাত্রছাত্রীরা মুক্ত আশ্রমে থাকে, তাছাড়া যে সময় রবীন্দ্রনাথ এই স্কুল প্রাণের জন্য চিন্তা করেছেন তখনই শান্তিনিকেতনের দুটো বাড়ি থেকে বেরিয়ে আসে সমুদ্রের অভিযানের মতো কবিতা।

রবীন্দ্রনাথ তাঁর জীবনের দ্বিতীয়ার্ধে অধিকাংশ সময় শান্তিনিকেতন আশ্রমে অতিবাহিত করেছিলেন, তাঁর সাহিত্য ও সৃষ্টি কর্মে এই আশ্রম ও আশ্রম সংলগ্ন প্রাকৃতিক পরিবেশের কথা বার বার এসেছে, শান্তিনিকেতনে চত্বরে নিজের ও অন্যান্য আশ্রমবাসীদের বসবাসের জন্য রবীন্দ্রনাথ বিভিন্ন ভবন, দেহলী, নতুন বাড়ি, সংগ্রহালয় প্রভৃতি, পাঠশালার জন্য তিনি একাধিক প্রতিষ্ঠান গড়ে তোলেন, তিনি মুক্ত পরিবেশে, স্বাধীনভাবে শিক্ষাদানে বিশ্বাসী।

শান্তিনিকেতনের শান্ত পরিবেশ সাহিত্য সৃষ্টির অনুকূল পরিবেশ, রবীন্দ্রনাথ তাঁর জীবনের অধিকাংশ সময় এখানে কাটানোর ফলে স্বাভাবিক ভাবেই তাঁর সাহিত্যে এর ছাপ পড়ে, এখানে বসে এবং এই পরিবেশকে কেন্দ্র করে তিনি অসংখ্য গান, কাব্যগ্রন্থ, নাটক, গল্প, প্রবন্ধ প্রভৃতি লেখেন, ঋতুরাজ বসন্তকে নিয়ে লেখা 'শারদোৎসব' 'অচলায়তন' প্রভৃতি নাটক তিনি এই এখানে বসে লেখেন, 'বলাকা', 'পুনশ্চ', 'পত্রপুট' 'শ্যামলী' কাব্যগ্রন্থের কবিতাগুলি শান্তিনিকেতনের পরিবেশের বিভিন্ন রূপ নিয়ে লেখা, যার ভাবনা ও অভিব্যঞ্জনা প্রকৃতিপ্রেমপূর্ণ।

শান্তিনিকেতনের আর একটি উল্লেখযোগ্য স্থান মিউজিয়াম। এখানে রবীন্দ্রনাথ ঠাকুরের ব্যবহৃত বিভিন্ন জিনিস সংরক্ষিত করা আছে, চশমা, পেন, কাপ, খড়ম, কাঁটি, জামা, প্রভৃতি, বিদেশ থেকে পাওয়া বিভিন্ন উপহার এখানে সংরক্ষিত করা আছে, এছাড়া 'গীতাঞ্জলি' কাব্যের জন্য পাওয়া নোবেল পুরস্কারটি রাখা আছে যদিও নকল প্রতিকৃতি রাখা আছে কারণ আসলটি চুরি হয়ে গেছে। বিশিষ্ট ব্যক্তিদের সাথে রবীন্দ্রনাথের প্রতিচিত্র এখানে আছে — আইনস্টাইন, হেলেনকেলার, গান্ধীজী প্রমুখ। শান্তিনিকেতনে আমরা শিল্প নিদর্শন দেখতে পাই। নন্দলাল বসু ও রামকিঙ্কর বেইজ প্রমুখের অনেক কারুকার্য এখানকার শ্রেষ্ঠ দেখার বিষয়।

চতুর্থ অধ্যায় (সংস্কৃতি ও দর্শনীয় স্থান)

বোলপুর শান্তিনিকেতনের আর ও একটি উল্লেখযোগ্য স্থান হল শিল্পগ্রাম, ২০০৮ সালে পশ্চিমবঙ্গ সরকারের তৈরি শিল্পগ্রাম পার্কমেকার্স ট্রাস্ট ও এখানে দেখা যাবে পূর্ব ও উত্তরপূর্ব ভারতের বিভিন্ন রাজ্যের শিল্প নিদর্শন, এবং একটি কুটির এক একটি রাজ্যের প্রতীক. এখানে বাংলার সাবেকি মাটির বাড়ি, খড়ের চাল, খেত, লাঙল, কামার, কুমোর, কুয়ো প্রভৃতি দেখতে পাওয়া যায়। বাংলার আদর্শ গ্রামের প্রকৃষ্ট উদাহরণ এটি, তাছাড়া বিভিন্ন রাজ্যের ঐতিহ্য, খানা-খাবার, ব্যবহারিক জিনিস দেখতে পাওয়া যায়। আর চত্বরে ছড়ানো নানা মূর্তি-ভাস্কর্য, বাঁশের তৈরী লাইটহাউস।

শান্তিনিকেতনে সারাবছর বিভিন্ন উৎসব পালন করা হয়, এর মধ্যে দুটি উল্লেখযোগ্য উৎসব হল পৌষ মেলা ও বসন্তউৎসব, এই উৎসব উপলক্ষে দেশ-বিদেশ থেকে বহু দর্শনার্থীর সমাগম হয়। প্রতি বছর শীতকালে ৭ই পৌষ তে শুরু হয় পৌষ মেলা। এখানে বিভিন্ন নৃত্য, লোকসঙ্গীত, কুটির শিল্প, হস্তশিল্প, পিঠে পায়েস সমস্ত কিছু পাওয়া যায়। দেবেন্দ্রনাথ ঠাকুর এই পৌষ উৎসবের সূচনা করেন, রবীন্দ্রনাথ ঠাকুরের উদ্যোগে যে ঋতুউৎসবের সূচনা হয়েছিল, তাই বসন্ত উৎসব হিসাবে পালিত হয়। দোল পূর্ণিমার আগে এই বসন্তউৎসব পালন করা হয়।

এছাড়াও শান্তিনিকেতনের কাছে একটি স্থান আছে যার নাম সোনাঝুরি, এখানে প্রতি সপ্তাহে শনিবার সোনাঝুরি হাট বসে, এটি মূলত একটি হস্তশিল্প মেলা, এই মেলায় মূল আকর্ষণ ওখানকার স্থানীয় মানুষদের হাতের কাজ। এই মেলাতে বিভিন্ন হাতে বানানো গয়না, চামড়ার ব্যাগ, শাড়ি, কাঠের তৈরী বিভিন্ন জিনিস ইত্যাদি খুবই কম দামে পাওয়া যায়, এর পাশাপাশি এই মেলাতে আদিবাসীদের নাচ, বাউল গান, বাঁশির সুর উপভোগে শুনতে ও দেখতে পাওয়া যায়।

শান্তিনিকেতনের প্রকৃতি, সাহিত্য, ওখানকার সংস্কৃতি সেই স্থানটিকে বাঙালির সমৃদ্ধ করেছে।

প্রথম দর্শনীয় স্থান শান্তিনিকেতন ভবন, যা মহর্ষি দেবেন্দ্রনাথ ঠাকুর তৈরী করেন। এটি আশ্রমের সর্বাপেক্ষা পুরানো বাড়ি, ব্রহ্মচর্য বিদ্যালয় স্থাপনের প্রথম দিকের সময় রবীন্দ্রনাথ কিছুকাল সপরিবারে এই বাড়িতে বাস করেন। এই বাড়ির সামনে বিখ্যাত শিল্পী রামকিঙ্কর বেইজ নির্মিত একটি ভাস্কর্য আছে।

এছাড়াও এই মন্দির প্রতিষ্ঠা করেন মহর্ষি দেবেন্দ্রনাথ ঠাকুরের (জ্যেষ্ঠ) পুত্র দ্বিজেন্দ্রনাথ ঠাকুর। বেলজিয়াম কাচের রঙিন কারুকার্য নান্দনিক নকশায় নির্মিত এই উপাসনা মন্দিরটি স্থানীয় লোকজনের কাছে কাঁচের মন্দির নামে পরিচিত।

আর রবীন্দ্রায়ন হল পাঁচটি বাড়ি নিয়ে গড়ে ওঠা স্থান, বাড়িগুলির নাম হল — উদয়ন, কোনার্ক, শ্যামলী, পুনশ্চ এবং উদীচী, প্রতিটি বাড়ি — দেওয়ালে মুখে লেখা আছে কবে কখন কী কারণে রবীন্দ্রনাথ এই বাড়িগুলি তৈরী করেন। পুরো রবীন্দ্রায়নের চত্বর জুড়ে আছে অসংখ্য দেশী ও বিদেশী, শিরীষ, মালতী সহ নানা গাছের সারি।

দেবেন্দ্রনাথ ঠাকুর এখানে এক ছাতিমতলায় বিশ্রাম করতেন। যদিও পুরাতন ছাতিম গাছটি মারা গেছে, তার জায়গায় দুটো ছাতিম গাছ রোপণ করা হয়েছে। কিন্তু আজও ছাতিমতলা শান্তিনিকেতনের দর্শনীয় স্থান।

রবীন্দ্রনাথ ঠাকুর মৃণালিনী দেবীর সাথে দেহলী বাড়িতে বাস করতেন। মৃণালিনী দেবীর স্মরণে এখানে শিশুদের বিদ্যালয় মৃণালিনী আনন্দ পাঠশালার সূচনা হয়।

রবীন্দ্রভবনের বিচিত্রা বাড়িতে রয়েছে মিউজিয়াম। রবীন্দ্রনাথ এবং তাঁর পরিবারের সদস্যদের ব্যবহৃত বিভিন্ন সামগ্রী ও ব্যবহার্য সামগ্রী এইখানে রাখা হয়েছে। পর্যটকরা টিকিট কেটে দেখতে পারেন।

উপসংহার

শান্তিনিকেতন নামের মধ্যেই ~~লক্ষ~~ লুকিয়ে রয়েছে জায়গাটির মূল বৈশিষ্ট্য, 'শান্তির নীড়' হল শান্তিনিকেতন, সত্যিই এখানে এলে মন জুড়িয়ে যায়, এক আলাদা শান্তির অনুভূতি পাওয়া যায়. লাল মাটি, সবুজ বনানীর চিত্রপট সাজে রয়েছে রবীন্দ্রনাথের সৃষ্টি 'বিশ্বভারতী' বিশ্ব বিদ্যালয়, প্রকৃতির অতুল ঐশ্বর্য ও মিলন সাহিত্যের অপূর্ব মেলবন্ধনে শান্তিনিকেতন আজকাল বাংলা বা ভারতের নয় সমগ্র বিশ্বের কাছেই আকর্ষণীয় একটি স্থান, ""

রবীন্দ্রনাথ ঠাকুর শান্তিনিকেতনে প্রকৃতি, মানুষ ও শিক্ষার সমন্বয় ঘটাতে চেয়েছিলেন, এমন শান্তিনিকেতনের ছাত্রছাত্রীদের শ্রেণী কক্ষের বাইরে প্রকৃতির মাঝে গাছের তলায় শিক্ষা দেওয়া হত, গুরু ও শিষ্যের মধ্যে মধুর সম্পর্ক গড়ে তোলার উপর গুরুত্ব আরোপ করেছিলেন এবং শিক্ষার্থীদের সৃজনমূলক কাজের উপর বিশেষ নজর দিয়েছিলেন, এখানে তিনি বিভিন্ন ধরনের উৎসব পালন করার ও ব্যবস্থা করেন যার মাধ্যমে শিক্ষার্থীদের বিকাশ ঘটতে সাহায্য করবে. তাছাড়া শান্তিনিকেতনের সঙ্গে আশেপাশের গ্রাম ও তার মানুষদের ঘনিষ্ঠ যোগাযোগ ছিল, তাই শান্তিনিকেতনের শিক্ষা হয়ে উঠেছিল মানবতাবোধের শিক্ষা; দেশ বিদেশের বহু গুণী ও শিক্ষকেরা এই প্রতিষ্ঠানের সাথে যুক্ত হয়েছেন,

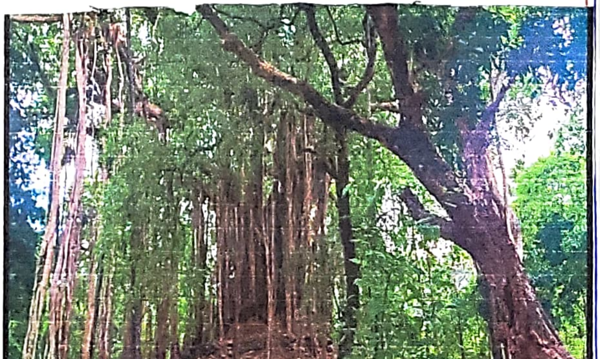
ব্যক্তিগত সাক্ষাৎকার :

শ্যামল ঘোষ, বয়স - ৬০ বছর, লিঙ্গ - পুং,
পেশা - শিক্ষক,
সাক্ষাৎকারের দিন - ২৬.০৬.২০২২

শান্তিনিকেতন গৃহ

ছাতিম তলা

উপাসনা গৃহ



প্রাচীন বটবৃক্ষ

রবীন্দ্র ভবন

শিল্পী রামকিঙ্কর বেইজের তৈরী ভাস্কর

শিল্পী রামকিঙ্কর বেইজের তৈরী ভাস্কর

কংকালী তলা

বেলাই নদী

বিশেষ পত্র নির্ভর ক্ষেত্রসমীক্ষাভিত্তিক প্রকল্পপত্র

বিশেষ পত্রঃ প্রাচীন ও মধ্যযুগের বাংলাসাহিত্য ও সংস্কৃতি

বিষয়ঃ দামিন্যার কবি কবিকঙ্কন মুকুন্দ চক্রবর্তী ও
চন্ডীমঙ্গল পুঁথি : একটি সমীক্ষাভিত্তিক আলোচনা

নামঃ আকাশ সাধুখাঁ

এম.এ চতুর্থ সেমিস্টার

রোল- BUR BENG 2020 নাম্বার- 414

রেজিস্ট্রেশন নাম্বার- 201701044881 অফ-2017-2018

পত্র- 400

শিক্ষাবর্ষ- 2020-2022

বর্ধমান বিশ্ববিদ্যালয়

গোলাপবাগ, বর্ধমান

পিন- 713104

সূচীপত্র

প্রশ্নমালা

১. কোন স্থান নির্বাচন করা হয়েছে ?
২. উক্ত স্থানটি কেন নির্বাচন করা হয়েছে?
৩. স্থানটি অতীতে কী সকই অবস্থানে ছিল না বর্তমানে তার বদল ঘটেছে?
৪. বর্তমানে স্থানটি পুরানো নামেই আছে না বদলেছে?
৫. উক্ত স্থানে বর্তমানে কী কী রয়েছে ?
৬. উক্ত স্থানে লেখ্য নিদর্শন ছাড়া আর বাকি যা আছে সেগুলি কি আগেও ছিল না পরে রাখা হয়েছে ?
৭. আগ্নীভূকের ব্যবহৃত কিছু বিকোষ সামগ্রী রাখা আছে কিনা?
৮. সেগুলির অতীতে কী মূল্য ছিল ও বর্তমানে কী গুরুত্ব আছে?
৯. কবির আত্মপরিচয়ে ও কবির নাম নিয়ে কোন বিতর্ক আছে কি?
১০. কবির আত্মপরিচয়ে গ্রাম ও স্থানের ভৌগোলিক পরিচয় কি পাওয়া যায়?
১১. কবির গ্রামে পূজিত কোন দেবদেবীর সন্ধান পাওয়া যায় ?
১২. কবির বংশধরেরা এখনও কি রয়েছেন ?
১৩. কবির গ্রামে পূজিত দেবীর কটি মূর্তি পাওয়া গেছে ?
১৪. কবির ব্যবহৃত সামগ্রীগুলির অতীতের নিরিখে কোন বিকোষ পরিবর্তন ঘটেছে কিনা? যদি ঘটে থাকে তাহলে তা কী ও কত-খানি ?
১৫. ঐ স্থানে বসে আগ্নীভূকের কোন বিকোষ বীজের আখ্যান হয়েছিল কিনা? যদি হয়েই থাকে তেমই আখ্যানকারের কোন নমুনা আজও আছে কিনা?
১৬. ঐ স্থানে আগ্নীভূষি ছাড়া আগ্নীভূকের আর কোন কর্ম কীর্তি আছে কিনা যদি থাকে তাহলে তা কী কী? তার কোন নমুনা আছে কিনা?
১৭. কবির গ্রামে পূজিত মূর্তি অঙ্কিত কোন প্রমাণিকতা আছে কি?

এই একটি নমুনা স্বরূপ প্রশ্নমালা। সমস্ত সমীক্ষাতে এই প্রশ্নমালা ও তার উত্তর অনুযায়ী সব তথ্য ব্যাখ্যা করা সম্ভবপর হবে তাই সঠিক-ভাবে প্রশ্ন বদলাতে হয়েছে প্রয়োজনুযায়ী অতে নেই তখন প্রশ্ন ও তার উত্তর ব্যাখ্যা করা হয়েছে আবার কিছু প্রশ্ন বদলাতে হয়েছে, তবেই সমীক্ষাটি সম্পূর্ণ করতে পারা সম্ভবপর হয়েছে।

ভূমিকা

ক্ষেত্রসমীক্ষার জন্যে আমরা কবিকঙ্কন মুকুন্দ চক্রবর্তীর জন্মভিটা পূর্ব বর্ধমানের অন্তর্গত দামিন্যা গ্রামটিকে নির্বাচন করেছি। কবি মুকুন্দ চক্রবর্তী ছিলেন ষোড়শ শতাব্দীর একজন বাঙালি কবি। এনার - রচিত 'চন্ডীমঙ্গল কাব্যটি বাঙালীর কাছে অত্যন্ত জনপ্রিয়তা লাভ করেছে কথিত আছে তালুকদার গোপীনাথ নিয়োগীর অধীনে মুকুন্দ চক্র- বর্তীর বংশ ছয় সাত পুরুষ ধরে চাষবাস করেছেন। রাজা মান- সিংহের বঙ্গদেশ বিজয়ের সময় ডিহিদার মাহমুদ শরীফ এর অত্যাচারের মাত্রা বেড়ে যায়। আবাদনত কুড়ি কাঠায় এক বিঘা হয় কিন্তু মাহমুদ শরীফের দলবল ১৫ কাঠায় এক বিঘে ধরে খাজনা আদায় করতে থাকে। এই অবস্থায় দামিন্যাবাসীরা গ্রাম ছেড়ে পালিয়ে যায়। কবিও তেমন তার পুত্র ও ভাইকে নিয়ে গ্রাম ছেড়ে পালিয়ে যান। যাওয়ার পথে দেবী চন্ডী কবিকে স্বপ্নে তার মাহাত্ম্য বর্ণনা করেন। শিলাবতী নদী পেরিয়ে কবি পৌছে যান আরড়ায়। তারপর রাজ বাঁকুড়া রায় তার নিজ পুত্র রঘুনাথ এর পঠন-পাঠনের কাজে কবিকে নিযুক্ত করে দেন। পরবর্তীকালে যখন কবির ছাত্র রঘুনাথ রাজা হন তখন তার অনুরোধেই কবি 'চন্ডীমঙ্গল' কাব্য রচনা - শুরু করেন। কথিত আছে চন্ডীমঙ্গল কাব্যের প্রাচীন পুঁথিটি এখনও তার নিজস্ব বাসভূমিতে বর্তমান। সেইজন্যই আমরা উক্ত স্থানটিকে নির্বাচন করেছি। 'দামিন্যা' নামে আজও শিহরন জাগে। মনের কল্পনায় ভেসে ওঠে ষোড়শ শতাব্দীর কোন এক গ্রাম।

স্থানটির সম্যক পরিচিতি

মুকুন্দরাম চক্রবর্তীর জন্মস্থান দামিন্যা। বর্তমান অবস্থান পূর্ব-বর্ধমান জেলায়, তাহলেও এই গ্রাম হুগলী ও পূর্ব-বর্ধমানের সীমানায় অবস্থান করছে। তারকেশ্বর থেকে দূরত্ব মাত্র কুড়ি কিলোমিটার। পথে পেরোতে হয় দুটি নদী দামোদর ও মুণ্ডেশ্বরী। দামোদর পেরিয়ে পশ্চিমদিকের যাবার রাস্তা ভালোই। তারকেশ্বর থেকে আথানুর হয়ে কাড়ারিয়া সেতু। এখান থেকে দামোদর পেরিয়ে দেউলপাড়া আসা যায়। সেখান থেকে উত্তর দিকে ও দক্ষিণের মাঝামাঝি বিস্তৃত দামোদরের স্বাভাবিক বাঁধ। এবার বাঁধ ছেড়ে পশ্চিমের রাস্তা ধরলেই ঢুকে পড়া যায় দো আব অঞ্চলে। অর্থাৎ দামোদর ও মুণ্ডেশ্বরীর মধ্যবর্তী অঞ্চলে। ডিহিবাতপুর, রনবাজপুরে হয়ে রাস্তা সোজা চলে গেছে মুণ্ডেশ্বরীর খেয়াঘাটে। আরও কিছুটা পশ্চিমে বেশ কয়েক কিলোমিটার যেতেই পাওয়া যায় কবিকঙ্কন মুকুন্দরাম (চক্রবর্তী) রোড। বলা বাহুল্য এই রাস্তা ধরে উত্তরে ৯০ কিলোমিটার গেলেই পৌঁছে যাওয়া যায় দামিন্যা গ্রামে।

কবিকীর্তি ও সেই সংক্রান্ত তথ্য

কবির বাসভূমির নিকটে যে সিংহবাহিনী দেবীর মন্দির আছে সেখানে কবির স্বহস্তে রচিত পুঁথিটি পাওয়া গেছে। মন্দিরের পুরোহিত সযত্নে সেটিকে সংরক্ষণ করে চলেছেন। এছাড়া কবির বংশধরেরা এখনও বর্তমানে আছেন। তাদের মুখ থেকেই শোনা যায় পুঁথিটি নিজের হাতে কবি লেখেন। পুঁথিটি সম্পূর্ণ নয়। কবি যে চন্ডীমঙ্গল লিখেছিলেন এই চন্ডী দেবী দুর্গা নন। তিনি শম্ভুদের দেবী ছিলেন। পুঁথিটি তালপাতাতে রচিত। শোনা যায় চন্ডীমঙ্গলের ২টি পুঁথিই আগে রক্ষিত ছিল কবির বাসস্থানে। এশিয়াটিক সোসাইটির কিছুজন এসে সব পুঁথি নিয়ে যায় গবেষণার জন্য। পরবর্তীকালে কবির বংশধরেরা সেগুলির অধিকার দাবি করেন। কিন্তু সঠিক ফল পান না তারা। তারা কোর্টকেস করেন। পরবর্তীকালে একটি পুঁথি তারা নিয়ে আসতে পেরেছিলেন বর্তমানে সেটিই রক্ষিত আছে। কবি চন্ডীমঙ্গলের চন্ডী শম্ভুদের দেবী হলেও বর্তমানে এই চন্ডীই দুর্গার আরেক রূপে পূজিত হয়ে আসছেন। কবি তার কাব্য রচনা শেষে যে শ্লোকটি দেন তার বর্ননা অনুযায়ী —

"শাকে রস রস বেদ শশাঙ্ক গনিতা
কতদিনে দিলা গীত হরের বনিতা।"

শ্লোক অনুযায়ী রস = ৬, বেদ = ৪, শশাঙ্ক = ১ অর্থাৎ ৬৬৪১ যেহেতু বাম দিক থেকে গননা করা হয় তাই ১৪৬৬ শকাব্দ বা ১৫৪৪ খ্রিস্টাব্দ। আবার রসকে নয় ধরলে দাড়ায় ৯৯৪১ অর্থাৎ ১৪৯৯ শকাব্দ অর্থাৎ ১৫৭৭ খ্রিস্টাব্দে চন্ডীমঙ্গল রচনার কাল।

মধ্যযুগের সঙ্গে বর্তমানের আমান্য পার্থক্য
ও
কবি কেন্দ্রিক অন্যান্য উৎসব অনুষ্ঠান

কবির বাড়িতে শোনা যায় নিত্য পুজোর মন্ত্রোচ্চারণ ও চন্ডীপাঠ হতো। কবি নিজে একটি বিষ্ণুহ বাহিনী মায়ের মন্দির প্রতিষ্ঠা করেন যা এখনও বর্তমান রয়েছে। মন্দিরে প্রতিষ্ঠিত বিষ্ণু-বাহিনী দেবী এখনো সেই গ্রামে নিত্য পুজো পাচ্ছেন কবির বংশধরদের দ্বারা। কবি যে বিষ্ণুহ বাহিনী মূর্তি দেখেছিলেন তিনি চতুর্ভুজা। কিন্তু বর্তমানে সেই গ্রামে যে মূর্তিটি রয়েছে তিনি দশভুজা। তিনি যে গ্রামে ফিরে এসে পুঁথিটি লিখেছিলেন, তার সন্ধান পাওয়া যায় না। কবিকে উদ্দেশ্য করে যে মেলা হয় অনুষ্ঠিত হয়, বহু মানুষ আসেন কবির বসতভিটে দেখার জন্য, পুঁথিটিকে দেখার জন্য, মেলা দেখার জন্য সেই জনপ্রিয়তা তৎকালীন সময়ে সেই জনপ্রিয়তা ছিল না। আরও জানা যায় আদিতে স্বয়ং মুকুন্দের পদবি কী ছিল না। বর্তমানে তার বংশধরেরা চক্রবর্তী উপাধি ব্যবহার করেন। কবির বসতভিটের পাশেই তৈরি হয়েছে একটি ব্যতিক্রমী। সেই ব্যতিক্রমীর পাশেই অবস্থিত একটি বিশাল মাঠ। সেই মাঠেই প্রতিবছর মেলা বসে। মাঝের গ্রামটিতেই অনেক মাটির দোতলা বাড়ি চোখে পড়ল। মাঝের পাড়াটিতেই কবির উত্তর পুরুষের বসবাস।

উপসংহার

কবি মুকুন্দ চক্রবর্তী দারিদ্র্যের বাস্তবিকা ছিলেন। তাই আমাদের সবারই কর্তব্য গ্রামটিকে বাঁচিয়ে রাখার সুন্দর করে রাখার। বর্তমানে মানুষের রুচি বদলাচ্ছে। মানুষ মদ্যপান, দেদার— হুল্লোড়, উচ্ছৃঙ্খল জীবন যাপনে অভ্যস্ত হয়ে পড়ছে। তাই আবার উচিত এলাকার পরিবেশকে সুন্দর করে রাখার, বাঁচিয়ে রাখতে হবে কবির সৃষ্টি গুলিকে। মধ্যযুগের কবিদের লিখিত বহু পুঁথি নষ্ট হয়ে গেছে। অনেক অজানা তথ্য হয়তো এখনও রয়ে গেছে গ্রামের অলাচে কানাচে। কেননা এগুলি রক্ষা হলেই অনেক ঐতিহাসিক বৈশিষ্ট্য করে এলাকায় আসবেন, নতুন নতুন গবেষক, ছাত্রছাত্রীরা আসবে নতুন জ্ঞান আহরন হবে, ততই এলাকার উন্নতি হবে। সরকার আরও বেশি করে নজর দেবে এলাকার দিকে। মিলবে ইতিহাসের অজানা তথ্যের সন্ধান।

ব্যক্তিগত সাক্ষাৎকার :-

১. মুকুন্দরাম চট্টোপাধ্যায়, বয়স- ৪৫ বছর, লিঙ্গ- পুং লিঙ্গ,
পেশা — গৃহশিক্ষক, শিক্ষাগত যোগ্যতা - বি. এ.

২. মুরারিমোহন চট্টোপাধ্যায়, বয়স- ৪২ বছর লিঙ্গ, — পুং লিঙ্গ,
পেশা — গৃহশিক্ষক ও সমবায় সমিতির ম্যানেজার,
শিক্ষাগত যোগ্যতা — সম. এ.

৩. সাক্ষাৎকারের দিন — ২৫.০৬.২০২২ ; সময় — ১০ টা (সকাল)

কবির বাস্তুভিটের উপর নির্মিত সংগ্রহশালা

কবির স্বহস্তে লিখিত পুঁথি

মন্দিরের পুরোহিত

কবির নির্মিত সিংহবাহিনী দেবীর মন্দির