



Budge Budge College

Estd. 1971

NAAC Accredited B+ & UGC 12B, 2(f)

Affiliated to the University of Calcutta

Ref. No.

Date 12.04.2024

With reference to DVV query regarding Extended Profile 1.3.2., this is to state that the clarification is as follows:

DVV Remarks:

1. HEI is requested to provide list of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23) only.
2. Please provide internship completion certificate/project work completion certificate from the organization where internship/project was completed.
3. Please provide report of the field work/sample photographs of the field work/permission letter only for field work from the competent authority.
4. Kindly note that data for the latest completed academic year (2022-23) only to be considered in this metric.

HEI Input: 1155

Response - Input to DVV Remarks

No change in data input from our end. only additional documents / certified documents enclosed.

Enclosed Documents

1. List of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23) enclosed.
2. Field work Completion certificate enclosed wherever relevant
3. a) Permission letter for field work from the competent authority wherever relevant
b) Sample photographs of the field work wherever relevant
c) Sample report of the field work / project work
4. Data for only the latest completed academic year (2022-23) has been considered.

Debjani Datta
DR. DEBJANI DATTA
M.Sc. (Gold Medalist), Ph.D
Principal
Budge Budge College
7, D B.C. Road, Kol-700137
West Bengal, India
12.04.2024



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Ref. No.

Date : 12.04.2024

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

1.3.2.1. Number of students undertaking project work/field work / internships: 1155

SUMMARY REPORT

Sl. No.	Name of Program	Other Details	Number of Students
2022-2023			
1.	B.Com Honours	Semester 6	84
2.	B.Sc. Food & Nutrition Honours	Semester 3/ 5 / 6	34
3.	B.A. & B.Sc. Geography Honours	Semester 5 / 6	43
4.	B.A. History Honours	Semester 1, 3, 5	48
5.	B.Sc. Zoology Honours	Semester 5 / 6	15
6.	B.Sc. Botany General	Semester 5	10
7.	B.Sc. Zoology General	Semester 4	6
8.	B.A. / B.Sc. / B.Com	Semester 2: AECC: Environmental Studies	915
Total			1155


DR. DEBJANI DATTA
M.Sc. (Gold Medalist), Ph.D
Principal
Budge Budge College
7, D.J.C. Road, Kol-700137
West Bengal, India

1.3.2 Percentage of students undertaking project work/ field work/ internships (Data for the latest completed academic year)

1.3.2.1. Number of students undertaking project work/ field work/ internships (1155) mentioned in Summary Report does not include any repeat count.

- Eight (08) students of B.Sc. Zoology General who have also undertaken project work in B.Sc. Food and Nutrition Honours
- Eleven (11) students of B.A. AECC Environmental Studies who have also undertaken project work in B.A. History Honours

have been highlighted in the B.Sc. Zoology General and B.A. AECC Environmental Studies lists and omitted from both Summary Report and Data Template 1.3.2

B.Com Honours

Sl. No.	Content	Page No.
1.	Syllabus Extract indicating project work	2 – 4
2.	List of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23) enclosed	5 – 8
3.	Sample report of the Project work 1 (certificate included as part of the report)	9 - 49
4.	Sample report of the Project work 2 (certificate included as part of the report)	50 - 74

UNIVERSITY OF CALCUTTA



NISHAT ALAM

Secretary,

Councils for Undergraduate Studies,
University of Calcutta.

SENATE HOUSE

87/1, College Street, Kolkata-700 073.

Phone : 2257-3376, 2241-0071-74

e-mail: u.g.councilsc.u@gmail.com

Website: www.caluniv.ac.in

Ref. No. CUS/154/17

Dated the 26th May, 2017

To

The Principals

of all the Undergraduate Colleges
offering B.Com (Honours & General) courses
affiliated to the University of Calcutta.

Sir/Madam,

The undersigned is directed to forward you the University Notification No. CSR/26/17, dt. 26.05.2017 containing new course structure, syllabi and revised admission regulations for three-year B.Com. (*Honours & General*) Courses of Studies.

The above shall be effective for the students getting admission to the three-year six-semester B.Com. (Honours & General) Courses of Studies under CBCS, from the academic session 2017-18 and onwards.

The said notification along with detail course structure, syllabi and admission regulations are available in the Calcutta University website.

Thanking you,

Yours faithfully,

(NISHAT ALAM)

Secretary

Enclo.: C.U. Notification No. CSR/26/17, dt. 26.05.2017



UNIVERSITY OF CALCUTTA

Notification No. CSR/ 26 /17

It is notified for information of all concerned that the Syndicate in its meeting dated 23.05.2017 (vide Item No.46) resolved to approve the **New Course Structure & Syllabi and revised Admission Regulations for the B.Com. (Honours and General) courses of study under this University** as laid down in the accompanying pamphlet.

The above shall be effective for the students getting admission to the 3-year 6-Semester B.Com. (Honours and General) courses of study under CBCS, from the academic session 2017-2018 and onwards.

SENATE HOUSE
KOLKATA-700073
The 26th May, 2017

A handwritten signature in black ink, appearing to read "Rajagopal Dhar Chakraborti".
(Prof. Dr. Rajagopal Dhar Chakraborti)

Registrar

Year 3: Semester VI

		Marks	Credit Hours	
AECC 6.1Chg	Environmental Studies	100	2	
SEC 6.1Chg	Computerised Accounting and e-Filing of Tax Returns	100	4	
CC 6.1 Ch	Project Work	100	6	
DSE 6.1 A**	Financial Reporting and Financial Statement Analysis	100	6	
DSE 6.2 A**	Financial Management	100	6	
24				

Chg: Common for Honours and General; **Ch:** Core Course for Honours

Options:

**Or DSE 6.1 M (Retail Management and Marketing of Services (50+50)
& DSE 6.2 M (Rural Marketing and International Marketing (50+50)

**Or DSE 6.1 T (Indirect Tax: Laws and Practices)
& DSE 6.2 T (Tax Procedures and Planning)

**Or DSE 6.1 e-B (Internet & WWW and Functional e-Business System (50+50)
& DSE 6.2 e-B(Computer Applications and e-Business Applications – Practical (50+50)

Summary for B.Com. Hons.

		Marks	Credit Hours	
Ability Enhancement Compulsory Course (AECC)	Two Papers	200	2 x 2 = 4	
Skill Enhancement Elective Course (SEC)	Two Papers	200	2x4 = 8	
Generic Elective (GE)	Four Papers	400	4 x 6 = 24	
CORE COURSE (CC)	Fourteen Papers	1400	14x 6 = 84	
Discipline Specific Elective (DSE)	Four Papers	400	4 x 6 = 24	
		2600	Total 144	

BUDGE BUDGE COLLEGE**Academic Session: 2022-2023****1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)****Department of Commerce****List of students undertaking project work/field work/internship**

Sl. No.	Name of Student	University Roll No.	University Registration No.	Title of Project	Name of Supervisor
1	Ankur Shaw	181561-21-0008	561-1111-1247-18	Online Banking	Dr. Gautam Das
2	Nabanita Sadhukhan	191561-11-0003	561-1211-0431-19	Financial Ratio Analysis of ITC Ltd.	Mr. Mriganka Mallick
3	Priyanka Kairi	191561-11-0010	561-1211-0391-19	Axis Mutual Fund	Dr. Gautam Das
4	Farhan Mirdha	191561-21-0016	561-1111-0417-19	GST- The New Era of the Taxation System	Dr. Gautam Das
5	Arpita Halder	201561-11-0001	561-1211-0441-20	Online Banking	Dr. Gautam Das
6	Madhushree Dalui	201561-11-0004	561-1211-0457-20	Comparison of Liquidity & Solvency position of TATA STEEL & SAIL	Dr. Gautam Das
7	Neha Shaw	201561-11-0005	561-1211-0461-20	Goods and Services Tax	Dr. Gautam Das
8	Payel Khanra	201561-11-0006	561-1211-0463-20	Ration Analysis of a Pharmaceutical Industry	Dr. Sandip Sinha
9	Payel Sadhukhan	201561-11-0007	561-1211-0464-20	Working Capital Management - A Case Study of CEAT Company Ltd.	Dr. Sandip Sinha
10	Pritha Santra	201561-11-0008	561-1211-0467-20	A Comparative Analysis Of The Financial Performances Of Selected Indian Automobile Companies Applying DuPont Model	Dr. Sandip Sinha
11	Priti Ghosh	201561-11-0009	561-1211-0468-20	A COMPARATIVE ANALYSIS ON FINANCIAL STATEMENTS OF IT SECTOR COMPANIES : CASE STUDY ON FINANCIAL STATEMENT ANALYSIS OF TCS AND WIPRO	Dr. Sandip Sinha
12	Rimi Das	201561-11-0010	561-1211-0473-20	Corporate Social Responsibility for Economic Growth of Indian Company ITC Ltd.	Mr. Sujit Kumar Mahato
13	Sanchita Das	201561-11-0011	561-1211-0478-20	Working Capital Management -A Case Study of CEAT Company Ltd.	Mr. Sujit Kumar Mahato
14	Sayanti Majumdar	201561-11-0012	561-1211-0485-20	RATIO ANALYSIS : A STUDY OF SHREE CEMENT AND AMBUJA CEMENT	Mr. Sujit Kumar Mahato
15	Serina Khatun	201561-11-0013	561-1211-0486-20	A Theoretical Construct in respect of Relationship between Stock Market and Bond Market	Mr. Sujit Kumar Mahato
16	Suhena Ghosh	201561-11-0015	561-1211-0504-20	Ratio Analysis of a Pharmaceutical Industry	Mr. Mriganka Mallick

Sl. No.	Name of Student	University Roll No.	University Registration No.	Title of Project	Name of Supervisor
17	Sumaiya Kharun	201561-11-0016	561-1211-0506-20	Financial Statement Analysis of HUL	Mr. Mriganka Mallick
18	Anindita Malick	201561-11-0018	561-1211-0521-20	The Indian Stock Market and its Operations	Mr. Mriganka Mallick
19	Meghna Rajak	201561-11-0020	561-1212-0460-20	Ratio Analysis of Shree Cement and Ambuja Cement Ltd.	Mr. Mriganka Mallick
20	Sutapa Mondal	201561-11-0021	561-1212-0510-20	Working Capital Management of Tata Motors Ltd.	Mr. Mriganka Mallick
21	Sk Jahir Hossain	201561-11-0023	561-1215-0518-20	Solvency Ratio Analysis of Dabur India Ltd.	Mr. Sourav Bhuiya
22	Aman Ali	201561-21-0001	561-1111-0434-20	Financial Statement Analysis on Wipro Ltd.	Mr Sourav Bhuiya
23	Anirban Adak	201561-21-0002	561-1111-0435-20	3-Stage DuPont Analysis of two Fast Moving Consumer Goods (FMCG) Companies	Mr. Sourav Bhuiya
24	Anirban Mondal	201561-21-0003	561-1111-0436-20	E-COMMERCE: A STUDY ON THE IMPACT OF ONLINE RETAILING ON THE SECTOR A CASE ON FLIPKART	Mr. Sourav Bhuiya
25	Anish Nath	201561-21-0004	561-1111-0437-20	A STUDY ON E-COMMERCE OF THE FLIPKART	Mr. Sourav Bhuiya
26	Argha Paul	201561-21-0005	561-1111-0438-20	Online Banking	Dr. Gautam Das
27	Aritra Gayen	201561-21-0006	561-1111-0439-20	A Theoretical Construct in Respect of Relationship Between Stock Market and Bond Market	Dr. Gautam Das
28	Arpan Panja	201561-21-0007	561-1111-0440-20	Micro-finance Institution in India	Dr. Gautam Das
29	Ayon Chatterjee	201561-21-0008	561-1111-0442-20	E-commerce on TRENDS Company	Dr. Gautam Das
30	Bishal Sabtra	201561-21-0009	561-1111-0443-20	Working Capital Management- A Case Study Of CEAT Company Ltd.	Dr. Gautam Das
31	Biswajyoti Deb	201561-21-0010	561-1111-0444-20	EFFECTIVENESS OF ADVERTISING: A CASE STUDY OF NESTLE VS CADBURY	Dr. Sandip Sinha
32	Debasish Das	201561-21-0011	561-1111-0446-20	A Report On E-Commerce	Dr. Sandip Sinha
33	Deb Kumar Das	201561-21-0012	561-1111-0448-20	WORKING CAPITAL MANAGEMENT - A Case Study of CEAT Company Ltd.	Dr. Sandip Sinha
34	Dipon Roy	201561-21-0013	561-1111-0449-20	An Analysis to Insurance Industry: Special Reference To Life Insurance	Dr. Sandip Sinha
35	Debprakash Shaw	201561-21-0014	561-1111-0451-20	A STUDY ON CUSTOMER SATISFACTION ON HEALTH DRINK & BEVERAGE	Dr. Sandip Sinha
36	Kushal Mondal	201561-21-0017	561-1111-0456-20	Solvency Ratio Analysis of Dabur India Ltd.	Mr. Sujit Kumar Mahato
37	Md Jalaluddin	201561-21-0018	561-1111-0458-20	AN ANALYSIS TO INSURANCE INDUSTRY SPECIAL REFERENCE TO LIFE INSURANCE	Mr. Sujit Kumar Mahato
38	Pallab Mondal	201561-21-0019	561-1111-0462-20	A Comparative Study on Profitability of Indian Oil Corporation Limited and Hindustan Petroleum Corporation Limited	Mr. Sujit Kumar Mahato

Sl. No.	Name of Student	University Roll No.	University Registration No.	Title of Project	Name of Supervisor
39	Pritam Banerjee	201561-21-0020	561-1111-0465-20	Ratio Analysis of a Pharmaceutical Industry	Mr. Sujit Kumar Mahato
40	Rahul Patra	201561-21-0021	561-1111-0470-20	Role of NABARD In Rural Sector	Mr. Sujit Kumar Mahato
41	Rohan Halder	201561-21-0022	561-1111-0474-20	Goods & Services Tax	Mr. Sourav Bhuiya
42	Sagar Santra	201561-21-0023	561-1111-0475-20	RELATIONSHIP BETWEEN STOCK MARKET AND BOND MARKET	Mr. Sourav Bhuiya
43	Samiran Das	201561-21-0024	561-1111-0476-20	An Analysis to Insurance Industry Special reference to Life Insurance	Mr. Sourav Bhuiya
44	Sayan Chatterjee	201561-21-0025	561-1111-0480-20	Working Capital Management -A Case Study of CEAT Company Ltd.	Mr. Sourav Bhuiya
45	Sayan Kumar Mondal	201561-21-0026	561-1111-0481-20	A Comparative Analysis on The Marketing Strategies of Swiggy and Zomato	Mr. Sourav Bhuiya
46	Sk Anish	201561-21-0028	561-1111-0487-20	E-Commerce	Mr. Sourav Bhuiya
47	Sk. Imran Hossain	201561-21-0029	561-1111-0488-20	GST-The New Era of The Taxation System	Mr. Sourav Bhuiya
48	Sk Salman	201561-21-0031	561-1111-0491-20	Working Capital Management	Mr. Sourav Bhuiya
49	Sk. Saruf	201561-21-0032	561-1111-0492-20	SOLVENCY RATIO ANALYSIS OF DABUR INDIA LTD.	Mr. Sourav Bhuiya
50	Soumadip Dhara	201561-21-0033	561-1111-0494-20	An Overview of Mutual Fund	Mr. Mriganka Mallick
51	Soumen Das	201561-21-0034	561-1111-0495-20	Analysis of Usage Pattern of Online Banking facilities by Customers with special reference to Kolkata	Mr. Mriganka Mallick
52	Subhajit Chatterjee	201561-21-0035	561-1111-0499-20	SALES & DISTRIBUTION MANAGEMENT	Mr. Mriganka Mallick
53	Subhajit Mondal	201561-21-0036	561-1111-0500-20	A PROJECT ON E COMMERCE THE IMPACT OF RETALING ON THE SECTOR A CASE ON AMAZON	Mr.Mriganka Mallick
54	Sudip Mukherjee	201561-21-0037	561-1111-0502-20	Corporate social responsibility: an initiative of Hindustan Unilever Limited	Mr. Mriganka Mallick
55	Sujay Banerjee	201561-21-0038	561-1111-0505-20	Working Capital Management - A Case Study Of CEAT Company LTD	Mr. Mriganka Mallick
56	Supratim Sarkar	201561-21-0039	561-1111-0507-20	Micro-finance Institutions in India	Mr. Mriganka Mallick
57	Swastik Bhattacharjee	201561-21-0040	561-1111-0513-20	INTRODUCTION OF E-COMMERCE TO THE ECONOMY AND IT'S SCOPE IN THE FUTURE: A CASE STUDY ON FLIPKART	Mr. Mriganka Mallick
58	Trimoy Dey	201561-21-0041	561-1111-0515-20	Working Capital Management - A Case Study of CEAT Company Ltd.	Mr. Mriganka Mallick
59	Souvik Das	201561-21-0042	561-1111-0520-20	E-COMMERCE	Mr. Mriganka Mallick
60	Sandeep Paul	201561-21-0044	561-1111-0523-20	Corporate Social Responsibility	Mr. Sujit Kumar Mahato
61	Kabir Khan	201561-21-0045	561-1111-0524-20	Working Capital Management - A Case Study of CEAT Company Ltd.	Mr. Sujit Kumar Mahato
62	Md Ariaan Raj	201561-21-0046	561-1111-0525-20	Online Banking	Mr. Sujit Kumar Mahato

Sl. No.	Name of Student	University Roll No.	University Registration No.	Title of Project	Name of Supervisor
63	Arpan Sau	201561-21-0047	561-1111-0527-20	Relationship between Stock Market and Bond Market	Mr. Sujit Kumar Mahato
64	Avijit Das	201561-21-0048	561-1111-0528-20	The Study of Working Capital Management with Ratio Analysis	Mr. Sujit kumar Mahato
65	Debasish Pramanick	201561-21-0050	561-1112-0447-20	Goods and Services Tax	Mr. Sujit Kumar Mahato
66	Ranajit Naskar	201561-21-0053	561-1112-0472-20	A Comparative Study on Profitability of Indian Oil Corporation Limited and Hindustan Petroleum Corporation Limited	Mr. Sujit Kumar Mahato
67	Samiran Mondal	201561-21-0054	561-1112-0477-20	Online Banking	Mr. Sujit Kumar Mahato
68	Sayan Pagra	201561-21-0055	561-1112-0482-20	E-commerce Project on Myntra	Dr. Gautam Das
69	Sayan Sardar	201561-21-0056	561-1112-0484-20	Corporate Social Responsibility in India & An Analysis of CSR Expenditure & Relationship with the Financial Performance of Reliance Industries Ltd.	Dr.Gautam Das
70	Sourav Baidya	201561-21-0057	561-1112-0496-20	A Comparative Study on Customer Satisfaction between Amazon and Flipkart	Dr. Gautam Das
71	Souvik Mondal	201561-21-0058	561-1112-0497-20	Goods & Services Tax	Dr. Gautam Das
72	Suvayan Dhara	201561-21-0060	561-1112-0512-20	Revolutionizing the Online Shopping Experience - E-Commerce	Dr. Gautam Das
73	Tunir Mondal	201561-21-0062	561-1112-0516-20	A Comparative Study of Financial Performances of Tata Steel and Jindal steel & Power using Ratio Analysis	Dr. Gautam Das
74	Rakesh Ghosh	201561-21-0063	561-1114-0471-20	Financial Performance Analysis of Tata Steel Ltd.	Dr. Gautam Das
75	Santanu Ghosh	201561-21-0064	561-1114-0479-20	Corporate Social Responsibility for Economic Growth of Indian Companies (Tata Motors, HUL)	Dr. Gautam Das
76	Souvik Samanta	201561-21-0065	561-1114-0498-20	Financial Statement Analysis of Tata Motors	Dr. Sandip Sinha
77	Subham Sadhukhan	201561-21-0066	561-1114-0501-20	CORPORATE SOCIAL RESPONSIBILITY	Dr. Sandip Sinha
78	Suresh Karmakar	201561-21-0067	561-1114-0508-20	RATIO ANALYSIS A STUDY OF BAJAJ AUTO LTD AND TVS MOTORS	Dr. Sandip Sinha
79	Sushabhan Nath	201561-21-0068	561-1114-0509-20	Customer's Satisfaction Towards Amazon.in	Dr. Sandip Sinha
80	Sk Najrul Islam	201561-21-0070	561-1115-0490-20	ANALYSIS OF FINANCIAL PERFORMANCE OF SELECTED INDIAN CEMENT COMPANIES USING DUPONT MODEL	Dr. Sandip Sinha
81	Sk. Mafuj	201561-21-0071	561-1115-0493-20	Online Banking	Dr. Sandip Sinha
82	Sk. Tariful Islam	201561-21-0072	561-1115-0517-20	Online Banking	Dr. Sandip Sinha
83	Sounak Dutta	201561-21-0145	561-1111-1260-20	Goods & Services Tax	Dr. Sandip Sinha
84	Touhid Mollick	201561-21-0147	561-1115-1287-20	Financial Statement Analysis	Dr. Sandip Sinha

Project Work

(Submitted for the Degree of B.Com Honours in Accounting & Finance under the University of Calcutta)

Title of the Project

“Corporate Social Responsibility in India & an analysis of CSR expenditure and relationship with the financial performance of Reliance Industries Ltd.”

Submitted By:

Name of the Candidate : Sayan Sardar
Registration No. : 561-1112-0484-20
C.U. Roll No. : 201561-21-0056
Name of the College : Budge Budge College

Supervised By:

Name of the Supervisor : Dr. Gautam Das
Name of the College : Budge Budge College

May 2023

S. M. Sardar
Budge Budge College
Department of Commerce

Annexure-IA

Supervisor's Certificate

This is to certify that Mr. Sayan Sardar, a student of B.Com (Honours) in Accounting & Finance of Budge Budge College under the University of Calcutta has worked under my supervision and guidance for his Project Work and prepared a Project Report with the title "Corporate Social Responsibility in India & an analysis of CSR expenditure and relationship with the financial performance of Reliance Industries Ltd."

The project report which he is submitting, is his genuine and original work to the best of my knowledge.



Signature :

: Dr. Gautam Das

Name :

: Assistant Professor

Designation :

: Budge Budge College

Place : Kolkata/Budge Budge

Date : May, 2023

Name of the College

Annexure-IB

Student's Declaration

I hereby declare that the Project Work with the title "Corporate Social Responsibility in India & an analysis of CSR expenditure and relationship with the financial performance of Reliance Industries Ltd." submitted by me for the partial fulfilment of the degree of B.Com (Honours) in Accounting & Finance under the University of Calcutta is my original work and has not been submitted earlier to any other University/Institution for the fulfillment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature	: Sayan Sardar
Name	: Sayan Sardar
Address	: Paschim Balarampur, Budge Budge Kolkata - 700137
Registration No.	: 561-1112-0484-20
Roll No.	: 201561-21-0056

Place : Kolkata/Budge Budge

Date : 6th May 2023

Acknowledgement

I being a benefited student of Budge Budge College, affiliated under the University of Calcutta, would like to take this opportunity to express my profound gratitude and regards to my supervisor, and to the entire Department of Commerce for their exemplary guidance, monitoring and constant encouragement throughout the course of the completion of the project "Corporate Social Responsibility in India & an analysis of CSR expenditure and relationship with the financial performance of Reliance Industries Ltd."

The guidance given by them time to time shall carry me a long way in the journey of my career on which I am about to embark. I would also like to express my thankfulness to the college and university committee for providing me with the opportunity to work on this project, and for their cordial support, valuable information and guidance, which helped me in completing this task through its various stages.

I am thankful to all the people who willingly responded to the questionnaire and their contribution has been invaluable. This project would not have been completed without their participation. I am grateful for their cooperation during the period of my project. Lastly, I thank to my parents and friends for their constant encouragement without which the project would not have been possible.

Name	:	Sayan Sardar
College	:	Budge Budge College
Roll No.	:	201561-21-0056
Registration No.	:	561-1112-0484-20

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Chapter 1:

Introduction

Background of the study

Profit maximization is the primary aim of a capitalist economy. The mantra of this kind of economy is profit, and only profit, but recently a new concept has emerged being referred to as co-operational capitalism. This "new" capitalism, though focuses on the profit motive, it also incorporates the essence of cooperation, being accountable, social values. Such an idea of modern capitalism is reflected in corporates, too. For the new generation of corporate leaders, optimization of profit is given more importance than maximization. Hence there is a change in accountability, from shareholders to stakeholders (including employees, consumers and affected communities), along with a growing realization that in the long-run business success can only be achieved by those companies who understand that the economy is a part of the earth's ecosystem which is finite, non-growing and materially closed.

Corporate Social Responsibility (CSR) can be considered as a self-regulating business model that helps a company become accountable—to itself, its stakeholders, and the public. By practicing CSR, companies can be conscious of the kind of impact they are having on all aspects of society i.e. economic, social, and environmental. To engage in CSR means that, in the course of business, a company is operating in ways that enhance society and the environment, instead of contributing negatively to them. The term CSR itself came into common use during the last decade of the 20th century and witnessed a shift in focus from charity and traditional philanthropic ways towards a more direct engagement of business in the development and concern for disadvantaged groups in the society.

The concept of CSR is not easy to define, various concepts and themes overlap this term. The ideas of sustainable business, environmental responsibility, social and environmental accountability, business ethics and corporate accountability are all very much linked with CSR. Different perspectives of individuals and organizations lead to different meanings and understanding of CSR. If we see it from a Business Perspective, it can be said that CSR is nothing but a new way for the businesses to gain the confidence of investors and increase the brand image leading to the reduction of investment risks and maximization of profits. From a Social Perspective, which understands the fact that social and environmental stability is required for the stability of the market in the long-run, CSR is a value and strategy to ensure the sustainability of the business. From the Perspective of Rights of various stakeholders like consumers, employees, affected communities, etc. who have a right to know about the businesses, CSR is a way to stress the business houses to be accountable and transparent in their dealings and policies. In a nutshell it can be said that CSR is an opportunity which if done wisely and impactfully would give a positive image of the company in the market and serve as a competitive edge for the company.

India is one of the fastest growing economies. However, it has several issues too which act as hindrances against development and progress. Hunger, malnutrition, unemployment, illiteracy, casteism, are some in the long list of issues.

The government is working tirelessly towards to remove these hindrances. However, poor accountability, corruption and favoritism are reducing the efforts. Lack of adequate methods of nurturing talent are forcing many young and talented individuals to move abroad causing the country to lose the workforce and the minds which are crucial to the development of the country.

But many of these issues are location and site specific which can be taken care of by specific customized solutions and some NGOs are doing very good work in this department. However, these NGOs rely on external funding which is often difficult to obtain. Accordingly, their focus then shifts from the cause to arranging of funds since they have to keep looking for investors to carry out their activities in the short as well as long-run.

In order to tackle these issues realistically, the country needs business-like approach towards its problems, a kind of approach which can be exhibited by corporate bodies who are known for their efficiency and logical decisions.

Corporates often work and gain profit in the resource rich rural areas and not giving something back to that place which leads to an imbalance and creating a feeling of hatred among the local population towards these corporates. The existence of big conglomerates in the area causes an increase in population and people from different places come in search of work and benefits which in turn sometimes leave the natives with almost nothing and thus creates a feeling of animosity not only towards the company but also the people who work for the company. In order to safeguard the organization from this imbalance which could often lead to violence, the corporates can initiate CSR projects in the area to ensure that the society as well as its functioning are moving towards a positive growth. Apart from this, the regular practice of CSR would tie the organizations to dedicate a budget for CSR. Corporates act with proper physical, legal and financial planning towards any project. They have accountability as they want to ensure that the money they spend is being used as planned. They can use these skills along with the superior knowledge of familiarity of the situations in the backward areas in which they are operating, gained by the extensive research, to turn the tables in the favor of the society. This will not only build a goodwill for the organization but will also boost national development.

Usually people have a view that India copies whatever products and policies they see prevailing in the foreign countries. But it can be said that the ideology of responsibility towards the society is something which dates back to Ancient India and is mentioned in various religious literature. Long before the time when the foreign industries started to think that they have a responsibility to give something to the society. Religious traditions like daan, seva, and zakat have been operated in India for centuries which tried to bridge the gap between the privileged and the underprivileged. One could also say that this ancient knowledge and wisdom has been the foundation of the modern CSR practices that we see today.

Many Indian philanthropists and industrialists have been engaged in CSR/charity since time immemorial, whether it was setting up of factories in areas where there was a dire need of

employment or building schools, hospitals, places of worship etc. Big Indian industrialists have always ensured that along with their expansion in business they also give back to the society. In India, big industrialists and pioneers like Tata, Birla, Ambani, etc. have been voluntarily engaging in various charitable works and helping the underprivileged class for a long period, some activities can be traced even during the Pre-Independence period. But it was seen that only these philanthropists were only contributing to these while others, even some big business houses were not engaging in these activities and were focused on supporting their own interests i.e. maximization their own profits, this led to an increase in the gap between the rich and poor, and nearly the whole burden of development of the society was on the Government. Government tried everything to motivate the industries to engage in social activities, setting up of various public sector undertakings for better distribution of wealth in the society. Still it was not enough to satisfy the needs and wants to an optimum level. Thus, in order to engage almost every corporate house to give back to the society, the Government of India, implemented The Companies Act, 2013 where they dedicated the entire Section 135 towards mandatory CSR regulations which must be followed by all the eligible corporates and make them engage in CSR activities.

Reliance Industries Ltd. (RIL) is world's leading and India's fastest revenue generating company. RIL group is a highly diversified group and is in to multiproduct businesses like oil and gas exploration, retail of petroleum and consumer products and manufacturing of petrochemical and textile products. They are also operating in infrastructure and transportation sectors. The Reliance Group, founded by Dhirubhai H. Ambani (1932-2002), is India's largest private sector enterprise, with business in the energy and materials value chain. Group's annual revenues are in excess of nearly Rs. 3,24,770 Crores. Reliance Industries Ltd. is a Fortune Global 500 company and is the largest public sector company in India. Starting with textiles in the late seventies, the Group's activities span exploration and production of oil and gas, petroleum refining and marketing, petrochemicals (polyester, fiber intermediates, plastics and chemicals), textiles, retail and special economic zones. Reliance enjoys global leadership in its businesses, being the largest polyester yarn and fibre producer in the world and among the top five to ten producers in the world in major petrochemical products.

At RIL, CSR is embedded in the long-term business strategy of the Company. For RIL, business priorities co-exist with social commitments to drive holistic development of people and communities. The Company's CSR initiatives help elevate the quality of life of millions, especially the disadvantaged sections of the society. It seeks to touch and transform people's lives by promoting healthcare, education and employment opportunities. RIL aims to continue its efforts to build on its tradition of social responsibility to empower people and deepen its social engagements.

Headquartered in Mumbai, Reliance possesses organizations all over India occupied with petrochemicals, materials, retail and media communications. Reliance is the most beneficial organization in India, the biggest traded on an open market organization in India by market capitalization, and the second biggest organization in India as estimated by income after the administration controlled Indian Oil Corporation. The organization is positioned 203rd on the Fortune Global 500 rundown of the world's greatest partnerships starting at 2017. It is

positioned 8th among the Top 250 Global Energy Companies by Platts starting at 2016. Reliance keeps on being India's biggest exporter representing 8% of India's all out stock fares with an estimation of Rs. 1,47,755 Crores and access to business sectors in 108 nations. Reliance is in charge of nearly 5% of The Government of India's all out incomes from traditions and extract obligation and is additionally the most astounding Income citizen in the private segment in India.

The company's equity shares are listed in the National Stock Exchange of India (NSE) and the Bombay Stock Exchange (BSE). The Global Depository Receipts (GDRs) issued by the company are listed on the Luxembourg Stock Exchange. It has issued approx. 56 million GDRs wherein each GDR is equivalent to 2 equity shares of the company. Approx. 3.46% of its total shares are listed in the Luxembourg Stock Exchange. Its debt securities are listed at the Wholesale Debt Market (WDM) Segment of the NSE.

Major Subsidiaries and Associates of Reliance Industries Ltd. are:

- Reliance Retail: The retail business wing of Reliance Industries. It is the largest retailer in India with many brands like, Reliance Fresh, Reliance Footprint, Reliance Digital, Reliance Trends, etc. under Reliance Retail.
- Reliance Institute of Life Sciences (RILS): Established by Dhirubhai Ambani Foundation, it is an institution offering higher education in various fields of life sciences and related technologies.
- Reliance Logistics: It is a single-window company selling transportation, distribution, warehousing, logistics, and supply-chain related products.
- Relicord: It is a cord blood banking service owned by Reliance Life Sciences. It was established in 2002.
- Reliance Jio Infocom Ltd. (RJIL): Previously known as Infotel Broadband, it is a broadband service provider which gained 4G licenses for operating across India.
- Reliance Industrial Infrastructure Limited (RHL): It is an associate company of RIL. RIL holds 45.43% of total shares of total shares of RIIL. The infrastructure company constructed a 71,000 kilo-litre petrochemical product storage and distribution terminal at Jawaharlal Nehru Port Trust (JNPT) Area in Maharashtra.
- Network 18: It is a mass media company with interests in television, digital platforms, publication, mobile apps, and films. It operates two joint ventures, namely Viacom 18 and History TV 18 with Viacom and A+E Networks respectively. It also has acquired ETV network and renamed it under the Colors TV brand.

Justification of the Study

After studying the provisions of Section 135 of The Companies Act, 2013 and about the ethical views towards corporate social responsibility in Business Ethics in the 4th Semester, it created a view that The Companies Act 2013, in addition to the Companies (Corporate Social Responsibility Policy) Rules, 2014 has been a forward-looking move by the Government of India, calling on companies to partner in contributing to the country's development challenges by unleashing creativity and innovation. The mandatory CSR reporting has its unique advantages. It allows corporates to demonstrate their commitment towards organizational transparency and can act as a communication tool to engage with different stakeholders. 2018-19 is the 5th year of compliance of this Act and in my opinion, following are the reasons as to why there is a need of this study:

- Society and corporates are interdependent to each other, CSR is something which links these two. For the companies it is not only a statutory expense but also a way to increase their brand image, plus the corporate planning and strategies will be of no use if the society does not exist, they will have no resources to work with and gain profits. Similarly, for the upliftment of the underprivileged there is a need of corporates to bring in their financial capital as well as planning and an active role in the development of the society.
- It has been implemented for quite some time now and thus, almost every people have now acquired a brief idea of what this new provision is and how this has affected different companies and the society.
- Going into the 5th year, it is enabling us to see the trend of CSR expenditure of a company and see if it has a positive or negative impact on the financial performance of the company.
- Lastly, this study will help to know that whether the basic thought of implementing Section 135 of The Companies Act, 2013 (i.e. involving the corporates to have an active approach towards societal development), is actually taking shape and creating a benefit to the society or not.



Objective of the Study

- To know about the awareness and viewpoint of people towards the CSR regulations implemented through The Companies Act, 2013.
- To study and analyze the sector-wise CSR expenditure in India.
- To analyze the CSR expenditure and relationship with financial performance of Reliance Industries Ltd.

Research Methodology

Research Methodology is a way to systematically solve the research problem. It may be understood as science of study of a phenomenon. It is important for researcher to know not only the research method but also know methodology. The procedure by which researchers go about their work of describing, explaining and predicting phenomenon are called methodology. Method comprises the procedures used for generating, collecting and evaluating data.

Data collection is an important step in any project and success of it will largely depend upon how accurately you will be able to collect the data and how much time and money is required to collect the necessary data.

There are **two types** of Data Collection methods:

- i. **Primary Data:** The data which is collected first hand and for the first time, which is original in nature. It can be collected through personal interview, questionnaire, etc.
 - In this project, a questionnaire using Google Forms was created and circulated it through the use of social media like WhatsApp and e-mail.
- ii. **Secondary Data:** The data which is collected from past records, annual reports, magazines, journals, internet is called secondary data. The data which has been used previously and is therefore, old in nature unlike primary data is called secondary data.
 - In this project, Annual Reports of Reliance Industries Ltd., Report of High-Level Committee on Corporate Social Responsibility by the Ministry of Corporate Affairs, KPMG India CSR Survey and various other reports and websites were used.

Sampling Techniques: A sample is a representative part of the population. In sampling techniques, information is collected only from a representative part of the universe and the conclusions are drawn on that basis for the entire universe. A random sampling technique was used to collect the data from the respondents. A random sample is selected from a population in such a way that every member of the population has an equal chance of being selected and selection of any individual does not influence the selection of any other.

Sample Size: A sample size denotes the number of elements selected for the study.

- Based on the time and finances available, a sample size of 50 respondents were selected. All the 50 respondents were either students or working individuals.

Time Period of the study: F.Y. 2014-15 to F.Y. 2018-19 has been considered as time period for the study.

Area of the study: The study is limited to the area of Corporate Social Responsibility in India, state-wise and sector-wise expenditure. And the CSR expenditure and financial performance of Reliance Industries Ltd.

Limitation of the Study

1. In the study, the conclusive decision largely depends on the adequacy of the data. The sample study consists of 50 respondents and there has been an assumption that the feedback received from the population is true.
2. Some of the respondents were not ready to fill the questionnaire and were hesitant to give their views.
3. The study is based on the prevailing respondent's viewpoint but there's a chance that the viewpoint might change according to time, situations, etc.
4. Due to unavailability of data regarding sector-wise CSR expenditure in India for 2018-19, the comparisons could not be drawn perfectly.
5. A portion of the study has been based on a secondary data availed from annual reports and related studies. Non adequacy of time did not allow primary data collection possible by interviewing the executives of Reliance Industries Ltd. Primary data would have been more effective certainly.
6. If the actual point of CSR initiatives could have been analyzed, and studied by going through the places where Reliance is investing, more realistic data could have been obtained and the real picture could have become more evident rather than picturing a print data only.
7. Some of the information was confidential. Which the company and its employees only use, so such information is not revealed outside for the general public.

Chapter Planning

The study is divided into 4 chapters and references:

Chapter 1: Introduction

Chapter 2: Conceptual Framework

Chapter 3: Data Collection and Analysis

Chapter 4: Conclusion and Recommendation

Chapter 2:

Conceptual Framework

International Scenario

There is not a single historical event that marks the birth of CSR. Some of the researchers date its origins to the early 1960s. The long tradition of corporate philanthropy in the U.S. has remained a standard component and expectation of "responsible business" since the early days of the American Industrialization. The name has been changed throughout the years, during 1992 to 2000 it was known as Environment Reporting, later converted to Environment and Safety, and now since 2011 it has been known as Sustainability and Corporate Social Responsibility Reporting.

It remains voluntary in the European Union (EU) countries. However, some of the individual members of the EU have taken a more driven approach. In France, since 2001 all listed companies must submit information on their social and human resource activities in their annual reports. In the UK a similar requirement has been functioning since 2007. In 2008, Denmark passed a mandatory CSR reporting law which requires the largest 1100 Danish public companies to report on their CSR works. Sweden since 2009 has obliged the public companies to issue sustainability reports. Sweden is also the 1st country in the world to require CSR reports from all state-owned companies since 2007. Spain has also introduced mandatory CSR reporting for the companies and firms employing more than 1,000 employees. The Norwegian and Finnish governments have also been very active in promoting CSR.

KPMG international conducts surveys every 3 years to gain an insight into the CSR reporting globally and contribute to the evolving dialogue on transparency and accountability. The reports have shown that almost 95% of the largest 250 global companies report on their CSR activities. The reports have also shown that there is a difference in the level of disclosure along countries and industries as well. It is mainly due to the existence of rules and regulations in various countries like Japan, UK and Australia regarding disclosure of CSR activities while in the others, the companies report on a voluntary basis. Besides the rules and regulation, the level of adoption depends on the role of the enforcement. Companies will be slower in complying the norm in those countries where there are low levels of enforcement than those with high level.

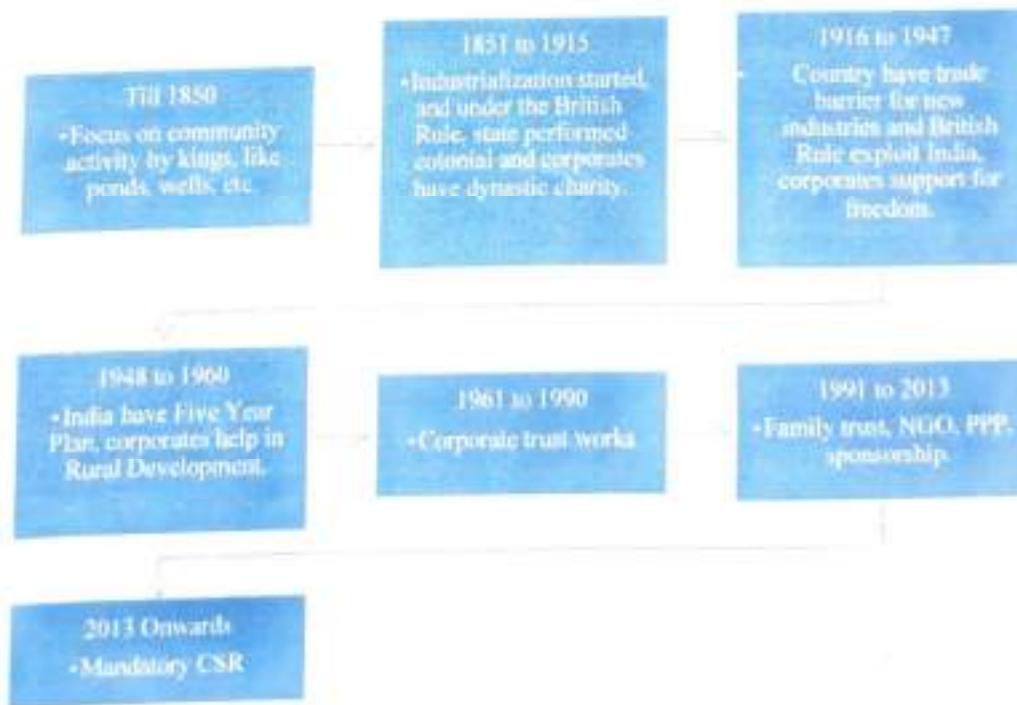
According to Economist Intelligence Unit (EIU) survey, approximately 40% of American and European respondents to the survey said that the main reasons for emphasizing CSR included the need to improve community relations and to deflect pressure from regulators. Whereas in Asia where companies are less sensitive to community relation and where regulators are less powerful, only 33% of respondent took this view.

Indian Scenario

CSR is not a new term in India. During the freedom fighting many companies helped in the freedom struggle. After WWI, in 1930, Jamshedji Tata had given steel plant for the nation so it's a part of corporate social responsibility for nation and communities. As far back as 1965, then Prime Minister of India, Lal Bahadur Shastri, prescribed over a national meeting that issued the following declaration on the Social Responsibilities of business:

"Business has responsibility to itself, to its customers, workers, shareholders and the community. Every enterprise, no matter how large or small, must, if it is to enjoy confidence and respect, seek actively discharge its responsibilities in all directions... and not to one or two groups, such shareholders and workers, as expense of community and consumer. Business must be just and humane, as well as efficient and dynamic."

India has lots of examples for CSR activity. In ancient times, kings made ponds, lakes and wells for the public. From 1850, industrialization started and India was under the British Rule, the corporate sector had done traditional charity for the society. But after 1915, Mahatma Gandhi had given new concept of trusteeship to the businessman. Trusteeship suggests that business is a trustee of the wealth. After Independence, India had lot of economic and social problems. So, the Indian government came with Five Year Plan for the growth of the country but it did not help the country to stand at international level. So, India adopted Liberalization, Privatization, and Globalization (LPG) policy. LPG policy helps for economic growth but it doesn't help in social development. CSR is done in a Public Private Partnership format and trust and NGO sponsorship. After the Companies Act, 2013, CSR has become mandatory for the corporate sector under specific conditions which would help the socio-economic growth of India. Pattern of disclosure is changed from qualitative to quantitative aspect.



CSR provisions in The Companies Act, 2013: The Companies Act, 2013 has formulated Section 135, Companies (Corporate Social Responsibility) Rules, 2014 and Schedule VII which prescribes mandatory provisions for companies to fulfill their CSR. It is applicable on:

- i. Every company including its holding or subsidiary having
 - a. Net worth of Rs. 500 Crore or more, or
 - b. Turnover of Rs. 1,000 Crore or more, or
 - c. Net Profit of Rs. 5 Crore or more, during the immediately preceding financial year.
- ii. A foreign company having its branch office or project office in India, which fulfills the criteria specified above.

However, if a company fails to meet the above criteria for consecutive 3 financial years then it is not required to comply with CSR provisions till such time it meets the specified criteria.

CSR Committee: Every company on which CSR is applicable is required to constitute a CSR Committee of the board:

- Consisting of 3 or more directors, out of which at least one director shall be an independent director. However, if a company is not required to appoint an independent director, then it shall have 2 or more directors in the committee.
- Consisting of 2 directors in case of a private company having only 2 directors on its Board.
- Consisting of at least 2 persons in case of Foreign Company of which one person shall be its authorized person resident in India and another nominated by the Foreign Company.

Functions of CSR Committee: The CSR committee shall:

- Formulate and recommend to the Board, a CSR Policy which shall indicate the activities to be undertaken by the Company.
- Recommend the amount of expenditure to be incurred on the activities referred in Schedule VII.
- Monitor the CSR Policy of the company from time to time.
- Institute a transparent monitoring mechanism for implementation of the CSR projects or programs or activities undertaken by the company.

Responsibility of the Board of Directors (BOD): The BOD of every company on which CSR is applicable shall:

- After considering the recommendations made by the CSR Committee, approve the CSR Policy for the Company and disclose contents of such Policy in Board report.
- Ensure that the activities as are included in CSR Policy of the company are undertaken by the Company
- Shall disclose the composition of the CSR Committee in Board Report
- Ensure that the company spends, in every financial year, at least 2% of the average net profits of the company made during the 3 immediately preceding financial years, in pursuance of its CSR Policy. The CSR projects/programs/activities undertaken in India only shall amount to CSR Expenditure.

Note: The Company shall give preference to the local area and areas around it where it operates, for spending the amount earmarked for CSR activities and shall specify the reasons for not spending whole of earmarked amount (if it fails to spend some) in Board Report.

CSR Policy: CSR policy of the company shall include the following namely:-

- A list of CSR projects or programs which a company plans to undertake specifying procedure of execution of such project or programs and implementation schedules for the same.
- Monitoring process of such projects or programs.
- A clause specifying that the surplus arising out of the CSR projects or programs or activities shall not form part of the business profit of the company.

CSR Activities:

- The CSR activities shall be undertaken by the company, as per its CSR Policy, excluding activities undertaken in pursuance of its normal course of business.
- The BOD may decide to undertake its CSR activities approved by the CSR Committee, through
 - A Section 8 company or a registered trust or a registered society, established by the company, either singly or along with any other company, or
 - A Section 8 company or a registered trust or a registered society, established by the Central Government or State Government or any entity established under an Act of Parliament or a State legislature, or
 - A Section 8 company or a registered trust or a registered society, other than those specified above, having an established track record of 3 years in undertaking similar programs or projects; collaboration with other companies, for undertaking projects or programs or CSR activities in such a manner that the CSR Committees of respective companies are in a position to report separately on such projects or programs.
- The CSR projects or programs or activities not to be considered as CSR Activities:
 - Expenses for the benefit of only the employees of the company and their families.
 - Contribution of any amount directly or indirectly to any political party.

Other Important Points:

- The balance sheet of a foreign company to be filed under section 381(1)(b) of the Act shall contain an Annexure regarding report on CSR.
- The Board of Directors shall ensure that activities included by a company in its CSR Policy are related to the areas or subjects specified in Schedule VII of the Act.

Schedule VII:

Activities which may be included by the companies in their Corporate Social Responsibility Policies relating to:

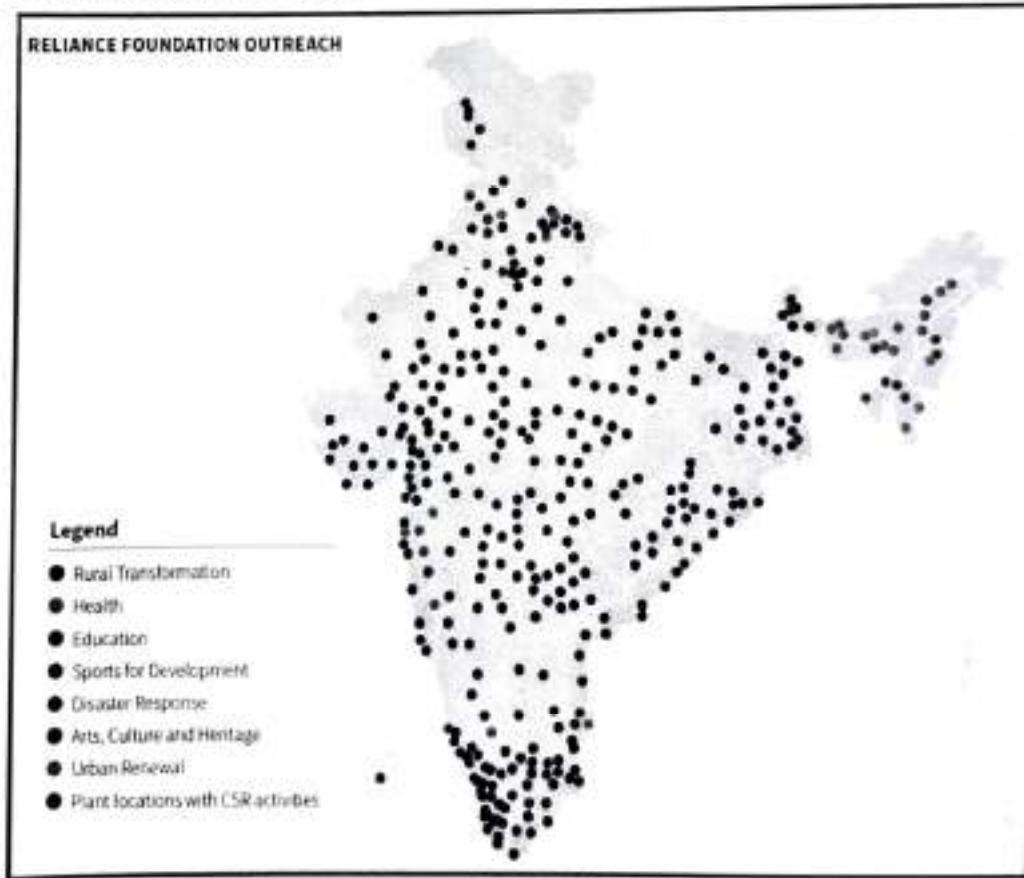
1. Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to the Swachh Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water.
2. Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly and the differently abled and livelihood enhancement projects.
3. Promoting gender equality, empowering women, setting up homes and hostels for women and orphans; setting up old age homes, day care centres and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups.
4. Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water, including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvenation of river Ganga.
5. Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries; promotion and development of traditional art and handicrafts;
6. Measures for the benefit of armed forces veterans, war widows and their dependents;
7. Training to promote rural sports, nationally recognised sports, paralympic sports and olympic sports
8. Contribution to the Prime Minister's national relief fund or any other fund set up by the central govt. for socio economic development and relief and welfare of the schedule caste, tribes, other backward classes, minorities and women;
9. Contributions or funds provided to technology incubators located within academic institutions which are approved by the central govt.
10. Rural development projects
11. Slum area development.

CSR activities of Reliance Industries Ltd.

The vast majority of the CSR exercises of the Company are done under the aegis of Reliance Foundation (RF), which has risen as a main corporate establishment tending to country's various improvement challenges. The Foundation was built up in 2010 under the administration of Smt. Nita M. Ambani.

Schedule VII of The Companies Act, 2013 records out different regions in which corporates are relied upon to send their CSR assets and actualize programs for social advancement. Reliance has deliberately picked the organization's CSR activities with an attention on improving the personal satisfaction. The activities centre around Seven Territories: Rural Transformation, Health, Education, Sports for Development, Disaster Response, Arts, Culture and Heritage and Urban Renewal. The key logic of all the social advancement activities of RIL depends on three centre duties of Scale, Impact and Sustainability.

In F.Y. 2018-19, Reliance has spent Rs. 904 Crores on CSR activities under these certain territories. Till March 2019, Reliance's advancement activities have contacted the lives of 26 million individuals across India.



(Image from Annual Report 2018-19 of Reliance Industries Ltd.)

Rural Transformation: Reliance has been addressing the challenges of rural communities through its rural transformation programme. Key initiatives in this programme include building rural institutions, making villages water secure, mentoring producer companies and enabling alternative livelihood options on and off the farm. The programme also used technology-based solutions for securing the livelihoods of farmers, fisher folk and livestock owners across the country. In addition to direct engagement, Reliance supported several organizations working in the field of rural development with an aim to benefit the rural community.

Health: The health programme of Reliance addresses primary healthcare issues around affordability and accessibility of quality healthcare. The company also provides specialised services through tertiary healthcare facilities such as multi-speciality hospitals, at subsidised prices to the communities. Some noticeable institutions started by Reliance are Shri HN Reliance Foundation Hospital and Research Centre, Dhirubhai Ambani Hospital, Reliance Foundation Drishti, etc.

Education: Initiatives of Reliance in the education space are aimed at promoting primary and secondary education and enabling higher education through merit-cum-means scholarships across the country. Reliance has been leveraging appropriate technologies and learning resources for improving the quality of teaching and, in turn, student performance. Some initiatives are The Reliance Foundation Jr. NBA, Reliance University, Reliance Foundation Schools, etc.

Environment: The Foundation has made significant efforts in promoting ecological sustainability through resource conservation, promotion of biodiversity and use of cleaner energy sources. The Foundation has undertaken construction of bio-gas plants in rural households. The shift to cleaner fuel has led to reduction in indoor pollution thereby resulting in improved health of women and families.

Arts, Culture, Heritage and Urban Renewal: Reliance works to preserve heritage, art and culture of India for its future generations and make conscious efforts to improve the livelihood opportunities of traditional artisans and craftsmen. This is done by primarily undertaking various promotional projects and documenting India's heritage for the benefit of future generations. Some of the initiatives are Abbaji Annual Concert, 8 Prahar: Concert on Indian Classical Music, etc.

Disaster Response: Reliance aspires to respond swiftly and effectively to disasters that endanger human lives and livelihood, by directly engaging with affected communities. It leverages all its strengths, including human resources and information technology, to provide relief and rehabilitation support.

Improving Access to Sports Infrastructure: Reliance installed a multi-sports complex in two stadiums under Thane Municipal Corporation. This facility has specially designed net cage to suit all playing fields with LED illuminated line markings to facilitate the sports being played. The sports facility can accommodate six different games: football, ring hockey, volleyball, handball, cricket and tennis. With the space for sports persons and fitness enthusiasts shrinking in urban areas, these multi-sports stadiums in the centre of densely populated cities address an acutely felt need.

Chapter 3:

Data Collection and Analysis

Viewpoint of people towards CSR

In this section, the viewpoint of people towards CSR is shown which has been obtained through questionnaire. The sample size is of 50 respondents.

Age	Frequency
18-30 Years	11
31-40 Years	7
41-50 Years	4
51-60 Years	3
More than 60 Years	3
Total	50

Age of the respondents are divided into five categories and among the respondents' majority belong from age group of 18-30 years.

Gender	Frequency
Male	32
Female	18
Total	50

Among all the respondents 64% are male respondents and 36% are female respondents for this survey.

Education	Frequency
Graduation	26
Post-Graduation	14
CA	4
CS	1
CMA	0
MBA	5
Total	50

Mostly students Graduates and Post-Graduates are respondents to the questionnaire.

Occupation	Frequency
Business	3
Consultant	5
Research Scholar	1
Service	23
Student	18
Total	50

The data is collected mostly from individuals working in a company or a consultancy firm and students.

Experience	Frequency
0-10 Years	35
11-20 Years	5
21-30 Years	5
More than 30 Years	5
Total	50

Experience of respondents are divided into 4 categories and among the respondents' majority belong to 0-10 years of experience.

Have you heard about the mandatory CSR for companies under The Companies' Act 2013?	
Yes	43
No	7
Total	50

Of the 50 respondents, 7 respondents have not heard about the CSR regulations implemented through The Companies Act, 2013 and hence did not answer further questions.

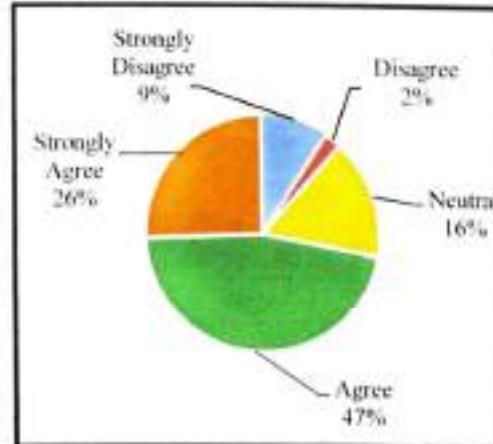
Which stakeholders need CSR disclosure policies by the company?

Particulars	Frequency
Government	31
Employee	15
Customer	15
Suppliers	8
Shareholder	31



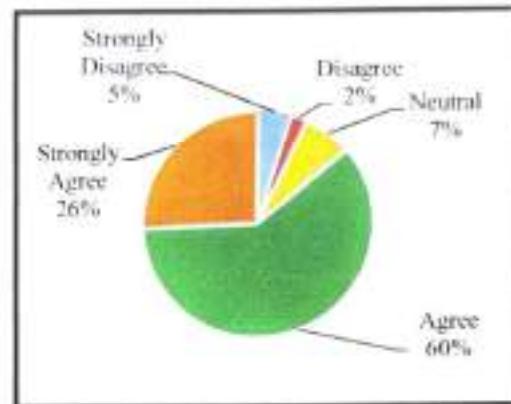
“Making CSR mandatory and make company more social makes sense”

Particulars	Frequency
Strongly Disagree	4
Disagree	1
Neutral	7
Agree	20
Strongly Agree	11



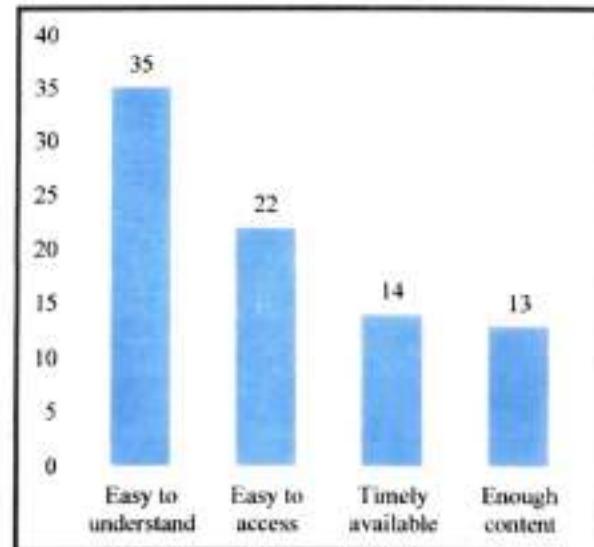
"CSR will be useful to Society for Social Development"

Particulars	Frequency
Strongly Disagree	2
Disagree	1
Neutral	3
Agree	26
Strongly Agree	11



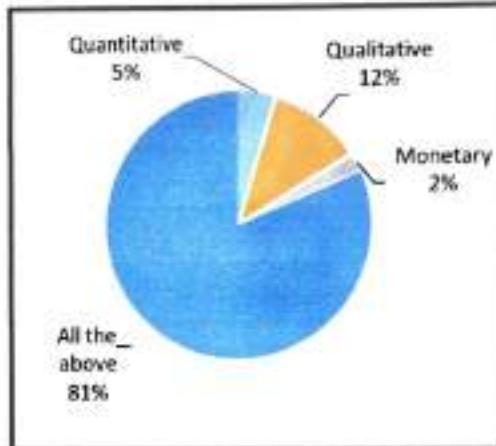
How CSR information should be and reported in the annual report?

Particulars	Frequency
Easy to understand	35
Easy to access	22
Timely available	14
Enough content	13



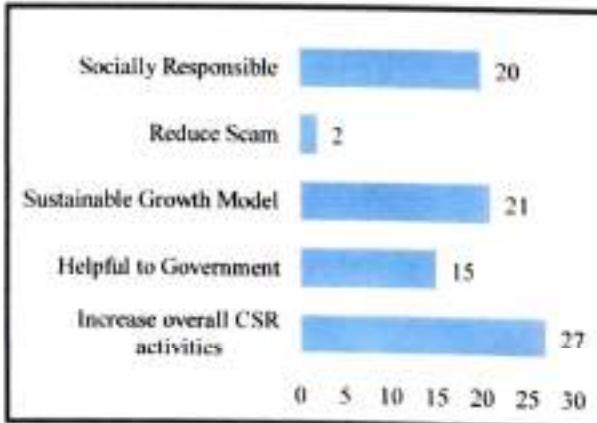
What is best for CSR disclosure?

Particulars	Frequency
Only Quantitative	2
Only Qualitative	5
Only Monetary	1
Only Pictorial	0
All the above	35



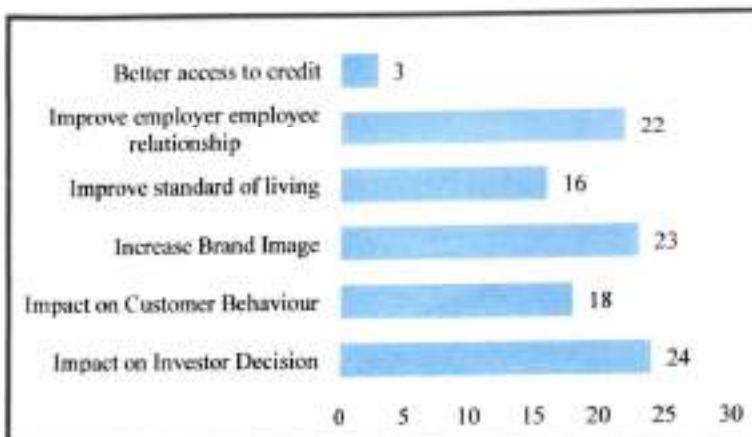
What is your opinion on new mandatory CSR for companies in India?

Particulars	Frequency
Increase overall CSR activities	27
Helpful to Government	15
Sustainable Growth Model	21
Reduce Scam	2
Socially Responsible	20



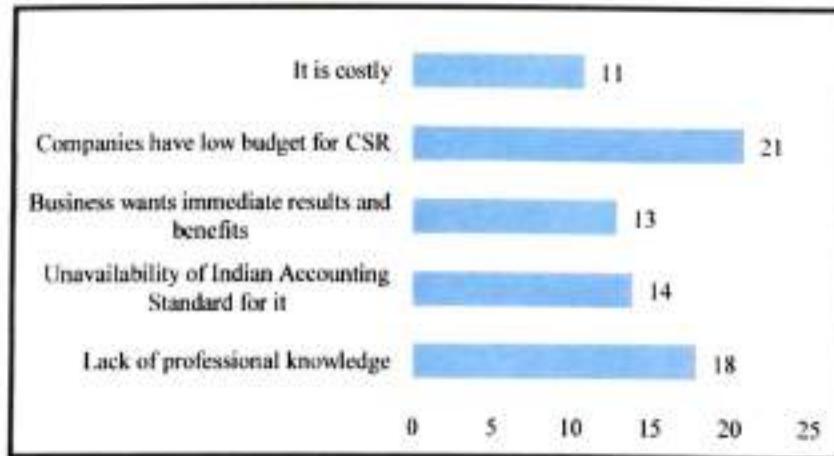
What are the benefits and effects of CSR reporting to companies?

Particulars	Frequency
Impact on Investor Decision	24
Impact on Customer Behaviour	18
Increase Brand Image	23
Improve standard of living	16
Improve employer employee relationship	22
Better access to credit	3



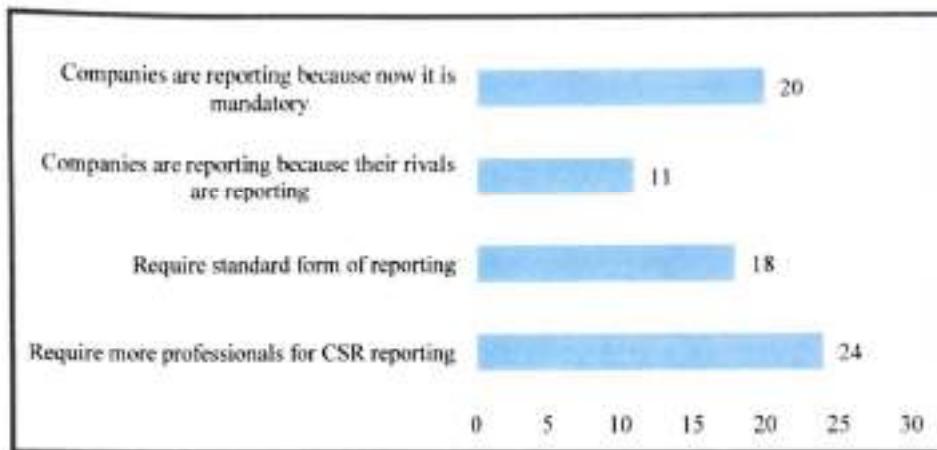
What is your opinion regarding problems faced by companies in CSR reporting?

Particulars	Frequency
Lack of professional knowledge	18
Unavailability of Indian Accounting Standard for it	14
Business wants immediate results and benefits	13
Companies have low budget for CSR	21
It is costly	11



What do you think about CSR reporting in India?

Particulars	Frequency
Require more professionals for CSR reporting	24
Require standard form of reporting	18
Companies are reporting because their rivals are reporting	11
Companies are reporting because now it is mandatory	20



Observation: Based on all the data collected and analysed in this section it can be said that the CSR disclosure by the companies is of utmost importance to the shareholders and the government. Making CSR mandatory is making social sense and is helping in the social development. The CSR initiatives must be disclosed in way which is easy to understand and covers all aspects: qualitative, quantitative, monetary and pictorial. This CSR regulation will increase the overall CSR activities of the companies, make them socially responsible and create a sustainable growth model. All of this creates a positive impact on the investor decision towards the company, better brand image and improve the employer employee relationship. But there are hindrances to successful implementation and getting desirable results, namely lack of professional knowledge towards CSR and low budget by the companies towards CSR. It has to be noted that some of the companies are now reporting it because it is mandatory. Through a standard form and more professionals in CSR reporting these hindrances can be removed to a great extent.

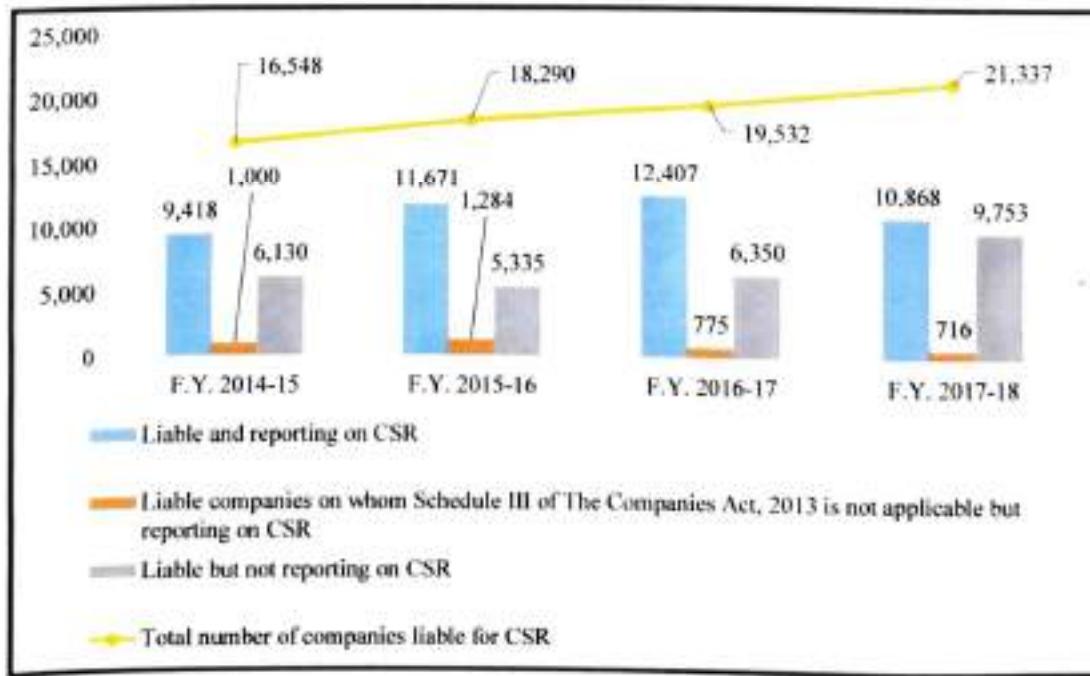
CSR in India

In this section, the state-wise and sector-wise CSR expenditure in India has been presented and analysed. To ensure the accuracy of data as much as possible:

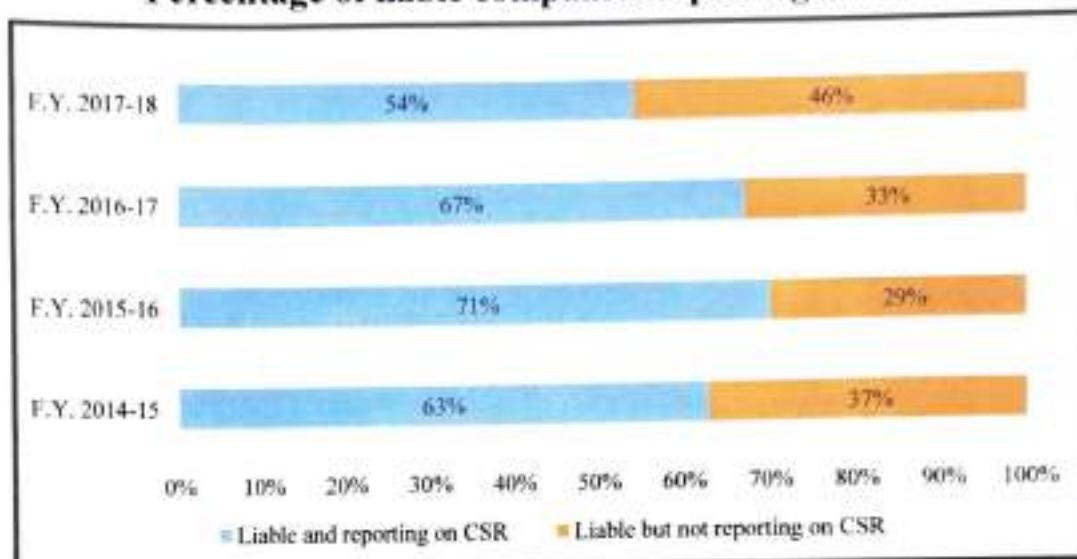
- The data has been collected from "Report of High Level Committee on Corporate Social Responsibility 2018" by the Ministry of Corporate Affairs (Govt. of India) dated August 7, 2019, which has considered the data from F.Y. 2014-15 to 2017-18. The sector-wise CSR expenditure of all the companies in India are collected from this source.
- The data has also been collected from "India's CSR reporting survey" by KPMG from F.Y 2014-15 to 2018-19. The report has considered "Top 100 Listed Companies in India by Market Cap" (the name of the companies are mentioned in the end of the project). The sector-wise CSR expenditure of these "Top 100" companies has been collected from this source.

Profile of companies liable for CSR based on their reporting status.

Company Profile based on reporting status	F.Y. 2014-15	F.Y. 2015-16	F.Y. 2016-17	F.Y. 2017-18
Liable and reporting on CSR	9,418	11,671	12,407	10,868
Liable companies on whom Schedule III of The Companies Act, 2013 is not applicable but reporting on CSR	1,000	1,284	775	716
Liable but not reporting on CSR	6,130	5,335	6,350	9,753
Total number of companies liable for CSR	16,548	18,290	19,532	21,337



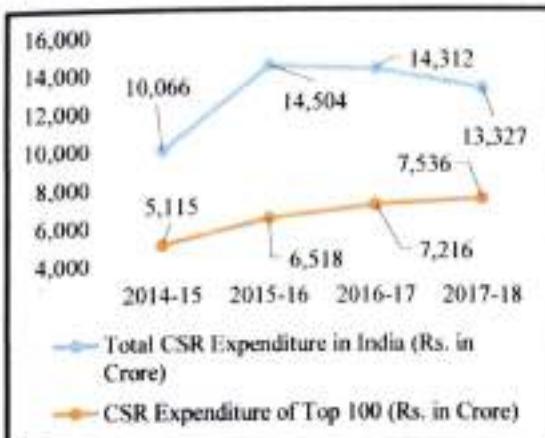
Percentage of liable companies reporting on CSR



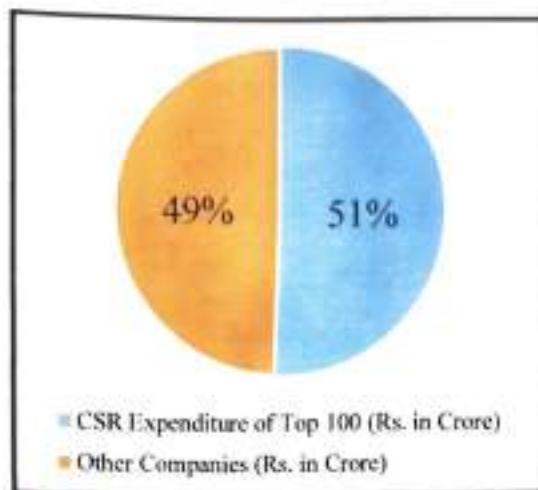
Observation: From the above table and diagrams, it can be observed that there has been a steady increase in the no. of companies liable for CSR reporting. However, the percentage of companies liable but not reporting on CSR was reduced in F.Y. 2015-16 but it is again increasing from F.Y. 2016-17.

Total CSR expenditure in India

Year	CSR Expenditure of Top 100 (Rs. in Crore)	CSR Expenditure of Other Companies (Rs. in Crore)	Total CSR Expenditure in India (Rs. in Crore)
F.Y. 2014-15	5,115	4,951	10,066
F.Y. 2015-16	6,518	7,986	14,504
F.Y. 2016-17	7,216	7,096	14,312
F.Y. 2017-18	7,536	5,791	13,327
Total	26,385	25,824	52,208



Observation: It can be seen that in the time period of the study, the total CSR expenditure in India was increasing in 2015-16, but since then it has kept on falling from 2016-17. On the other hand, it can be seen that although there has been a fall in the total CSR expenditure in the country, the expenditure of the Top 100 is increasing.



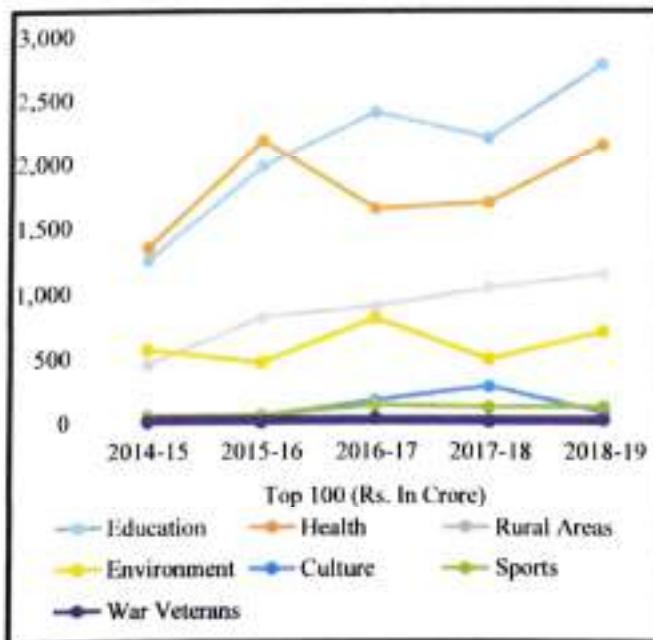
Observation: Considering the total CSR expenditure of the companies from 2014-15 to 2017-18, The Top 100 contribute to nearly 51% of the total expenditure.

Sector-Wise CSR Expenditure

(7 important activities according to the researcher out of the 11 activities mentioned in Schedule VII of The Companies Act, 2013 are considered for the analysis)

Top 100

Activities	2014-15	2015-16	2016-17	2017-18	2018-19
Education	1,249	1,978	2,404	2,202	2,775
Health	1,344	2,177	1,641	1,691	2,145
Rural Areas	443	804	889	1,029	1,143
Environment	559	455	797	483	700
Culture	49	47	168	279	78
Sports	48	52	133	120	123
War Veterans	0	1	31	7	20
Total	3,692	5,514	6,063	5,811	6,984

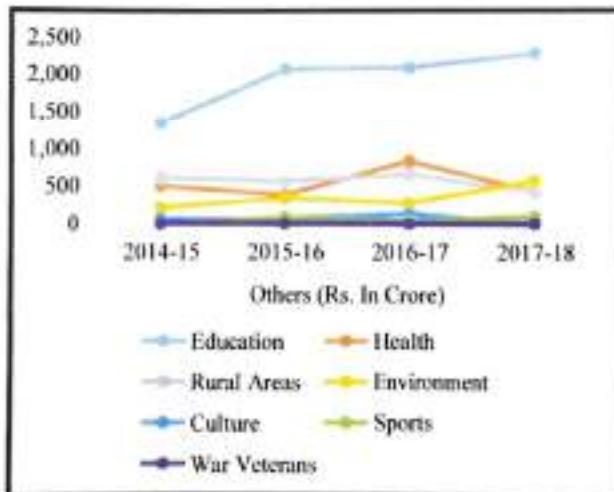


Observation: The Top 100 have been mostly engaged in Education and thus it is in a rising trend. The second highest expenditure is towards Healthcare, although there was a sharp fall in 2016-17 it is increasing. The highest fluctuation in expenditure is seen towards Environment. The activity with the lowest expenditure is towards the of War Veterans.

Other Companies

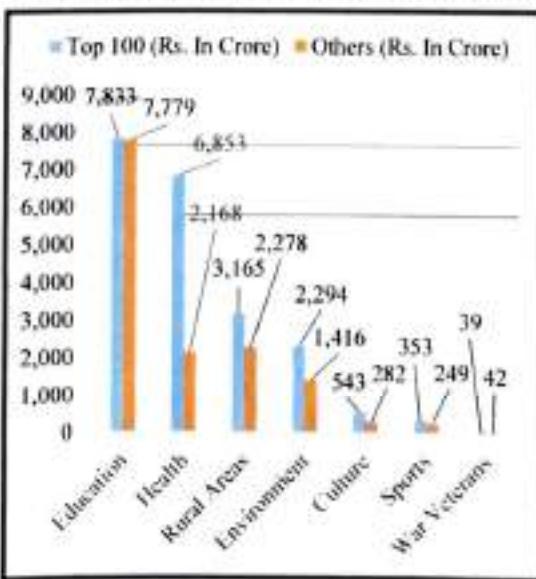
(Due to unavailability of data on Total CSR expenditure in India in 2018-19 the analysis is restricted till 2017-18)

Activities	2014-15	2015-16	2016-17	2017-18
Education	1,340	2,074	2,088	2,277
Health	504	387	841	436
Rural Areas	616	572	663	427
Environment	215	342	279	580
Culture	68	72	138	4
Sports	10	87	47	105
War Veterans	5	10	7	20
Total	2,758	3,544	4,063	3,849



Observation: It can be seen that other companies are mainly spending towards Educational activities and in comparison to other activities there is a big difference in expenditure.

Sector-wise total CSR Expenditure (F.Y. 2014-15 to F.Y. 2017-18)



Activities	Top 100	Others
Education	7,833	7,779
Health	6,853	2,168
Rural Areas	3,165	2,278
Environment	2,294	1,416
Culture	543	282
Sports	353	249
War Veterans	39	42
Total	21,080	14,214

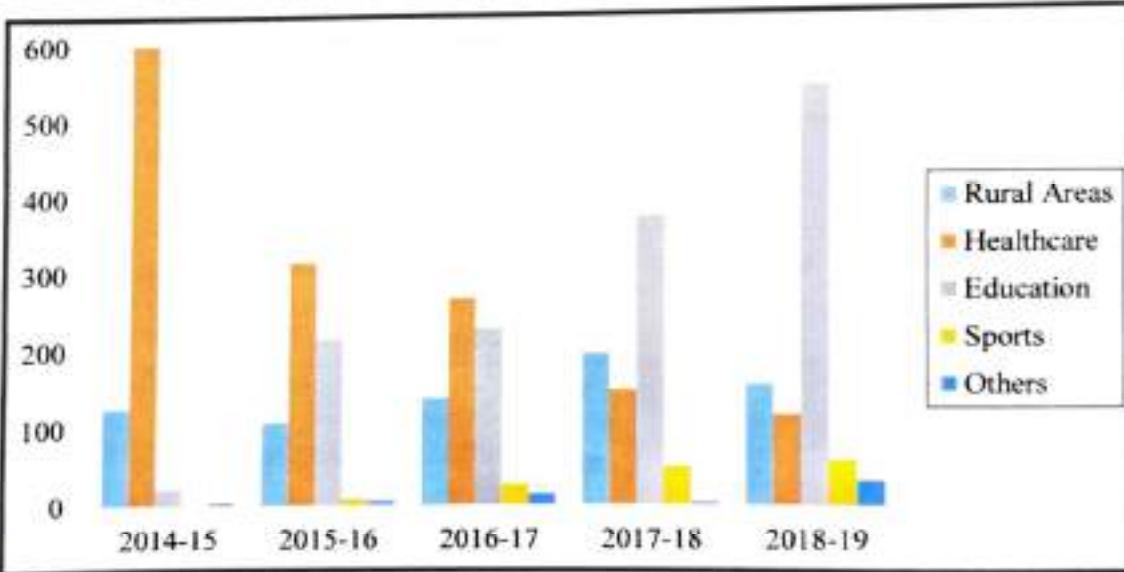
Observation: Other than expenditure towards war veterans, the Top 100 have been contributing more towards all the other activities and thus contributing more.

CSR activities of Reliance Industries Ltd.

In this section, the sector-wise CSR expenditure of Reliance Industries Ltd. (RIL) from F.Y. 2014-15 to 2018-19 has been presented and analysed and a relationship of the CSR expenditure with the financial performance of RIL has been formulated. To ensure the accuracy of data as much as possible, the data has been collected from the Annual Report of RIL from F.Y. 2014-15 to 2018-19.

Sector-wise Expenditure (Rs. in Crore)

Years	Rural Areas	Healthcare	Education	Sports	Others	Total
2014-15	126	608	22	0	4	761
2015-16	107	314	215	9	7	652
2016-17	138	267	227	27	15	674
2017-18	195	148	373	50	5	771
2018-19	156	116	540	59	33	904
Total	722	1,453	1,377	145	64	3,762



Observation: From the above diagram, it can be observed that initially i.e. till 2014-15, RIL had been heavily investing in Healthcare, but from the next year, there was a sharp decline in the expenditure towards it and there was a shift towards Education, which is now turning out to be the major CSR activity of RIL. It can also be observed that from 2014-15 to 2018-19, RIL have been spending mostly towards Education (39%) and Healthcare (36%).

Considering the total CSR expenditure of RIL from 2014-15 to 2018-19, there was a fall during 2015-16, but since then, the expenditure has been increasing at an average growth rate of 5.19%.

Relationship between CSR Expenditure and Financial Performance of RIL (Rs. in Crore)

Years	Total CSR Expenditure	Turnover	Profit After Tax	CSR as % of PAT
2014-15	761	3,88,494	23,566	3.23
2015-16	652	2,93,298	25,171	2.59
2016-17	674	3,30,180	29,901	2.25
2017-18	771	4,30,731	34,988	2.20
2018-19	904	6,22,809	39,588	2.28

Observation:

- **CSR as % of PAT:** The provisions of The Companies Act, 2013 specify that the liable companies must spend at least 2% of the Average Profit after Tax the company made over the last three financial years. RIL have been always spending more than the required rate, but the rate of spending has been declining and can be observed that RIL is spending only that much which is required to comply with the law.
- **Relationship between CSR Expenditure and Turnover of RIL:** From the data, it can be observed that the CSR expenditure and Turnover are positively and highly correlated with each other (+0.9856).
- **Relationship between CSR Expenditure and Profit After Tax of RIL:** From the data, it can be observed that the CSR expenditure and Turnover are positively and highly correlated with each other (+0.74750). Although compared with correlation of CSR Expenditure and Turnover, it is less related.

Note: Formula of Correlation: $\Gamma_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$

Where, x = Total CSR Expenditure

y = Turnover/ Profit After Tax

\bar{x} = Mean of Total CSR Expenditure

\bar{y} = Mean of Turnover/ Profit After Tax

Chapter 4:

Conclusion and Recommendation

Conclusion

Corporate Social Responsibility (CSR) is essential in India as more than 65% of the population are living in Rural Areas and are devoid of many facilities. There is a huge difference between the privileged and underprivileged class in terms of Healthcare facilities, Education, Housing, Infrastructure, etc. In India, the concept of CSR is governed by Section 135 of The Companies Act, 2013 which encourages the companies to spend at least 2% of their average net profit in the last three years on CSR activities. The basic thought of implementing this Section was that CSR is viewed as a vital tool for social development, it can also be considered as a vital tool for increasing a company's competitive edge over their opponents as it can increase their brand image. However, it is seen that the companies are undertaking CSR and disclosing it just because it is mandatory now. Even then there is trend seen that although the total number of companies liable for CSR is increasing (i.e. the companies are growing in terms of their profitability and turnover), the companies who are liable but not disclosing is increasing since the time Section 135 came into force. Also of the total CSR expenditure in the country, majority of the expenditure is undertaken by the Top 100 only of the total number of companies that were reporting on CSR (11,584), which shows that the other companies have not enough motivation to spend towards CSR and are thus seeing the CSR provisions as only a provision to be complied with and a way to reduce tax burden.

Considering the Sector-wise CSR expenditure in India, every company undertaking CSR are mainly focused towards Education only. Although the Top 100 are also focusing towards other activities like Healthcare and Rural Areas, the other companies are not at all engaged too much in other activities. It can also be seen that the companies are undertaking those activities which directly or indirectly benefiting them (Education, Healthcare and Rural Areas) and not the ones which are benefiting the society (Culture, Sports, War Veterans).

After analysing the CSR Expenditure and Financial Performance of Reliance Industries Ltd. (RIL), a conclusion can be drawn that social welfare and community development is at the core of Reliance's CSR philosophy and this continues to be a top priority. Reliance embraces responsibility for impact of its operations and actions on all stakeholders including society and community at large. It revolves around a deeply held belief in principle symbiotic relationship with the local communities, recognising that business ultimately has a purpose- to serve human needs. RIL undertake activities towards Education, Healthcare, Rural Areas, etc. Also the CSR activities are positively correlated with the company's turnover and profit after tax, but more correlated with turnover, as the company spending towards CSR increases their brand image and in turn increasing their Revenue from Operations i.e. Turnover, as people are more likely to associate with a company who are doing something for the society.

Recommendation

After conducting the study, a basic conclusion can be drawn that even after 5 years since Section 135 came into force, the companies are mostly seeing it as only a compliance requirement and thus doing the bare minimum to avoid contravention of law and avail tax benefit as much as possible and not as a philanthropic initiative to do good something to the society which is failing the main intention behind passing this resolution.

The way to solve this problem is by the Government taking steps towards amending the provisions to make it more friendly to the companies and motivate them to look at the provisions as not just a law provision which is needed to be complied with but a responsibility of every company to give back to the society as much as possible. Engage and motivate the companies other than Top 100 to also increase their contribution so as to increase the total CSR expenditure in the country.

Regarding the activities of CSR, there is no denial that Education and Healthcare are very important but not the only activities which require spending in, there are other activities like Sports, Art and Culture, benefit towards War Veterans, etc. which also need spending for benefit of the society.

To sum it up, there is still need of many improvements and amendments to increase the CSR expenditure in the country and improve all the sectors of the society and bring in an all-round increase in the standard of living of people. All this can be achieved by motivating the companies to give have a more active participation towards CSR as not only it will benefit the society but also the company itself.

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- www.moneycontrol.com

Questionnaire

Sir/ Ma'am,

I am currently pursuing B.COM(H) specializing in Accounting & Finance under University of Calcutta. For the partial fulfilment of this course I am preparing a project titled "Corporate Social Responsibility in India & an analysis of CSR expenditure and relationship with the financial performance of Reliance Industries Ltd." under the supervision of Professor Priyanka Banik.

I have prepared a questionnaire for understanding the viewpoint of the people on the CSR regulations implemented through The Companies Act, 2013. Following is the link to the questionnaire: <https://forms.gle/LxRDtbwRGfvBUeV7>

Kindly provide your viewpoint through the questionnaire and also forward it to your colleagues and friends.

Regards,

Sayan Sardar

Mobile: 8335862943

Email ID: asayan74569@gmail.com

Questionnaire

Demographic Information

* Required

1. Name *

2. Age *

Mark only one oval.

- 18-30 years
- 31-40 years
- 41-50 years
- 51-60 years
- more than 60 years

3. Gender *

Mark only one oval.

- Female
- Male
- Others

4. Education *

Mark only one oval.

Graduation

Post Graduation

CA

CS

CMA

MBA

Other: _____

5. Occupation

Mark only one oval.

Service

Business

Consultant

Other _____

6. Experience (if working)

Mark only one oval.

0-10 years

11-20 years

21-30 years

more than 30 years

Project Specific

7. Have you heard about the mandatory CSR for companies under The Companies Act, 2013? (If the answer is no then no need to answer further questions) *

Mark only one oval.

Yes

No

8. According to you which stakeholders need this disclosure?

(Check all that apply)

Shareholder

Suppliers

Customer

Employee

Government

Other: _____

9. "Making CSR mandatory and make company more social makes sense".

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. "It will be useful to society for Social Development".

Mark only one oval.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

11. What is best for CSR disclosure?

Mark only one oval.

- Only Qualitative
- Only Quantitative
- Only Monetary
- Only Pictorial
- All of the above aspects should be covered.

12. According to you how CSR information should be and reported in annual report of the companies?

Check all that apply.

- Easy to understand
- Easy to Access
- Timely available
- Enough Content

Other:

13. What is your opinion on new mandatory CSR for companies in India?

Check all that apply.

- It will increase overall CSR activities by companies!
- will be helpful to government in social activities
- Companies will work on sustainable growth model
- Reduces Scam
- Make them Socially ResponsibleOther:
-

14. According to you what are the benefits and effects of CSR reporting to companies?

Check all that apply.

- Have positive impact on investor decision
- Have positive impact on customer buying behaviourIncreases brand image and reputation
- Improves the standard of living of people which will help business in long run Socially responsible business improves employer employee relationship Better access to credit

Other:

15. What is your opinion regarding problems faced by companies in CSR reporting?

Check all that apply.

- Lack of professional knowledge
- Unavailability of Indian Accounting Standard for it
- Business wants immediate results and benefits
- Companies have low budget for CSR so less focus on reporting It is costly

Other:

16. What do you think about CSR reporting in India?

Check all that apply.

- Require more professionals for CSR reporting
- standard form of reporting
- Companies are reporting because their rivals are reporting
- Companies are reporting because now it is mandatory

Other:

Top 100 Listed Companies on the basis of Market Capitalization

Sl. No.	Company Name	Market Cap (Rs. In Crore)	Sl. No.	Company Name	Market Cap (Rs. In Crore)
1	Reliance	10,68,806.51	50	Eicher Motors	47,741.03
2	TCS	7,68,525.91	51	JSW Steel	47,619.24
3	HDFC Bank	5,67,697.09	52	Hero Motocorp	46,764.98
4	HUL	4,90,308.08	53	Biocon	46,752.00
5	Bharti Airtel	3,19,095.55	54	InterGlobe Avi	45,796.53
6	HDFC	3,05,932.20	55	Adani Green Ene	44,449.29
7	Infosys	2,99,714.72	56	GAIL	44,382.41
8	Kotak Mahindra	2,65,080.63	57	Bharti Infratel	43,678.50
9	ITC	2,45,783.16	58	Aurobindo Pharm	43,596.76
10	ICICI Bank	2,31,329.96	59	United Spirits	42,581.03
11	Maruti Suzuki	1,73,658.27	60	Marico	42,178.45
12	SBI	1,67,604.20	61	Grasim	41,714.46
13	Nestle	1,64,849.66	62	Siemens	40,934.24
14	Avenue Supermar	1,61,746.10	63	Lupin	40,879.60
15	Asian Paints	1,57,308.44	64	Torrent Pharma	40,688.86
16	HCL Tech	1,56,279.97	65	IDBI Bank	39,861.48
17	Bajaj Finance	1,43,978.18	66	Bandhan Bank	39,846.15
18	Larsen	1,34,113.80	67	Vedanta	39,160.57
19	Wipro	1,25,010.38	68	DLF	38,911.90
20	San Pharma	1,18,563.14	69	Ambuja Cements	38,749.87
21	Axis Bank	1,14,416.67	70	Petronet LNG	38,192.50
22	UltraTechCement	1,11,735.81	71	Tata Steel	38,227.43
23	ONGC	1,09,385.53	72	Colgate	37,098.84
24	HDFC Lite	1,04,249.90	73	Muthoot Finance	36,901.45
25	NTPC	96,966.66	74	Cadila Health	36,747.24
26	Power Grid Corp	89,721.76	75	Abbott India	36,299.65
27	Coal India	89,267.12	76	Yes Bank	36,145.36
28	Titan Company	87,984.05	77	Havells India	35,535.63
29	IOC	84,209.65	78	TATA Cons. Prod	35,005.14
30	Bajaj Finserv	83,305.98	79	IGL	34,212.54
31	Britannia	83,232.09	80	Tata Motors	34,194.94
32	Dabur India	81,753.21	81	Bosch	33,913.70
33	Bajaj Auto	80,365.90	82	UPL	33,545.42
34	BPCL	80,240.66	83	Hindalco	33,537.03
35	Shree Cements	79,743.68	84	Mutherson Sumi	32,826.73
36	SBI Life Insura	79,727.38	85	P and G	32,606.81
37	Pidilite Ind	76,663.18	86	I&T Infotech	32,115.28
38	Hind Zinc	73,182.53	87	PNB	31,807.93
39	Adani Ports	69,292.89	88	HPCL	31,169.79
40	Dr Reddys Labs	66,933.28	89	Info Edge	30,651.71
41	Godrej Consumer	66,496.57	90	Vodafone Idea	30,229.61
42	Divis Labs	65,722.06	91	IndusInd Bank	29,306.37
43	M&M	60,214.03	92	Alkem Lab	28,647.18
44	ICICI Lombard	59,079.30	93	Embossy Office	27,538.81
45	SBI Cards	58,764.61	94	Bajaj Holdings	27,220.17
46	HDFC AMC	58,053.24	95	NMDC	27,219.84
47	Tech Mahindra	56,028.23	96	MRF	26,944.02
48	ICICI Prudential	55,632.90	97	United Breweries	26,908.51
49	Cipla	52,613.21	98	Whirlpool	26,249.78
50	Bayer Paints	49,469.08	99	Piramal Enter	25,409.15

Data collected from website of NSE and Moneycontrol

Project Report

(Submitted for the Degree of B.Com Honours in Accounting under the
University of Calcutta)

Title of the Project

**An Analysis to Insurance Industry
Special reference to Life Insurance**

Submitted by

Name of the Candidate: Dipon Roy
CU Registration No: 561-1111-0449-20
CU Roll No: 201561-21-0013
Name of the College: Budge Budge College

Supervised by

Name of the Supervisor: Dr. Sandip Singh

Name of the College: Budge Budge College

Dipon
20/7/23
Budge Budge College
Department of Commerce

Month & Year of Submission

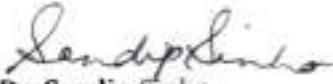
May, 2023

Supervisor's Certificate

This is certify that Mr. Dipon Roy a student of **B.Com Honours in Accounting** of **Budge Budge College** under the **University of Calcutta** has worked under my supervision and guidance for his/her project work and prepared a project report with the title **AN ANALYSIS TO INSURANCE INDUSTRY - (SPECIAL REFERENCE TO LIFE INSURANCE)** which he/she is submitting is his/her genuine and original work to the best of my knowledge.

Place: Budge Budge, Kolkata

Date: 6th May 2023

Signature: 

Name: Dr. Sandip Sinha

Designation: Associate Professor

Name of the College: Budge Budge College

Student's Declaration

I hereby declare that the project work **AN ANALYSIS TO INSURANCE INDUSTRY – (SPECIAL REFERENCE TO LIFE INSURANCE)** submitted by me for the partial fulfillment of the degree of **B.Com. Honours in Accounting** under the University of Calcutta is my original work and has not been submitted earlier to any other University / Institution for the fulfillment of the requirement for any other course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by other or by me. However, extracts of any literature which has been used for this report has been duly acknowledge providing details of such literature in the references.

Signature: Dipon Roy
Name: Dipon Roy
Address: 77 Adhar Das Road,
Budge Budge, Kolkata-700137
Registration No: 561-1111-0449-20

Place: Budge Budge, Kolkata

Date: 6th May 2023

ACKNOLEDGEMENT

The success and final outcome of this project required a lot of guidance and assistance from many people and I am extremely privileged to have got this all along the completion of my project. All that I have done is only due to such supervision and assistance and I would not forget to thank them.

I respect and thank my supervisor Dr. Sandip Sinha for providing me an opportunity to do the project work and giving me all support and guidance which made me complete the project duty. I am extremely thankful to him for providing such a nice support and guidance, although she had busy schedule managing the university and college work.

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CHAPTER 1

INTRODUCTION

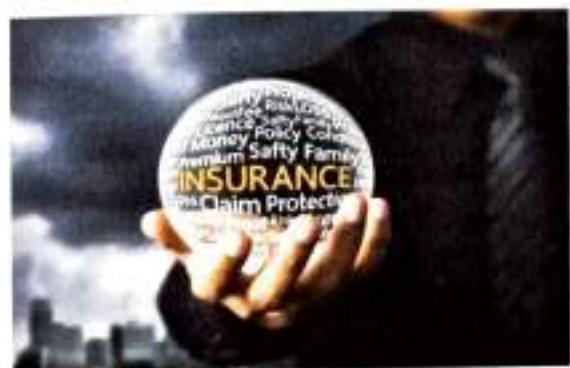
: Background of the study:

The insurance industry is critical for any country's economical development. A well-developed insurance sector boosts risk-taking in the economy, as it provides some security in the event of an unforeseen, loss causing incident. It also provides much-needed support to family members in the case of loss of life or health as well as for an entity it provides financial protection or reimbursement against losses from an insurance company.

In India, the insurance sector operates under the aegis of the Ministry of Finance and is regulated by the Insurance Regulatory and Development Authority of India (IRDAI). The insurance sector plays a critical role in country's economic development. It acts as a mobilizer of savings, a financial intermediary, a promoter of investment activities, a stabilizer of financial markets and a risk manager.

The Indian insurance industry, valued at Rs 7.31 trillion (US\$ 94.7 billion) in FY20. Globally, India ranks 10th in terms of life insurance in terms of premium. Indian insurance sector is open to private participation from foreign players as well as under the Foreign Direct Investment (FDI). The Government has approved an ordinance to increase Foreign Direct Investment (FDI) limit in the Insurance sector from 26 per cent to 49 per cent, which would further help attract investment in the sector. As per Union Budget 2021-22, 100 per cent FDI was permitted for insurance intermediaries.

The insurance industry in India has also grown along with the country's economy. Several insurance companies in the country are expanding their operations, across both the public and the private sector. At present, there are 24 life insurance companies of which Life Insurance Corporation of India (LICI) is the only Public sector insurance company and rest 23 are Private insurance companies.



: Objectives of the study:

Below mentioned are some of the objectives of the study:-

- To understand the national and international scenario of the insurance industry.
- To understand the competitiveness in life insurance industry with the help of comparative study.
- To know the recent market structure and size of both public and private insurance sector.
- To understand the different types of premium for life insurance industry.
- To understand the importance of agency in life insurance industry.
- To understand the claim settlement in the life insurance industry.
- To know the flagship schemes launched by the government.
- To know the recent developments in the insurance sector.
- To know the government initiatives / policies taken for the betterment of the life insurance industry.

: Research Methodology:

The study on the Life Insurance Industry of India was done on the basis of SECONDARY DATA. Secondary data has contributed in a significant way to understand the scope as well as it helped in developing the conceptual framework. Chapter 3 has been devoted to secondary data analysis.

Basically the analysis of data is done through comparative study between the public and private life insurance sector, on the basis of market share, in terms different types of premium, performance, role of the insurance agents, claim settlement and flagship schemes launched by the Government of India.

For this study some secondary data sources are collected from publications of IRDAI and LIC, annual reports, journals and articles regarding to the Indian life insurance sector.

: Review of the Literature on the Insurance Industry of India

1. **Global Index Insurance Facility (2020)** in its report "**When and How Should Agricultural Insurance be Subsidized? Issues And Good Practices**" discussed how to avoid the problems regarding agriculture, any insurance subsidy needs to be carefully designed to be "smart", in the sense that it is cost effective in achieving its underlying purpose, minimizes disincentive problems, and does not become a growing financial burden on the government. At the end they have proposed some best practice guidelines for the design and implementation of subsidized agricultural insurance.

(Source: World Bank Group)

2. **Indian Chamber of Commerce (ICC) and Pricewaterhouse Coopers (PwC) (2021)** in its report "**India insurance perspective**" stated that India's robust economy is expected to keep pace with the growth in insurance premiums written. Higher personal disposable incomes will result in higher household savings that will be channeled into different financial savings instruments like insurance and pension policies.

(Source: India Insurance Perspective - PwC)

3. **Rudra P. Pradhan, Mak B. Arvin, Mahendhiran Nair, John H. Hall, Atul Gupta (2021)** in their article "**Is there a link between economic growth and insurance and banking sector activities in the G-20 countries?**" discussed about by using the vector auto-regression model and the Granger causality test, the study shows that in the long run, developments in the banking sector and insurance industry have had a significant impact on the economic growth of the G-20 countries. In the short term, the inter-relationships between the three factors prove to be more complex in that they differ by countries in different stages of development.

(Source: Review of Financial Economics)

4. **Prasanna Rajesh (2022)** in his book "**Valuation of Indian Life Insurance Companies**" bridges the gap between the accounting and the actuarial sides of Indian life insurance companies, by exploring the relationships between the embedded value calculated by actuaries and the revenue account and balance sheet prepared by the accountants.

(Source: Oriley)

5. **J. D. Chandrapal (2022)** in his article "**Impact of liberalisation on Indian life insurance industry: A truly multivariate approach**" discussed that with the passage of the Insurance Regulatory and Development Authority (IRDA) Bill, The Government of India has liberalized the insurance sector in March 2000. Thus entry restrictions lifted and foreign players were allowed to enter in the Indian insurance industry with their domestic partners with FDI Capital of 26 per cent. Deregulation and liberalization has revolutionized Insurance sector in India.

(Source: IIMB Management report)

: Limitations of the study:

Below mentioned are some of the limitations of the study:-

- Lack of detailed study on the sector due to secondary source perspective.
- Some of the data analysis on life insurance industries are encrypted and therefore presenting of data makes it difficult.
- Lack of initiatives from the Private insurance companies in terms of flagship schemes for poor peoples.
- Many company has low percentage of Claim settlement.
- Lack of data available on website.
- Preparation of such detailed project work within limited pages.
- Preparation of such detailed project within short span of time.

: Chapter Planning:

- Chapter 1| Introduction
- Chapter 2| Conceptual Framework
- Chapter 3| Presentation of Data, Analysis and Findings
- Chapter 4| Conclusion and Recommendation

CHAPTER 2

Conceptual Framework



भारतीय बीमा विनियामक और विकास प्राधिकरण
INSURANCE REGULATORY AND DEVELOPMENT AUTHORITY OF INDIA

National Scenario of Life Insurance Industry:

The life insurance industry in India is regulated by the Insurance Regulatory and Development Authority (IRDA). Twenty four Life Insurance companies are licensed to do Insurance Business in India. Out of these companies, Life Insurance Corporation of India (LIC of India) is the only public sector company.

Steady Growth Rate: India's life insurance industry has been growing at a steady pace. Over a period of 6 years from the financial year 2016 to 2022, the new business premium has grown at a CAGR (Compounded Annual Growth Rate) of 14.44%.

Low Insurance Penetration: Despite the steady growth rate, life insurance penetration (Premium as % of GDP) in India still remains low, at 2.76 % as of 2021. Combined insurance penetration of life and non-life is 3.69 % as of 2021.

Increasing Private sector contribution: The market share of private insurance companies were 2.00% in 2003 but has grown to 33.76% in terms of premium on the financial year 2022.

Government Support:

- (A) Tax incentives for insurance products with the exempt model of taxation.
- (B) IRDA provides a robust and reliable regulatory platform for the insurance industry.
- © IRDA recently allowed life insurance companies that have completed 10 years of operations to raise capital through Initial Public Offerings (IPOs). Companies will be able to raise capital if they have embedded value of twice the paid-up equity capital.

LIC of India Continues to dominate the market: Since opening up of the market and constitution of IRDA in 1999, the number of private players has increased with time and has reached 24 as of 2022. But Still LIC of India the only public sector insurer is dominating the market with 66.24% of market share in premium.

: Life Insurance Industry in Global Scenario:

India's share in global insurance market was 1.92 % during 2021. However, during 2021, the total insurance premium in India increased by 9.3 % (inflation adjusted) whereas global total insurance premium increased by 1.5 % (inflation adjusted).

Globally, the share of life insurance business in total premium was 54.30% during 2021. However, the share of life insurance business for India was very high at 73.85 %.

In life insurance business, India is ranked 10th among the 88 countries, for which data is published by Swiss Re. India's share in global life insurance market was 2.61 % during 2021.

However, during 2021, the life insurance premium in India increased by 7.7 % (inflation adjusted) when global life insurance premium increased by 0.2 % (inflation adjusted).

TABLE I.5

TOTAL REAL PREMIUM GROWTH RATE 2021 (IN PERCENT)

<i>Life Regions/Countries</i>	<i>Life</i>	<i>Non-Life</i>	<i>Total</i>
Advanced markets	0.8	1.9	1.3
Emerging markets	-2.0	7.1	2.1
Asia-Pacific	0.1	6.4	2.1
India	7.7	14.0	9.3
World	0.2	3.0	1.5

Source: Swiss Re, sigma No. 3/2022

Total premium growth rate

CHAPTER 3

Presentation of Data Analysis and Findings

: Market Share of Life Insurance Companies:

From the past 2 decades Privatisaton in the Insurance sector took place and till now this sector continuously increasing its market share in terms of both premium and no. of policies at a steady pace. Apart from LIC which is still holding the top position in terms of market share on both the aspects.

We have taken some top performing Public and Private companies providing Life Insurance facilities to the people and made a comparative study by analyzing the Market share of Premium and No. of policies made during the year.

Public Sector:

1. **LIC of India:** Life Insurance Corporation of India (LICI) is a statutory corporation established in 1956. It came into existence on 1st September, 1956 with the objectives of spreading life insurance more widely and in particular to the rural areas with a view to reach all insurable persons in the country, providing them adequate financial cover at a reasonable cost.

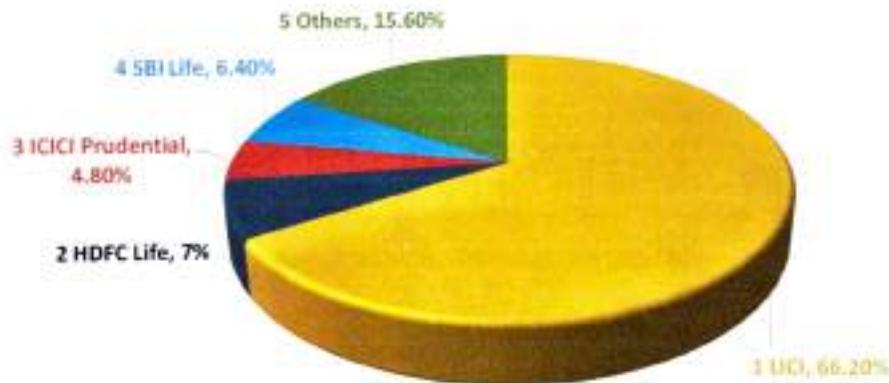
Private Sector:

1. **HDFC Life:** It is a joint venture between Housing Development Finance Corporation Ltd (HDFC) and Standard Life Aberdeen of United Kingdom. HDFC Life was established in 2000 becoming the first private sector life insurance company in India.
2. **SBI Life:** SBI Life Insurance is a joint venture life insurance company between State Bank of India (SBI), the largest state-owned banking and financial services company in India, and BNP Paribas Cardif a French multinational bank and financial services.
3. **ICICI Prudential Life Insurance:** ICICI Prudential Life Insurance Company Limited (ICICI Prudential Life) is promoted by ICICI Bank Limited and Prudential Corporation Holdings Limited. ICICI Prudential Life began its operations in fiscal year 2001 and has consistently been amongst the top players in the Indian life insurance sector. The first insurance company in India to be listed on NSE and BSE.

The data helps to study about the Market share of Insurance companies in terms of Market share of: (a) **Insurance premium** and, (b) **No. of policies**, and to compare it between the Private and Public Insurance companies.

Market Share of Insurance Companies 2021-22			
Sl. No.	Companies	Market Share	
		Premium	No. of Policies
1	LICL	66.20%	74.70%
2	HDFC Life	7%	3.40%
3	ICICI Prudential	4.80%	3.12%
4	SBI Life	6.40%	5.30%
5	Others	15.60%	13.50%

MARKET SHARE OF INSURANCE PREMIUM

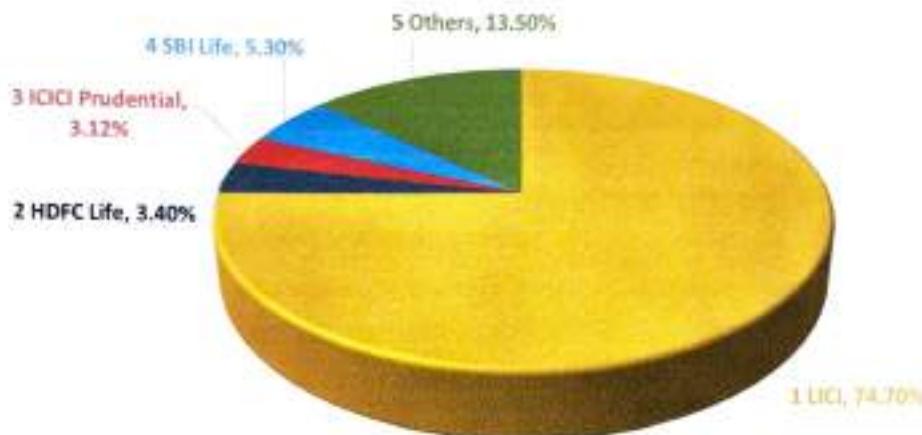


(Source: IRDAI Annual Report 2021-22)

Interpretation:

Here the market share in terms of insurance premium for the year 2021-22 shows that Life Insurance Corporation of India (LICL) the only Public Sector Company leads the market with 66.24% share in terms of premium, whereas in private sector HDFC Life leads the market with 7% share in terms of premium, SBI Life comes after that with 6.40%, ICICI Prudential with 4.80% and others standing with 15.60%.

MARKET SHARE OF NO. OF POLICIES



(Source: IRDAI Annual Report 2021-22)

Interpretation:

Here the market share in terms of number of policy for the year 2021-22 shows that Life Insurance Corporation of India (LICI) the only Public Sector Company leads the market with 74.70% share in terms of number of policy, whereas in private sector SBI Life leads the market with 5.30% share in terms of policy, HDFC Life comes after that with 3.40%, ICICI Prudential with 3.12% and others standing with 13.50%.

Life Insurance Corporation of India (LICI) leads the market in terms of both insurance premium collected with 66.20% and in terms of number of policies with 74.70% during the year 2021-22. The reason behind this is the vast number of agent working under and providing insurance facilities not only to the urban or sub-urban people but also to the rural people where other private sectors could not reached till date.

Unlike private insurance companies LICI have 8 Zonal Offices and number of divisional, branch, mini and satellite offices across India insuring lives and people face less difficulty in paying premiums or submission of any grievances.

Another aspect is that as it is a public sector company, therefore people have more trust as their savings are in safer hands and will surely get their maturity benefits.

: Study of Private Insurers Vs LIC of India (in terms of Premium):

Insurance premium is a specified amount stipulated by the insurance company, which the insured individual should periodically pay to maintain the actual coverage of insurance.

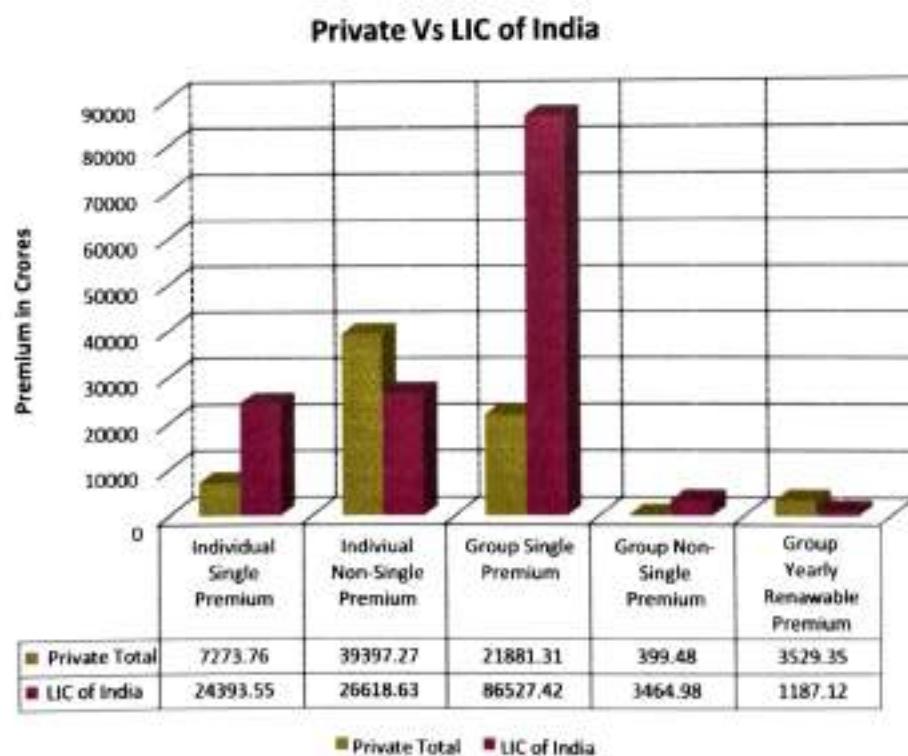
Insurance companies offer policyholders a number of options when it comes to paying insurance premium. Policyholders can generally pay the insurance premium in installments, for example monthly or semi-annual payments, or they can even pay the entire amount upfront before coverage starts.

Here, the insurance premiums are categorized in the following 5 groups:

1. **Individual Single Premium:** An individual single premium policy is a type of life insurance policy wherein a lump sum is paid as premium by an individual instead of the yearly, quarterly or monthly form of premium payment.
2. **Individual Non-Single Premium:** An individual non-single premium policy also known as Regular premium policy is a type of life insurance policy wherein premium is paid by an individual either yearly, quarterly or monthly.
3. **Group Single Premium:** The Single Premium Group Insurance Plan is a non-participating, non-linked, single premium payment, term insurance policy that is especially catered towards employees of an organization or members of an affinity/homogenous group.
4. **Group Non-Single Premium:** Group non-single premium or commonly known as Group regular premium life insurance is a type of life insurance in which a single contract covers an entire group of people wherein premium is paid by an individual either yearly, quarterly or monthly. Typically, the policy owner is an employer or an entity such as a labor organization, and the policy covers the employees or members of the group.
5. **Group Yearly Renewable Premium:** Group term life is typically provided in the form of yearly renewable term insurance. When group term insurance is provided through employer, the employer usually pays for most (and in some cases all) of the premiums. The amount of coverage is typically equal to one or two times of annual salary.

The data provides the Study of Private Insurers Vs LIC of India (in terms of Premium).

Private Vs LIC of India					
Categories	Individual Single Premium	Individual Non-Single Premium	Group Single Premium	Group Non-Single Premium	Group Yearly Renewable Premium
Private Total	7273.76	39397.27	21881.31	399.48	3529.35
LIC of India	24393.55	26618.63	86527.42	3464.98	1187.12



(Source: IRDAI Annual Report 2021-22)

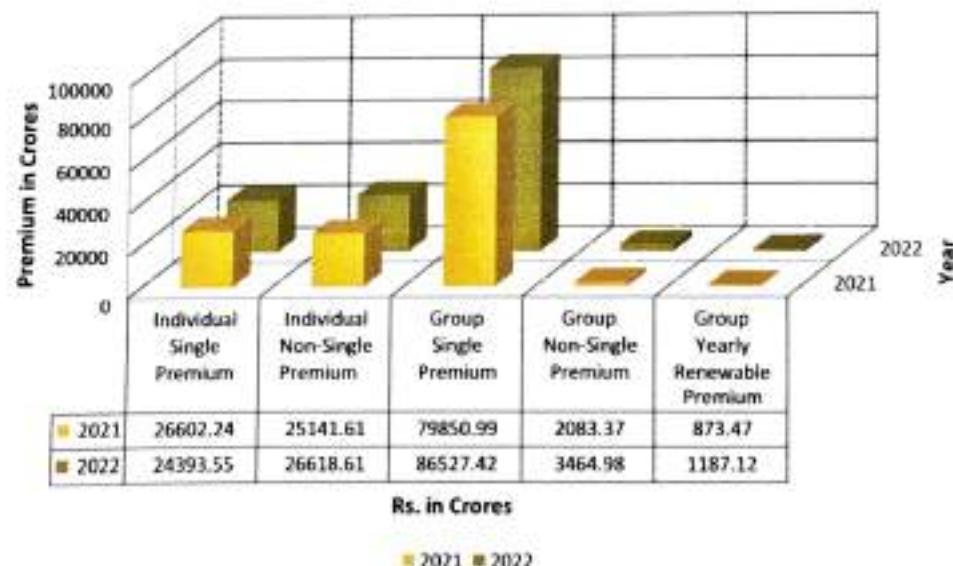
Interpretation:

LIC of India is leading in three categories namely Individual Single Premium, Group Single Premium, and Group Non-Single premium. On the other hand, Private total is higher in Individual Non-Single premium and Group-Yearly-Renewable premium.

: Performance of LIC of India - 2021 Vs 2022:

Life Insurance Corporation of India (LICI) is a Public sector giant in terms of market share of insurance premium. Therefore, a comparative study has been made for LIC of India in terms of premium for the year ended 2021 Vs 2022.

Premium Comparison of LIC of India 2021 Vs 2022



(Source: IRDAI Annual Report 2021-22)

Interpretation:

The total premium collected by LIC of India increased by 5.68 % in 2022 compared to the previous year. LIC of India collected a premium of 142191.69 crores in 2022 whereas the premium collection for the year 2021 was 13455.68 crores.

Changes of premium in percentage as compared to 2021:

- Individual Single Premium reduced by -8.30% in 2022.
- Individual Non-Single Premium increased by 5.87% in 2022.
- Group Single Premium increased by 8.36% in 2022.
- Group Non-Single Premium increased by a whopping 66.32% in 2022.
- Group Yearly Renewable Premium increased by 35.90% in 2022.

: Role of Agents in Life Insurance Industry:

An agent is a primary source for procurement of insurance business and as such his role is the corner stone for building a solid edifice of any life insurance organization.

Insurance Agents are responsible for identifying sales opportunities for insurance plans and overseeing a portfolio of clients. Also known as Insurance Sales Agents, these professionals are responsible for identifying risk management strategies, handling policy renewals, and tracking claims.

Role of life insurance agents:

- In viewpoint of Insurance companies:**

An agent in law is one who acts for another and insurance agent is one who works for an insurer. His job is to bring in customers for the insurance company and is remunerated in the form of commission expressed as a percentage of the premium payable on the business introduced. The rates of commission payable to an agent would normally depend on market competition and the volume and profitability of business procured by the agent concerned. In India, the rates of commission payable are stipulated under the insurance law and no commission is payable for insurance of firms having paid up capital in excess of the amount stipulated.

- In viewpoint of policyholder:**

An insurance agent is a trained professional whose job is to sell insurance policies. Life insurance agents specialize in selling policies that pay beneficiaries when a policyholder dies. An agent has to sell himself before selling his product of life insurance. This is due to the intangible nature of the products and its long-term commitment. So, trust and belief in the customer is to be created for buying this product, which also needs to be sustained and continued in future too.

Contributions of agents in Life Insurance Corporation (the Giant Insurance co. in India):

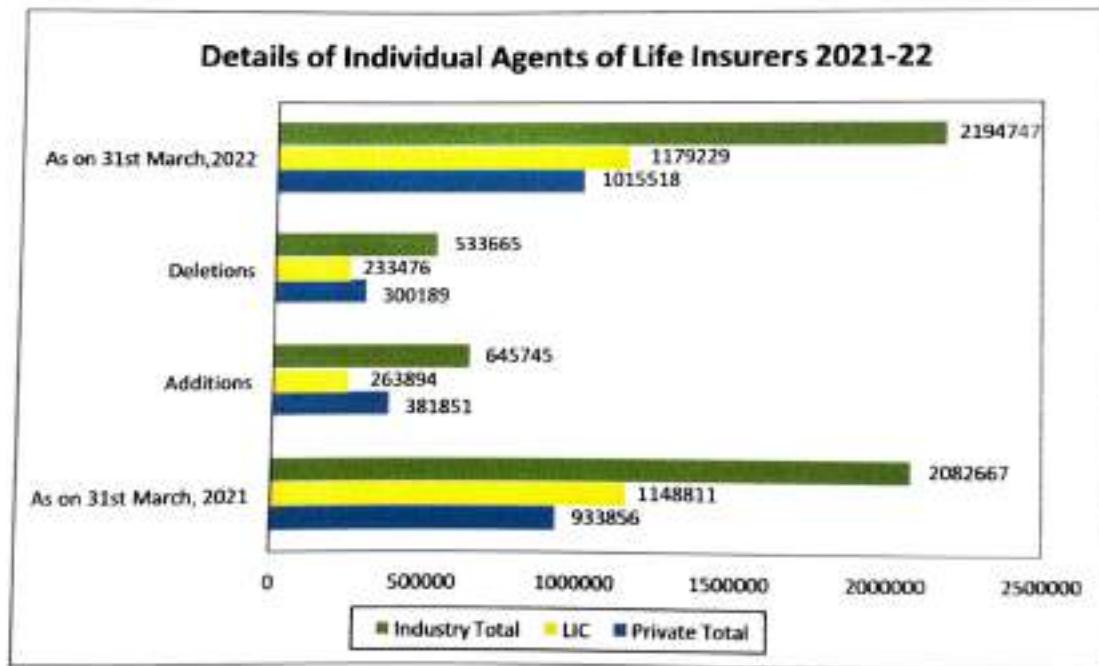
In India, life insurance is generally considered as a tax-saving device instead of its other implied long term financial benefits. Indian people are prone to investing in properties and gold followed by bank deposits. They selectively invest in shares also but the percentage is very small. Even to this day, Life Insurance Corporation of India dominates Indian insurance sector.

What is it that takes this performance forward?

One reason undoubtedly is the large network of agents on rolls in LIC. The tremendous success is of course on account of constant and tireless efforts of LIC agents who bring new business to the corporation with increasing growth rate. This record will become the benchmark for future evolution of the efforts of agents.

With the help of this data, a comparative study has been shown between LIC of India Vs Private Insurance (Total) and total number of agents working under this industry:

Details of Individual Agents of Life Insurers 2021-22				
Insurer	As on 31st March, 2021	Additions	Deletions	As on 31st March, 2022
Private Total	933856	381851	300189	1015518
LIC	1148811	263894	233476	1179229
Industry Total	2082667	645745	533665	2194747



(Source: IRDAI Annual Report 2021-22)

Interpretation:

The number of individual agents as at 31st March, 2022 were 21.95 lakhs as against 20.83 lakhs as on 31st March 2021. Private insurers stands with 10.16 lakh agents, whereas LIC of India stands with 11.79 lakh agents as at 31st March, 2022.

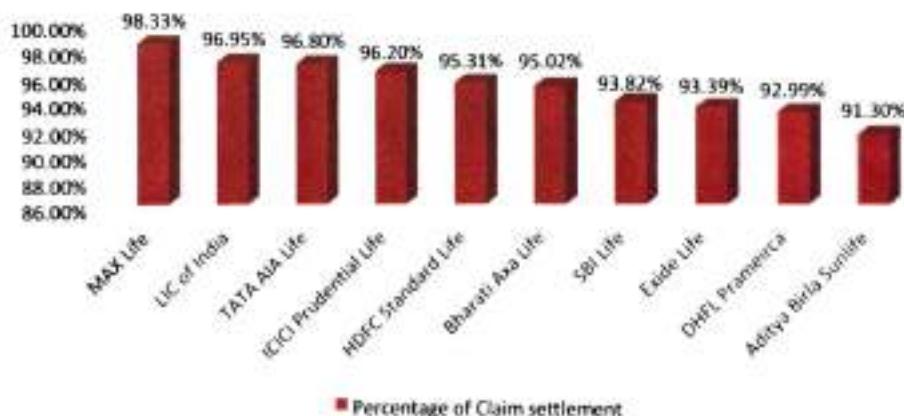
During the year 2021-22, the total number of agents appointed in life insurance industry were 6.46 lakhs and the number of agents terminated were 5.34 lakhs. While private insurers appointed 3.82 lakh and terminated 3.00 lakh agents, LIC of India appointed 2.64 lakh agents and terminated 2.33 lakh agents.

: Claims settlement in the Life Insurance industry:

Selection of a proper life insurance policy is a basic requirement of individual's risk management policy. At the same time proper claim settlement is also an important part of the risk management system. A claim is the payment made by the insurer to the insured or claimant on the occurrence of the event specified in the contract, in return for the premiums paid for the insured. The easy and timely settlement of a valid claim is an important function of an insurance company.

With the help of the following data Claims settlement in the Life insurance industry have been shown for the Financial Year 2020-21:

Top 10 best Life Insurance Companies as per Claim Settlement 2020-21



(Source: IRDAI Annual Report 2020-21)

Interpretation:

Among the Private life insurance companies and in the whole life insurance sector MAX Life provides the highest claim settlement with 98.33%, whereas Aditya Birla Sunlife provides 91.30% of the claim settlement, which stands lowest among the top 10 life insurance companies.

On the other hand, Life Insurance Corporation of India (LICI), stands second position in the terms of claim settlement with 96.95%, being the one and only public life insurance company and the giant life insurance company in India.

: Flagship schemes of Govt. of India for insuring the lives of Indians:

The Central Government launched two landmark insurance schemes, namely, Pradhan Mantri Jeevan Jyoti Bima Yojna (PMJJBY) and Pradhan Mantri Suraksha Bima Yojna (PMSBY) as a part of financial inclusion on 9th May, 2015. The purpose of these schemes is to provide insurance protection to account holders of the Banks at a very reasonable cost.

The PMJJBY is available to people in the age group of 18 to 50 years having a bank account who give their consent to join / enable auto-debit. The life cover of Rs. 2 lakhs shall be for the one year period stretching from 1st June to 31st May and will be renewable. Risk coverage under this scheme is for Rs. 2 Lakh in case of death of the insured, due to any reason. The premium is Rs. 330 per annum which is to be auto-debited in one installment from the subscriber's bank account on or before 31st May of each annual coverage period under the scheme.

The scheme is being offered by Life Insurance Corporation and all other life insurers who are willing to offer the product on similar terms with necessary approvals and tie up with banks for this purpose.

A small data analysis has been shown on the gross enrollment reported by the banks as on 1st February, 2021 (recent available data updated data on website):

Gross Enrollment Reported by Banks (Amt. In Rs. Crores)				
Parameters	As on. 01.02.2021	As on. 01.01.2021	Addn./Redn. over the month	Addn./Redn. during the month previous to that (01.01.2021 - 01.12.2020)
Gross enrolment reported by Banks subject to verification of eligibility, etc. (Amt. in Rs. Crores)	5.2714	5.2297	0.0417	0.0144
Total No. of claims recd.	92053	89216	2837	4455
Total No. of claims disbursed	83274	79373	3901	1553

[Source: Open Government Data (OGD) platform India]

Interpretation: PMJJBY Enrollment as on 1st February, 2021 is Rs. 5.28 Crores with an addition of Rs. 4.17 Lakhs. Total number of claims received is 92,053 and total number of claims disbursed is 83,274.

: Findings:

1. The market share in terms of Life Insurance Premium for the year 2021-22 shows that Life Insurance Corporation of India (LICI) leads the market with 66.24%, whereas in Private sector HDFC Life leads with 7% share in terms of premium, SBI Life comes after that with 6.40%, ICICI Prudential with 4.80% and others standing with 15.60%.
2. The market share in terms of Number of Policy for the year 2021-22 shows that Life Insurance Corporation of India (LICI) leads the market with 74.70%, whereas in Private sector SBI Life leads the market with 5.30% share in terms of policy, HDFC Life comes after that with 3.40%, ICICI Prudential with 3.12% and others standing with 13.50%.
3. LIC of India is leading in three categories of premium namely Individual Single Premium, Group Single Premium and Group Non-Single premium. On the other hand, Private total is higher in Individual Non-Single premium and Group-Yearly-Renewable premium.
4. The total premium collected by LIC of India increased by 5.68 % in 2022 compared to the previous year. LIC of India collected a premium of Rs.142191.69 crores in 2022 whereas the premium collection for the year 2021 was Rs.13455.68 crores.
5. The number of individual agents as at 31st March, 2022 were 21.95 lakhs as against 20.83 lakhs as on 31st March 2021. Private insurers stands with 10.16 lakh agents, whereas LIC of India stands with 11.79 lakh agents as at 31st March, 2022.
During the year 2021-22, the total number of agents appointed in life insurance industry were 6.46 lakhs and the number of agents terminated were 5.34 lakhs. While private insurers appointed 3.82 lakh and terminated 3.00 lakh agents, LIC of India appointed 2.64 lakh agents and terminated 2.33 lakh agents.
6. Among the Private life insurance companies and in the whole life insurance sector MAX Life provides the highest Claim settlement with 98.33%, whereas Aditya Birla Sunlife provides 91.30% of the claim settlement, which stands lowest among the top 10 life insurance companies.
On the other hand, Life Insurance Corporation of India (LICI), stands second position in the terms of claim settlement with 96.95%.
7. PMJJBY Enrollment as on 1st February, 2021 is Rs. 5.28 Crores with an addition of Rs. 4.17 Lakhs. Total number of claims received is 92,053 and total number of claims disbursed is 83,274.

CHAPTER 4

CONCLUSION

: Conclusion:

After the reforms in insurance sector, life insurance industries have seen a remarkable growth moreover; the policies measures provided a favorable environment for insurance companies to flourish in the country.

Till 2022 there were 24 life insurance companies operating in India of which 23 are private insurers and 1 public insurer that is LIC of India. LIC has been successfully able to create value for its customers or policy holders, showing a respectable growth in its business. There is enormous potential for life insurance and no doubt that LIC still enjoys immense goodwill in our country.



Government of India tries to promote the insurance sector by giving Deductions under Section 80C of Chapter VIA of the Income Tax Act, 1961 and there are number of peoples who invest in life insurance for attaining Tax saving benefits. Also, flagship schemes like Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) helps in insuring lives for those who are of lower income groups and are unable to purchase policies.

The future looks promising for the life insurance industry with several changes in regulatory framework which will lead to further change in the way the industry conducts its business and engages with its customers. The overall insurance industry is expected to reach US\$ 280 billion by 2020. Life insurance industry in the country is expected grow by 12-15 per cent annually for the next three to five years.

Demographic factors such as growing middle class, young insurable population and growing awareness of the need for protection and retirement planning will support the growth of Indian life insurance.

: Recommendations and Suggestions:

The life insurance industry plays an important role in improving national economy and for developing this sector certain changes and improvements are to be made. Some of these are:

- a) Due to the intense competition in the life insurance market, the life insurance companies have to adopt better strategies to attract more customers. Insurers will need to increase efforts to design new products that are suitable for the market and make use of innovative distribution channels to reach a broader range of the population.
- b) Life insurance products are taken mainly by middle and higher income groups. Hence, they should be regarded as main targeted income groups. Apart from them a large number of lower income groups lives in the country, therefore, life insurance products which are suitable for lower income group should also be released so that the market share increases.
- c) There are people living in the society who prefers to invest their savings in purchasing gold ornaments rather than investing in insurance especially life insurance. Life insurance companies should educate importance and benefits of insurance to general public through the agent and corporate social responsibility activity.
- d) LIC has to made more efforts to enhance its business in terms of technology distribution network, technological innovations, client relationship and quality.
- e) Procedure of claim should be made hassle-free and comfortable for the policyholder or the beneficiaries, as there are lot of guidelines which have to be followed for making the claim and many of the policyholder gets irritated as they have to approach from one department to the other.
- f) There are also a lot of fake claims which the insurers must take care of it. They must develop a simple guideline in which they could identify whether the claim is genuine or not, as it would be applied to all the policyholders. Thus, it would make the claim easy for both the insurers and policyholders.

BIBLIOGRAPHY

References and links:

Annual Reports:

1. IRDAI Annual Report
2. LIC of India Annual Report

Journals:

1. Competing in a new age of Insurance - PwC
2. Role of agents in competitive regimes

Websites and weblinks:

1. www.ibef.org
2. www.investindia.gov.in
3. www.llicindia.in
4. www.irdai.gov.in.
5. <https://data.gov.in/>
6. <https://economictimes.indiatimes.com/>

B.Sc. Food and Nutrition Honours

Sl. No.	Content	Page No.
1.	Syllabus Extract indicating project work	2 – 9
2.	List of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23)	10 – 12
3.	Sample report of the Project 1	13 – 89
4.	Sample report of the Project 2	90 – 136
5.	Sample report of the Project 3	137 – 241
6.	Sample report of the Project 4	242 – 303



UNIVERSITY OF CALCUTTA

Notification No. CSR/ 12 /18

It is notified for information of all concerned that the Syndicate in its meeting held on 28.05.2018 (vide Item No.14) approved the Syllabi of different subjects in Undergraduate Honours / General / Major courses of studies (CBCS) under this University, as laid down in the accompanying pamphlet:

List of the subjects

<u>Sl. No.</u>	<u>Subject</u>	<u>Sl. No.</u>	<u>Subject</u>
1	Anthropology (Honours / General)	29	Mathematics (Honours / General)
2	Arabic (Honours / General)	30	Microbiology (Honours / General)
3	Persian (Honours / General)	31	Mol. Biology (General)
4	Bengali (Honours / General / LCC2 / AECC1)	32	Philosophy (Honours / General)
5	Bio-Chemistry (Honours / General)	33	Physical Education (General)
6	Botany (Honours / General)	34	Physics (Honours / General)
7	Chemistry (Honours / General)	35	Physiology (Honours / General)
8	Computer Science (Honours / General)	36	Political Science (Honours / General)
9	Defence Studies (General)	37	Psychology (Honours / General)
10	Economics (Honours / General)	38	Sanskrit (Honours / General)
11	Education (Honours / General)	39	Social Science (General)
12	Electronics (Honours / General)	40	Sociology (Honours / General)
13	English ((Honours / General/ LCC1/ LCC2/AECC1)	41	Statistics (Honours / General)
14	Environmental Science (Honours / General)	42	Urdu (Honours / General /LCC2 / AECC1)
15	Environmental Studies (AECC2)	43	Women Studies (General)
16	Film Studies (General)	44	Zoology (Honours / General)
17	Food Nutrition (Honours / General)	45	Industrial Fish and Fisheries – IFFV (Major)
18	French (General)	46	Sericulture – SRTV (Major)
19	Geography (Honours / General)	47	Computer Applications – CMAV (Major)
20	Geology (Honours / General)	48	Tourism and Travel Management – TTMV (Major)
21	Hindi (Honours / General /LCC2 / AECC1)	49	Advertising Sales Promotion and Sales Management –ASPV (Major)
22	History (Honours / General)	50	Communicative English –CMEV (Major)
23	Islamic History Culture (Honours / General)	51	Clinical Nutrition and Dietetics CNDV (Major)
24	Home Science Extension Education (General)	52	Bachelor of Business Administration (BBA) (Honours)
25	House Hold Art (General)	53	Bachelor of Fashion and Apparel Design – (B.F.A.D.) (Honours)
26	Human Development (Honours / General)	54	Bachelor of Fine Art (B.F.A.) (Honours)
27	Human Rights (General)	55	B. Music (Honours / General) and Music (General)
28	Journalism and Mass Communication (Honours / General)		

The above shall be effective from the academic session 2018-2019.

SENATE HOUSE
KOLKATA-700073
The 4th June, 2018


(Dr. Santanu Paul)
Deputy Registrar

**SCHEME AND SYLLABUS FOR CHOICE BASED CREDITSYSTEM FOR B.Sc. HONOURS
FOOD AND NUTRITION**

SEMESTER	CORE COURSE (4)	ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)	SKILL ENHANCEMENT COURSE (SEC)	DISPLINE SPECIFIC ELECTIVE COURSE (DSE)	ELECTIVE: GENERIC COURSE (GE)		
I	FNT-A-CC-1-1-T:BASIC FOOD SCIENCE-I	(2)	(2)	(4)			
	FNT-A-CC-1-1-P:BASIC FOOD SCIENCE-I (PRACTICAL)						
	FNT-A-CC-1-2-T:HUMAN PHYSIOLOGY-I						
	FNT-A-CC-1-2-P:HUMAN PHYSIOLOGY-I (PRACTICAL)						
II	FNT-A-CC-2-3-T:BASIC FOOD SCIENCE-II						
	FNT-A-CC-2-3-P: BASIC FOOD SCIENCE-II (PRACTICAL)						
	FNT-A-CC-2-4-T:HUMAN PHYSIOLOGY-II						
	FNT-A-CC-2-4-P:HUMAN PHYSIOLOGY-II (PRACTICAL)						
III	FNT-A-CC-3-5-T: HUMAN NUTRITION-I		SEC-A-(1/2)				
	FNT-A-CC-3-5-P: HUMAN NUTRITION-I (PRACTICAL)						
	FNT-A-CC-3-6-T:COMMUNITY NUTRITION						
	FNT-A-CC-3-6-P:COMMUNITY NUTRITION (PRACTICAL)						
	FNT-A-CC-3-7-T: FOOD COMMODITIES						
	FNT-A-CC-3-7-P: FOOD COMMODITIES (PRACTICAL)						

	FNTA-CC8T: HUMAN NUTRITION-II FNTA-CC8P: HUMAN NUTRITION-II (PRACTICAL)			
IV	FNT-A-CC-4-9-Th: DIET THERAPY-I FNT-A-CC-4-9-P: DIET THERAPY-I (PRACTICAL)		SEC-B(3/4)	
	FNT-A-CC-4-10-Th: NUTRITIONAL BIOCHEMISTRY-I			
	FNT-A-CC-4-10-P: NUTRITIONAL BIOCHEMISTRY-I (PRACTICAL)			
	FNT-A-CC-5-11-Th: DIET THERAPY-II FNT-A-CC-5-11-P: DIET THERAPY-II (PRACTICAL)		DSE- A(1/2)	
V	FNT-A-CC-5-12-Th: NUTRITIONAL BIOCHEMISTRY-II FNTA-CC12P: NUTRITIONAL BIOCHEMISTRY-II (PRACTICAL)		DSE- B(1/2)	
VI	FNT-A-CC-6-13-Th: FOOD MICROBIOLOGY FNT-A-CC-6-13-P: FOOD MICROBIOLOGY (PRACTICAL)		DSE- A(3/4)	
	FNT-A-CC-6-14-Th: FOOD PRESERVATION FNT-A-CC-6-14-P: FOOD PRESERVATION (PRACTICAL)		DSE- B(2/4)	

2. General concepts of weights and measures. Eye estimation of raw and cooked foods
3. Preparation of food from different food groups and their significance in relation to health.
4. Preparation of supplementary food for different age group and their nutritional significance.
5. Planning and preparation of low cost diet for Grade I and Grade II malnourished child

FNT-A-CC-3-6-Th: COMMUNITY NUTRITION**4 CREDITS**

1. Concept of Community, types of Community, Factors affecting health of the Community.
2. Nutritional Assessment and Surveillance: Meaning, need, objectives and importance
3. Nutritional assessment of human: Clinical findings, nutritional anthropometry, biochemical tests, biophysical methods.
4. Diet survey: Need and importance, methods of dietary survey, Interpretation - concept of consumption unit, individual and total distribution of food in family, adequacy of diet in respect to RDA, concept of family food security.
5. Clinical Signs: Need & Importance's, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs.
6. Nutritional anthropometry:Need and importance, standard for reference, techniques of measuring height, weight, head, chest and arm circumference, interpretation of these measurements. Use of growth chart.
7. International, national, regional agencies and organisations. Nutritional intervention programmes to combat malnutrition.

FNT-A-CC-3-6-P:COMMUNITY NUTRITION (PRACTICAL)**4 CREDITS**

1. Anthropometric Measurement of infant - Length, weight, circumference of chest, mid-upper arm circumference, precautions to be taken.
2. Comparison with norms and interpretation of the nutritional assessment data and its significance. Weight for age, height for age, weight for height, body Mass Index (BMI) Waist - Hip Ratio (WHR). Skin fold thickness.
3. Growth charts - plotting of growth charts, growth monitoring and promotion.
4. Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor, marasmus) I vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.

5. Estimation of food and nutrient intake: Household food consumption data, adult consumption unit, 24 hours dietary recall 24 hours record, Weightment method, food diaries, food frequency data, use of each of the above, information available through each individual, collection of data, estimation of intakes.

FNT-A-CC-3-7-Th: FOOD COMMODITIES

4 CREDITS

1. Cereals and Millets: Structure, processing, storage, use in various preparation, variety, selection and cost. Cereal products, breakfast cereals, fast food.
2. Pulses and Legumes: Structures, Selection and variety. Storage, Processing and use in different preparations, Nutritional aspects and cost.
3. Milk and Milk products : Composition, Classification, Selection Quality and Cost, Processing, Storage and uses in different preparations, Nutritional aspects, shelf life and spoilage.
4. Eggs: Production, grade, quality selection, storage and spoilage, cost nutritional aspects and use in different preparations.
5. Meat, Fish and Poultry: Types, Selection, Purchase, Storage, Uses, preparations Cost, Spoilage of fish Poultry and meat.
6. Vegetables and Fruits: Variety, Selection, purchase, storage, availability causes and nutritional aspects of raw and processed products and use in different preparations.
7. Sugar and sugar Products: Types of natural, sweeteners, manufacture, selection, storage and use as preserves, stages in sugar cookery.
8. Fats and Oils: Types and sources (animal and vegetable), Processing, uses in different preparations, storage, cost and nutritional aspects.
9. Raising and Leavening agents: Types, constituents, uses in cookery and bakery, storage.
10. Food Adjuncts: Spices, condiments, herbs, extracts; concentrates essences, food colours, origin, classification, description, uses, specifications, procurements and storage.
11. Convenience Foods: Role, types, advantages, uses, cost and contribution to diet.
12. Salt: Types and uses.
13. Beverages: Tea; Coffee. Chocolate and Cocoa Powder-Processing, cost and nutritional aspects, other beverages-Aerated beverages, juices.

FNT-A-CC-3-7-P: FOOD COMMODITIES (PRACTICAL)

2 CREDITS

1. Detection of starch, sucrose, sucrose, formalin, boric acid, and urea in milk.
2. Detection of urea in puffed rice.
3. Detection of Vanaspati in Ghee/Butter.
4. Detection of Khesari flour in besan.

2. Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.
3. Food Standards : ISI, Agmark, FPO, MPO, PFA, FSSAI.

FNT-A-CC-6-14-P: FOOD PRESERVATION (PRACTICAL) 2 CREDITS

1. Different methods of Food preservation – Drying, Freezing, Frying, canning, bottling etc.
2. Aseptic handling: Sources of contamination of foods.
3. Preparation of pickles, tomato sauce, chili sauce, jelly, tomato puree, squashes etc.

DISCIPLINE SPECIFIC ELECTIVE (DSE) SYLLABUS

FNT-A- DSE-A-5-1-Th: PUBLIC HEALTH 4 CREDITS

1. Health and Dimension of Health: Positive health Versus Absence of disease
2. Secondary Sources of Community Health data :Sources of relevant vital statistics of infant, child & maternal mortality rates
3. Immunization: Importance and Immunization schedule for children, adults and for foreign travellers.
4. Community Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.
5. Concept of Epidemiology: Study of the epidemiologic approach-determinants of disease preventive & social means.
6. Communicable and infective disease control: Nature of communicable and infectious diseases, infection, contamination, disinfections, decontamination, transmission-direct & indirect, vector borne disease infecting organisms and positive agents, environmental agents and epidemiological principles of disease control.
7. Public health hazards due to contaminated foods: Food borne infections and intoxications: symptoms, mode of transmission and methods of prevention, investigation and detection of food borne disease out-break.

FNT-A-DSE-A-5-1-P: PUBLIC HEALTH (PRACTICAL)	2 CREDITS
<ol style="list-style-type: none"> Preparation of 3 audio visual aids like charts, posters, models related to health and nutrition education. Formulation and preparation of low cost and medium cost nutritious/ supplementary recipe. Field visit(health centre, immunization centre, ICDS, MCH centre, NGOs etc.). 	

FNT-A-DSE-A-5-2-Th: MUSHROOM CULTURE	4 CREDITS
<ol style="list-style-type: none"> Definition and characteristics of mushroom. Morphology and life cycle of Mushroom. Identification and classification of mushroom Nutritional and medicinal value of edible mushrooms; poisonous mushrooms Types of edible mushrooms available in India- <i>Volvariella volvacea</i>, <i>Pleurotus citrinopileatus</i>, <i>Agaricus bisporus</i>. Process of mushroom cultivation. Storage and nutrition: short term storage (Refrigeration- upto 24 hours), long term storage (canning, pickles, papads), drying, storage in salt solutions. 	

FNT-A- DSE- A-5-2-P: MUSHROOM CULTURE(PRACTICAL)	2 CREDITS
<ol style="list-style-type: none"> Visit to Mushroom Culture Centers/ Farms for: <ul style="list-style-type: none"> Process involved in mushroom cultivation Types and varieties of mushroom Visual Identification of edible and poisonous mushroom Marketing Different Food preparation from mushroom 	

FNTA-DSE- A-6-3-Th : DIET COUNSELING AND PATIENT CARE	4 CREDITS
<ol style="list-style-type: none"> Introduction to term Dietician: Definition of Dietician , Difference between registered dietician & Nutrition Role of dietician in hospital : work area of hospital dietician, role of dietician in hospital Role of dietician in community :- work area of community dietician, role of community dietician 	

4. Introduction to Nutrition Care Process: Definition of Nutrition Care Process .Steps of Nutrition Care Process
5. Nutrition Assessment:-Definition , Nutrition assessment component, Critical thinking
6. Nutrition Diagnosis: nutrition diagnosis domain:- intake, clinical, behavioral – environmental
7. Nutrition diagnosis component• nutrition vs. medical diagnosis
8. Nutrition Interventions: Definition and objectives
9. Nutrition Monitoring & Evaluation : Definition, Nutrition monitoring & evaluation components, nutrition goals & objectives. Evaluation of nutrition care

**FNT-A-DSE- A-6-3-P: DIET COUNSELING AND PATIENT CARE (PRACTICAL)
2CREDITS**

Visit and training to hospitals/nursing homes for 7-15 days :

- 1 Taking Case history and study
- 2 Routine Hospital diet
- 3 Distribution of food from kitchen to individual patient with specific diet.
- 4 Dietary management of patient in different diseases and diet chart for the particular patient.
- 5 Role of dietitian /nutritionist in diet counselling

FNT-A-DSE- A-6-4-Th: GERIATRIC NUTRITION 4 CREDITS

1. Definition of ageing, senescence, old age or aged people, gerontology, geriatrics, and Geriatric nutrition. Classification of old population.
- 2 .Physiological and biochemical changes during old age.
3. Assessment of nutritional status of older adults.
4. Nutritional requirements and general dietary guidelines for elderly .
5. Major nutritional and health problems during old age.

FNT-A-DSE- A-6-4-P: GERIATRIC NUTRITION(PRACTICAL) 2 CREDITS

1. Visit to old- age homes.
2. Preparation of dishes suitable for older person- soft,semisolid and easily digestible balanced diet.

FNT-A-DSE-B-5-1-Th: THEORIES OF HUMAN DEVELOPMENT 4 CREDITS

BUDGE BUDGE COLLEGE
Academic Session: 2022-2023
Department of Food and Nutrition

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

List of students undertaking project field work follows:

B.Sc. Food and Nutrition Honours

Serial No.	Roll Number	Registration Number	Name	I. Course Name and Project Title	Supervisor	II. Course Name and Project Title	Supervisor	III. Course Name and Project Title	Supervisor
1	203561-11-0005	561-1211-0358-20	Alina Mitra	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
2	203561-11-0006	561-1211-0360-20	Anisha Dutta	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
3	203561-11-0007	561-1211-0363-20	Chandrani Garai	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
4	203561-11-0010	561-1211-0367-20	Pranita Basu	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
5	203561-11-0011	561-1211-0370-20	Sayantani Sarkar	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
6	203561-11-0012	561-1211-0374-20	Sneha Adhikary	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
7	203561-11-0013	561-1211-0375-20	Sudipa Dulai	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
8	203561-11-0036	561-1211-0429-20	Piu Paramanik	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu

Serial No.	Roll Number	Registration Number	Name	I. Course Name and Project Title	Supervisor	II. Course Name and Project Title	Supervisor	III. Course Name and Project Title	Supervisor
9	203561-11-0037	561-1211-0430-20	Payel Mukherjee	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
10	203561-11-0042	561-1212-0362-20	Arpita Mal	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
11	203561-11-0044	561-1212-0368-20	Riya Sardar	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
12	203561-11-0045	561-1212-0372-20	Shreya Kayal	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
13	203561-11-0046	561-1212-0377-20	Suparna Das	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
14	203561-11-0050	561-1214-0361-20	Anushree Sadhukhan	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
15	203561-11-0051	561-1214-0373-20	Shreya Mondal	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
16	203561-21-0002	561-1111-0369-20	Salil Panja	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
17	203561-21-0008	561-1111-0431-20	Sohan Mondal	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu
18	203561-21-0021	561-1115-0376-20	Suja Shaharyar Mozib	(DSE A-6-4-P) Geriatric Nutrition, Assessment of nutritional status of an elderly person	Dr.Shruti Agrawal	(CC-6-14-P) Food Preservation, Visit to Canning Industry	Dr.Shruti Agrawal	(DSE A-5-1-P) Public Health, Visit to ICDS Centre	Smita Sahu

IV. B.Sc. Food and Nutrition Honours

Serial No.	Roll Number	Registration Number	Name	Course Name and Project Title	Supervisor
1	213561-11-0012	561-1211-0308-21	Barsha Khamaru	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
2	213561-11-0013	561-1211-0310-21	Anisha Khatun	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
3	213561-11-0014	561-1211-0311-21	Rupsa Ghosh	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
4	213561-11-0015	561-1211-0312-21	Mahek Shaw	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
5	213561-11-0016	561-1211-0315-21	Sreemoyee Sengupta	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
6	213561-11-0017	561-1211-0317-21	Piyasa Ghosh	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
7	213561-11-0018	561-1211-0318-21	Nishat Sekh	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
8	213561-11-0019	561-1211-0319-21	Saptadipa Hazra	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
9	213561-11-0020	561-1211-0320-21	Sahina Khatun	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
10	213561-11-0021	561-1211-0321-21	Sneha Ghosh	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
11	213561-11-0022	561-1211-0322-21	Srijita Das	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
12	213561-11-0044	561-1214-0316-21	Rimita Pramanick	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
13	213561-11-0049	561-1215-0313-21	Monija Mollick	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
14	213561-11-0051	561-1212-1166-21	Priya Mondal	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
15	213561-11-0053	561-1212-1230-21	Trisita Mandal	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal
16	213561-21-0009	561-1115-0309-21	Ashik Iqbal Molla	(CC-3-6-P) Community Nutrition, Visit to ICDS Centre	Dr.Shruti Agrawal

B.Sc. SEMESTER-VI (H) PRACTICAL
EXAMINATION-2023
(UNDER CBCS)

FOOD & NUTRITION (HONOURS)

PAPER : DSE-A4 (GERIARTIC NUTRITION)

ROLL & NO : 203561 - 11-0013

REGISTRATION NO : 561 - 1211-0375-20

CONTENT

SL NO.	TOPICS	DATE	PAGE NO.	TEACHER'S SIGNATURE
1.	NUTRITIONAL REQUIREMENT & PREPARATION OF SUITABLE DISHES FOR ELDERLY PERSONS:			
	• NUTRITIONAL NEEDS & WHOLE DAY MENU PLANNING FOR AN ELDERLY MAN:	16/03/23	1 - 14	<i>SAC 23/03/23</i>
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NUTRITIONAL REQUIREMENT DURING OLD AGE & PREPARATION OF DISHES SUITABLE FOR ELDERLY PERSONS

• INTRODUCTION:

Indian population has approximately tripled during the last 50 years, but the number of elderly Indians has increased more than four fold. As per census 2011, the absolute number of elderly population has crossed the 100 million mark.

The cornerstone of geriatric nutrition is ensuring a well balanced diet to provide optimal nutrition which can then delay the leading cause of death : heart disease, cancer, stroke.

• NUTRITIONAL NEED:

The nutritional needs of the elderly vary widely due to changes in the ability to digest, absorb & utilize nutrients.

• ENERGY:

The age related body composition changes reduce the REE & with the declining PAL, the BMR & energy requirement ultimately decrease in old age. The estimate

Daily Nutrient recommendation for the elderly in India
 (ICMR, NIN, 2020 RDA).

Nutrients	ELDERLY PERSONS	
	Men ≥ 60 Years	Women ≥ 60 Years
Dietary Fibre (gm)	30	25
Protein (gm)	54.0	46.0
Vitamin A (μg)	1000	840
Thiamine B1 (mg)	1.4	1.4
Riboflavin B2 (mg)	2.0	1.9
Niacin (mg)	14	11
Vitamin C (mg)	80	65
Vitamin B6 (mg)	1.9	1.9
Folate (μg)	300	200
Vitamin B12 (μg)	2.2	2.2
Vitamin D (I.U.)	800	800
Calcium (mg)	1200	1200
Magnesium (mg)	440	370
Iron (mg)	19	19
Zinc (mg)	17	13.2
Iodine (μg)	140	140

energy) requirements (EER) based on BMR and physical activity levels. For the sedentary elderly man and woman weighing 65 kg and 55 kg are 1699 kcal and 1477 kcal, respectively. These requirements have been rounded off to 1700 kcal for man and 1500 kcal for woman.

• PROTEIN:

A major feature of ageing is progressive loss of protein. This is due to reduction in skeletal muscle mass & Sub-optimal intakes protein. The protein: energy ratio (PE ratio) must has to be increased to maintain the protein intake in the presence of a decreased energy intake.

• FAT:

Fat provides energy, essential fatty acids & fat soluble vitamins. Dietary fat should meet 30-40 % of total energy intake of elderly saturated fat should provide not more than 10% of total calories.

• CARBOHYDRATE:

The diet should include both simple and complex carbohydrates. The complex carbohydrates contain more fiber, vitamins and minerals are very important as they are digested more slowly & reduce glycemic response. Carbohydrate must provide 55-60% of the total calorie intake.

Daily Nutrients recommendations for the elderly in India (ICMR-NIN, 2020. EAR)

Elderly Persons	Energy (Kcal)
Men \geq 60 years	1700
Women \geq 60 years	1500

- EAR - Estimated Average Requirement.



• DIETARY FIBRE:

Elderly People should take adequate amount of dietary fibre, essentially the bulk forming cereal fibre. Fibre helps to prevent constipation and large bowel cancer.

• VITAMINS:

With the reduction in energy requirements & the lower intake of food along with the impaired absorption, metabolism and utilization, deficiency of certain vitamins is more likely occur in elderly.

■ WATER SOLUBLE VITAMINS:

• VITAMIN B₆:

Deficiency of Vitamin B₆ is common in older people. Vitamin B₆ deficiency is often associated with PEM and contributes to anaemia. Pyridoxine is also important for cell mediated immunity and lymphocyte proliferation.

• VITAMIN B₁₂:

Serum levels of vitamin B₁₂ decreases with age deficiency can causes anaemia neurological disorders and even dementia. Older population should consume foods fortified with vitamin B₁₂ or a supplement containing vitamin B₁₂ to meet their RDA.

•FOLIC ACID:

Folic acid is required for methylation & nucleotide biosynthesis reactions and its deficiency leads to anaemia, atherosclerosis, dementia etc. Folic acid deficiency is very common amongst the older population.

•VITAMIN-C:

The elderly are prone to vitamin deficiency & deficiency may cause capillary fragility & cataract. Hence older people encouraged to drink fruits or consume fruits rich in Vitamin-C.

•FAT SOLUBLE VITAMINS:

•VITAMIN-A:

Vitamin A deficiency is very rare in older people & essentially cause night vision impairment. However, the elderly are at risk of vitamin A deficiency if their intake of animal products, vegetables & fruits & inadequates.

•VITAMIN-D:

Vitamin D deficiency (VDD) is associated with osteoporosis in elderly people. VDD is also leads to secondary hyperparathyroidism, in sufficient bone calcification increased risk of osteoporosis, falls and fractures.

The ICMR-NIN (2020) recommends an additional

allowance of 200 IU (20 µg)/day). Vitamin D for the elderly population above 60 years in India as RDA at 800 IU.

• MINERALS:

• CALCIUM:

Calcium is important for bone health of elderly people also. Keeping in view the decreased absorption of calcium and age related bone loss, the ICMR-NIN (2020) recommends an additional allowance of 200 mg calcium to EAR of 800 mg set for adult person.

• ZINC:

Zinc is important for cell mediated immunity (CMI). Older adults are vulnerable to zinc deficiency leading to increased inflammation associated with various health problems, including cancer, CVDs, and autoimmune disease & diabetes. So diet of elderly people should be rich in good sources of zinc such as lean meat, seafood, and protein rich plant sources (beans and legumes).

• IRON:

Elderly people may have lower iron requirements to maintain adequate iron stores as compared to younger adults.

•FLUID:

Older people have a greater proportion of fat mass to lean muscle mass. Since the water content of fat mass is less than muscle mass, the elderly are likely to become dehydrated as there is impaired thirst response to hypovolemia & hyper osmolality. Therefore elderly should be encouraged to consume water frequently.

DIETARY GUIDELINES:

- The diet of the elderly may be modified according to physical activity of an individual & general condition.
- The diet should be simple but nutritious.
- Empty calorie foods should be taken minimum & calorie dense foods should be avoided.
- The quality of the diet can be improved by adding liberal amounts of green-leafy vegetables, Fruits, & whole cereals in the diet.
- Foods rich in protein, vitamin and minerals should be included in diet.
- Fat promotes weight gain. Fat particularly saturated fat should be limited.
- Fried food should be avoided.
- Gas forming foods like sulphur containing vegetables & certain type of pulses have to be avoided.
- The semi-solid and soft well cooked foods should be given.

MODIFICATION OF DIET DURING OLD AGE:

Dietary Modification	Reasons
• Foods must be soft, easily chewable.	• Problems of dentition fallen teeth or dentures.
• Food should be easily digestible.	• Decreased production of digestive enzymes.
• Restricted fat in diet inclusion of PUFA.	• Susceptible to heart disease
• Food rich in fibres should be given.	• To prevent constipation & reduce cholesterol level. Also prevent colon cancer.
• Coffee, tea and cola beverages should be restricted.	• May result in insomnia due to over stimulation.
• Foods rich in calcium like milk and curd should be given.	• To compensate the bone loss and reduce the incidence of osteoporosis. Curd can aid in balance of intestinal flora.
• Green leafy vegetables can be given liberally.	• Source of nutrients like carotene, calcium, iron, riboflavin, folic acid, & vitamins besides supplying fibres, rich in antioxidants.

Dietary Modification	Reasons
• Foods of the elderly should consist of familiar foods. New pattern may lead to foods are difficult to accept.	• Unfamiliar or changes in food psychological problems like depression.
• Clear soup at the beginning of meal.	• Aids digestion.
• Small & frequent meals instead of three heavy ones.	• Flavour more complete digestion and free from disease.
• A glass of warm milk Just before going to bed.	• calcium along with magnesium deactivates adrenaline & promotes sleep. The warmth of milk acts as a relaxant.
• Heavy meal at noon & light in the night meal.	• Sleep is less likely to be disturbed.
• Too many sweets which lot of fats and sugar should be avoided.	• Too much of sugar may cause fermentation, discomfort due to indigestion & cause tooth ache & may increase cholesterol level, may lead obesity.
• Plenty of fluid.	• To prevent constipation & dehydration.
• Consumption of flaxseed (40 gm/day)	• Decrease hot flushes in post menopausal women.

CALCULATION OF DAILY NEEDS OF MACRONUTRIENT ON THE BASIS OF ESTIMATED AVERAGE REQUIREMENT OF ENERGY:

EAR = Estimated Average Requirement.

RDA = Recommended Dietary allowance.

E = Total energy requirement.

∴ EAR of energy for elderly Men = 1700 Kcal

∴ RDA of protein = 54 gm.

∴ Hence, diet should provide at least 64 gm protein.

$(100 \times \frac{54}{85} = 63.5 \approx 64 \text{ gm})$ as digestibility of a

standard Indian diet is approximately 85%. (PDCAAS = 85%).

∴ For elderly men, dietary fat should meet 30-40% E.

(ICMR, RDA, 2020),

As energy requirement decreases with increasing age

PE ratio should be raised.

∴ If, protein and fat provide 15% & 30% of total energy respectively then, $[100 - (15+30)]\%$

= 55% of total energy should come from carbohydrate.

∴ $1700 \times 30\% = 510$ should come from fats.

∴ Amount of fat = $\frac{510}{9} \text{ gm} = 56.67 \text{ gm}$

(as 1 gm of fat provides 9 Kcal).

∴ $1700 \times 55\% = 935$ Kcal should come from carbohydrates.

∴ Amount of carbohydrate = $\frac{935}{4} \text{ gm}$.

= 233.75 gm.

(as 1 gm of carbohydrate provides 4 Kcal).

∴ $1700 \times 15\% = 255$ Kcal should come from protein.

To provide 255 Kcal, $\frac{255}{4} = 63.75 \text{ gm}$ protein is needed.

(as 1 gm of protein provides 4 Kcal).

WHOLE DAY MENU PLAN FOR ELDERLY MEN:

Time	Food Items	Quantity
1. Early Morning (6:30 - 7:00 AM)	• Black Tea • Almonds	1 cup 10 gm
2. Breakfast (8:30 - 9:00 AM)	• Chapati • Soyabean Curry • Papaya	2 pieces 1 small bowl 1 bowl
3. Mid Morning (11:00 - 11:30 AM)	• Butter Milk	1 glass
4. Lunch (12:30 - 1:00 PM)	• Rice • Spinach Curry • Chicken Curry • Curd	1 bowl 1 bowl 1 bowl 1 bowl
5. Afternoon (3:30-4:00 PM)	• Watermelon	1 bowl
6. Evening Snacks (5:30 - 6:00 PM)	• Cheera pulao	1 bowl
7. Dinner (8:30 - 9:00 PM)	• Daliya cooked with vegetables	1 bowl
8. Bed time (10:00 - 10:30 PM)	• Milk • Dates	1 cup 13/3/23 4 pieces



EARLY MORNING



BREAKFAST

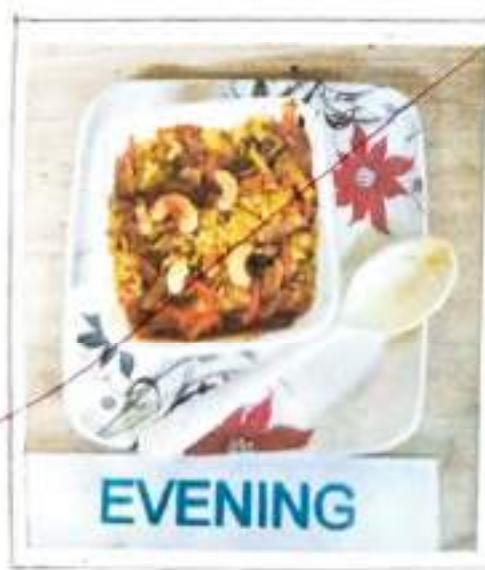
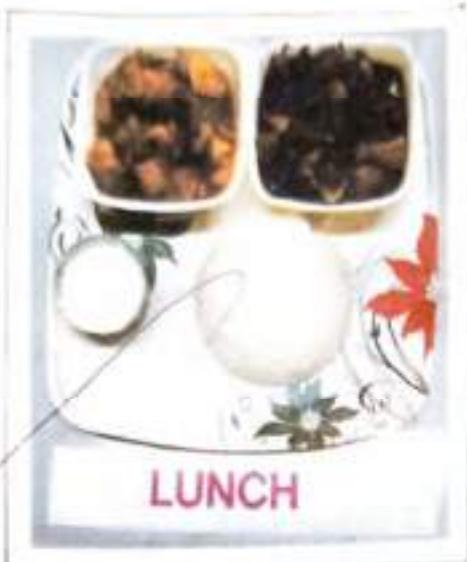


MID MORNING

NUTRITIVE VALUE OF WHOLE DAY MENU FOR ELDERLY

MEN:

Food Items	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
1 Early Morning					
→ Black Tea					
→ Almonds	10	65.5	1.05	2.08	5.89
2 Breakfast					
→ Chapati (whole wheat flour)	50	170.5	34.7	6.05	0.85
• Soyabean Curry					
→ Potato	80	77.6	18.08	1.28	0.08
→ Soyabean	25	108	1.47	10.8	1.87
→ Tomato	30	6	1.08	0.27	0.06
→ Onion	40	20	4.44	0.48	0.04
→ oil	5ml	45	—	—	5
• Papaya	80	25.8	5.76	0.48	0.08
3 Mid-Morning					
• Buttermilk	200ml	30	1	1.6	2.2
4. Lunch					
• Rice (Parboiled Milled)	50	173	39.5	3.2	0.2
• Spinach Curry					
→ Potato	50	48.5	11.3	0.8	0.05



Food Items	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
→ Spinach	70	18.2	2.03	1.4	0.49
→ Onion	50	25	5.55	0.6	0.05
→ oil	5ml	45	-	-	5
<hr/>					
• Chicken Curry				.	.
→ chicken	75	81.75	-	19.42	0.45
→ Potato	60	58.2	13.56	0.96	0.06
→ Onion	40	20	4.44	0.48	0.04
→ Tomato	40	8	1.44	0.36	0.08
→ oil	5ml	45	-	-	5
• Curd	100	60	3.0	3.1	4.0
<hr/>					
5. Afternoon:					
• Watermelon	100	16	3.3	0.2	0.2
<hr/>					
6. Evening Snacks					
• Cheera pulaw					
→ Rice flakes	30	103.8	93.19	1.98	0.36
→ Carrot	30	14.4	3.18	0.27	0.06
→ Onion	50	25	5.55	0.6	0.05
→ oil	5ml	45	-	-	5



DINNER



DATES



MILK

BED TIME



DINNER



MILK



DATES

BED TIME

	Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)
Total	1712.9	70.82 (60.19, 85%)	228.43	51.1
		digestable		
EAR	1700	43	-	-
RDA	-	54	-	-
Macronutrient Distribution (%E)		63.75 (15%)	233.75 (55%)	56.67 (30%)
Excess	$(1712.9 - 1700) = +12.9$	$(60.19 - 54) = 6.19$	-	-
Deficit			- 5.32	- 5.57

SOFT, SEMI SOLID & EASILY DIGESTABLE BALANCED DIET FOR ELDERLY PERSONS

Tooth loss, use of dentures & xerostomia (dry mouth) in elderly persons can lead to difficulties in chewing & swallowing. Missing teeth, loose or rotten teeth or poor fitting painful dentures make it difficult to eat some foods.

The soft diet is planned for condition where mechanical ease in eating or digestion or both are desired.

A soft diet is used as a transitional diet between a full fluid and a normal diet. The soft diet is a nutritionally adequate diet. It is soft in consistency, easy to chew, made up of simple, easily digestible foods, is moderately low in cellulose & connective tissues & does not contain such or highly flavoured foods.

In addition a soft diet also leaves a low residue after digestion & absorption. Thus, this diet is prescribed in acute infections. Some gastro-intestinal tract disorders & following surgery.

The average soft diet supplies between 1800-2000 Kcal & 55-65 gm protein. However, the energy, protein, and other nutrients are adjustable according to the individuals needs based on activity, height, weight, sex, age & disease condition. When properly planned, a soft diet is nutritionally adequate & can therefore, be continued for long periods.

■ Food Allowed:

- Refined cereals like rice & its products bread, biscuits, Semolina, Pasta etc.
- Washed pulses, as such or in the form of soups & in combination with cereals & vegetables.
- Milk & milk products such as curd, cottage cheese & mildly flavoured processed cheese
- Egg & lean meat like fish and chicken.
- Starchy & low fibre vegetable like potato, Spinach, bottle gourd etc.
- Soft fruits like papaya, banana, mango, etc. after removing the skin & seeds.
- Fruits & vegetables in the form of Juices, Soups & purees.
- Fats like butter, cream, vegetable oils etc.
- Salt & ~~sugar~~ in moderation.

■ Foods to be used in restricted amounts or avoided:

- Raw vegetables & fruits excepting soft fruits. Avoid skin & seeds of vegetables & fruits.
- High fibre vegetables like tomatoes, Peas, beans etc. these may only be used in puree or soup form.
- Whole grain cereals & their products like cracked wheat and atta.
- Whole pulses & split pulses with husk.
- Dried fruits & nuts.
- Fried foods, fatty & tough meats, rich gravies, cakes, pastries, halwas etc.
- Heavily spiced food, pickles.



DALIYA KHICHDI

DALIYA KHICHDI

■ Ingredient :

- Broken Wheat - 15 gm
- Green gram dal - 15 gm
- Grated Carrot - 15 gm
- Oil - 2.5 gm ($\frac{1}{2}$ tsp)
- Salt - to taste
- Water - 65 ml.
- Ginger paste - to taste.

■ Method:

1. oil is heated in pressure cooker.
2. Grated ginger is added and fried till it turn brown.
3. Then broken wheat is added & fried till golden brown.
4. Then rest of the ingredients are added & cook in pressure cooker for two minutes.

■ Nutritive Value:

Ingredient	Energy(Kcal)		Carbohydrate (gm)		Protein(gm)		Fat(gm)		
	Amount Present in (gm)	In taken 100 gm	Present In 100 gm	Amount in 100 gm	Present In 100 gm	Amount in 100 gm	Present In 100 gm	Amount in 100 gm	
Broken wheat	15	846	51.9	71.2	10.68	11.8	1.77	1.5	0.23
Green gram dal	15	348	52.2	59.9	8.98	24.5	3.615	1.2	0.18
Carrot	15	48	7.2	10.6	1.59	0.9	0.135	0.2	0.03
oil	2.5	900	22.5	-	-	-	100	2.5	
Total			133.8		21.25		5.58		2.94

■ Nutritional Significance of Daliya Khichdi:

■ GOOD SOURCE OF PROTEIN:

Daliya Khichdi consist of broken wheat & green gram dal. Broken wheat & green gram dal together, is good source of protein.

Wheat is deficient in lysine & green gram dal contains low amount of methionine but contain good amount of lysine. So, proteins from these two source (cereal & legume

complement each other & improve the quality of protein

One Serving of daliya Khichdi provide approximately 5.5 gm protein.

In old age there is a decrease in skeletal tissue mass. results in decrease in storage protein. Deficiency of protein results in oedema, anemia & lower resistance to infection. Thus requirements of protein increased.

Therefore daliya Khichdi is good for elderly person.

2. RICH SOURCE OF FIBRE:

Broken wheat & green gram dal both contain good amount of fibre. (100 gm wheat contain 1.2 gm fibre & 100 gm green gram dal contain 0.8 gm).

So, Daliya Khichdi is a fibre rich food.

→ Fibre stimulates peristalsis & increase bowel movement & faecal bulk, which helps to prevent constipation.

Constipation is frequent in old age.

→ Fibre also helps in reducing cholesterol level which may reduce the incidence of atherosclerosis.

→ Fibre also helps to prevent colon cancer. The incidence of cancer increases progressively with age.

Therefore, Daliya Khichdi is good for elderly person.

3. GOOD SOURCE OF MAGNESIUM:

Broken wheat is rich in Magnesium and green gram dal contains good amount of magnesium. (In 100 gm wheat - 138 mg & 100 gm green gram dal - 122 mg magnesium is present).

Magnesium deficiency may trigger an increased production of reactive oxygen species & promote a pro-inflammatory stage contributing to poor muscle strength.

Magnesium may retard the age-related loss of muscle function & performance.

4. Lastly, Daliya Khichdi is soft. So it is easy to chew & eat & also easy to digest.

In old age, people may have chewing problem & there is poor digestion due to decrease production of digestive enzyme & hydrochloric acid.

So, daliya khichdi is suitable for elderly person.



BREAD PUDDING

BREAD PUDDING

■ Ingredients:

- Bread - 40gm (2 Slices)
- Skimmed Milk - 300 ml.
- Sugar - 30 gm
- Egg - 55 gm (1 piece)
- Butter - 5 gm
- Vanilla essence - As per taste.

■ Method: 1) The edges of bread slices are trimmed & removed before buttering them.

2) The buttered side to be kept facing downwards in the mould in which pudding is to be baked.

3) The egg is to be beaten and sugar, milk, vanilla essence are to be added and mixed well.

4) The mixture of egg & milk to be spread over the slices of bread.

5) To be kept aside for 10-15 minutes.

6) In hot oven at 350°F for about 20 minutes to be baked & to be stored in refrigerator & kept 2 hrs.

7) To be served that cold bread pudding.

■ Nutritive Value:

Ingredients	Amount (gm)	Energy (Kcal)		Carbohydrate (gm)		Protein (gm)		Fat (gm)	
		Per 100gm	Taken Amount	Per 100gm	amount	Per 100gm	amount	Per 100gm	amount
Bread	40	295	98	51.9	20.76	7.8	3.12	0.7	0.28
Skimmed Milk	300 ml	29	87	4.6	13.8	2.5	7.5	0.1	0.3
Sugar	30	400	120	100	30	-	-	-	-
Egg	55	173	95.15	-	-	13.3	7.31	18.3	7.31
Butter	5	729	36.45	-	-	-	-	81	4.05
Total			436.6		64.56		17.93		11.94

■ Nutritional Significance of Bread pudding:

1. Bread pudding is soft & easily chewable food suitable for elderly persons because they generally face the problem of dentition or fallen teeth.
2. Loss of protein is very common in old age that increases the risk of infection & illness & reduces the muscle mass (Sarcopenia).

Bread pudding is made of first class

protein milk & egg & per serving of bread Pudding provides 17.93 gm of protein.

Thus, this food is an ideal food for elderly person.

3. Bread pudding is made of 300 ml of skimmed milk which provides 360 mg of calcium that helps to compensate the bone loss & reduce the risk of osteoporosis.

4. This food provides approximately 25-30% of total requirement of energy & it is palatable & provide Satisfaction.

5. As gastric acid & digestive enzymes production decrease in old age, so this food is suitable for digestion.



SUJI KHEER

SUJI KHEER

■ Ingredients:

- Semolina - 30gm
- Skimmed milk - 200 ml
(liquid)
- Sugar - 20gm

■ Method:

1. Semolina is roasted till it get slightly brown & gives an aroma.
2. Milk is added to it and cooked till the grains are cooked and become semi-solid.
3. After that sugar, powdered cardamom is added one by one.

■ Nutritive value of Suji Kheer:

Ingredients	Amount (gm)	Energy(kcal)		Carbohydrate		Protein		Fat(gm)	
		Per 100gm amount	Per taken amount	Per 100gm amount	Per taken amount	Per 100gm amount	Per taken amount	Per 100gm amount	Per taken amount
Semolina	30	398	10.4	79.8	22.44	10.4	3.12	0.8	0.24
Skimmed milk <small>(liquid)</small>	200	29	58	4.6	9.2	2.5	5	0.1	0.2
Sugar	20	398	79.6	99.4	19.88	0.1	0.02	-	-
Total			242		51.52		8.14		0.44

■ Nutritional Significance of Suji Kheer:

1. Excellent Protein Source:

Milk is an excellent protein source.

200ml of Skimmed milk provides upto 5gm of protein.

These protein is needed to build healthy skin, hair & muscle cells throughout the body. Milk's high protein contain is a good way for seniors to increase the amount of protein in the diet without having to eat more meat.

2. Milk Provides much needed calcium:

200 ml of skimmed milk provides upto 140 mg of calcium & seniors needed 1,200 mg of calcium per day (RDA).

Calcium is necessary because its important to keep the bones healthy, without proper calcium intake osteoporosis (a condition that causes bones to become brittle & breakable) occurs.

3. Good for heart health:

Semolina contains heart healthy nutrients like folate (25 µg/100 gm) & magnesium. It also rich in fibre that reduce the risk of heart disease. Fibre supports heart health by lowering LDL (bad) cholesterol, blood pressure & overall inflammation. 100 gm of semolina contains 9.72 gm of total dietary fibre.

4. SUPPORTS DIGESTIVE SYSTEM:

The high fibre content of Samolina supports digestive system by stimulating the growth of the gut bacteria and promoting regular bowel.

5. Due to its high level of Magnesium & dietary fibre:

Samolina improves blood sugar control, which then reduces the risk of type II diabetes, heart disease maintaining sugar level in old age.

→ Magnesium controls blood sugar by increasing cells response to insulin, that regulates blood sugar levels.
(100gm of Samolina contain 3.7 gm of Mg).

→ Whereas, fibre slows the absorption of carbohydrates in blood stream, helping to control blood sugar after a meal. Fibre also reduces HbA_{1c} levels as average blood sugar in old people with diabetes.

6. GOOD Carbohydrate SOURCE:

Lastly) Sugar from Suji Kheer provides a good amount of carbohydrate. The energy comes from sugar helps to boost the mood & also gives the energy for daily work of senior. Too much of sugar is strictly restricted for diabetic older person.



KHICHDI

KHICHDI

■ Ingredients:

- Rice - 25 gm
- Green gram dal - 25 gm
- Onion - 30 gm
- Grated Carrot - 15 gm
- oil - 5 ml
- Ginger paste - to taste.
- Salt - to taste
- Water - 125 ml.
- Cumin - as per taste.
- Turmeric - as per taste.

■ Method:

1. First oil is heated in pressure cooker.
2. Then ginger paste and onion is added and fried until its turns brown.
3. Then carrot is added and sauted for while.
4. After that rice, green gram dal is added and stirred for sometimes.
5. Then rest of the ingredients (salt, water) is added & cooked it in pressure cooker for 15 minutes.

■ Nutritive Value:

Ingredients	Amount (gm)	Energy (Kcal) Per 100g	Carbohydrate (gm)		Protein (gm) Per 100g	Fat (gm) Per 100g	
			Taken Amount 100g	Per Taken amount 100g		Taken Amount 100g	Per Taken amount 100g
Rice (Parboiled, milled)	25	346	86.5	79	19.75	0.4	0.1
Green gram dal	25	348	87	59.9	14.97	24.5	6.12
Carrot (grated)	15	10.6	1.59	48	7.2	0.9	0.13
Onion	30	59	17.7	12.6	3.78	1.8	0.54
oil	5ml	900	45	-	-	-	100
Total		237.8		46.95		6.89	5.53

■ Nutritional Significance of Khichdi:

1. WHOLESONE & NUTRITIOUS MEAL:

The rice & green gram dal combination in Khichdi helps to give the right mix of carbohydrate, dietary fibre and protein. Rice is packed with essential vitamins and minerals such as Vitamin B, potassium, phosphorus, folic acid, and magnesium. On the

other hand, green gram dal also contain similar minerals and vitamins.

2. Good Source Of Protein:

Rice is deficient in lysine but contains high amount of methionine and cysteine & green gram dal is contains good amounts of lysine but deficient in methionine. So, rice and green gram dal together is good source of protein & these two source complement each other, improve the quality of protein. This meal also contains essential amino acids, making it a complete protein source. One Serving of Khichdi provides approximately 6.89 gm protein.

During old age, it is very common to loose the skeletal muscle mass and results in decrease of protein storage in the muscle. Protein deficiency also shown in edema, anaemia. So in old age it is very important to increase the requirements of protein & Khichdi is the right meal for elderly persons to fulfill their requirements.

3. Helps in Digestion:

As per recipe, using cumin in Khichdi helps in the digestion by increasing the activity of digestive enzymes in the body. This also release bile from the liver, which helps in the digestion process in the gut.

In old age, the risk of digestive disorder is developed, like heart burn or acidity, irritable bowel

Syndrome etc. is very common, consumption of Khichdi helps to detoxify the body, according to ayurveda diet, & this also boost their immune system & maintains their digestive system properly.

4. RICH SOURCE OF MICRONUTRIENT:

Rice and green gram dal contains good amount of manganese, phosphorus, potassium, Zinc etc. But rice is good source of Mg & green gram dal also rich source of magnesium (100 gm of rice contain = 91 mg) & 100 gm of green gram dal contain = 122 mg).

Deficiency in micronutrients especially calcium can decrease bone density & results in osteoporosis which is very common in old age. Also developed a number of disorders like neuromuscular disorders, endocrine disturbance, diabetes & poor absorption of other nutrient.

5. RICH SOURCE OF FIBRE:

Khichdi is a good source of fibre. From 100g rice and green gram dal. We can get 3.74 gm & 9.37 gm of fibre.

During old age it is commonly, green gram dal help in the constipation problems. Fibre to prevent it by decreasing the bowel movement.

Fibre also helps in reducing the cholesterol level & lower the blood pressure which helps to prevent the various cardiovascular disease.

It helps to reduce the blood glucose level improve the glucose tolerance in the body.

Fibre helps to prevent the colon cancer which is very common in elderly person.

G. GLUTEN FREE:

Another advantage of Khichdi is that it is gluten free, as it contains rice and green gram dal, so it is beneficial for those elderly person who suffer from gluten sensitivity or celiac disease.

Celiac disease cause the gastrointestinal symptom like diarrhoea, steatorrhoea, so this recipe can prevent it.



PISH PASH

PISH PASH

- Ingredients:

- i) Rice (parboiled ; milled) - 50 gm

- ii) chicken - 100 gm

- iii) Potato - 50 gm.

- iv) Carrot - 50 gm

- v) Capsicum - 40 gm

- vi) Beans - 30 gm.

- vii) Onion - 100 gm.

- viii) Butter - 2 + tsp.

- Garlic - As per taste.

- Ginger - As per taste.

- Black pepper - As per taste.

- Cinnamon stick - As per taste.

- Cardamom - As per taste.

- Cloves - As per taste.

- Bay leaves - As per taste.

- Green chilli - As per taste.

- lemon - As per taste.

- Water - 3 to 4 cups.

~~properly & pack paper powder & side for 30 min~~

~~water is drained out.~~

~~rice at~~

~~whole~~

~~cinnamon, black pepper, cloves, cardamoms &~~

~~added & fried for 1 min.~~

~~5) Then all the vegetables & chicken pieces are add~~

~~& fried in low flames for 5-7 min~~

~~6) Then the washed rice is added & stirred & fried for~~

~~10 min.~~

~~7) The required amount of salt is sprinkled & 3-4 c~~

~~ob warm water added to the pan & allowed to cook~~

~~for 15-20 min.~~

~~8) Till rice is soft & mushy). $\frac{1}{2}$ tsp of butter is added~~

~~and pish pash is ready) to be serve.~~

NUTRITIVE VALUE CALCULATION:

Ingredients	Amount (gm)	Energy(Kcal)		Carbohydrate (gm)		Protein(gm)		Fat (gm)	
		Per 100 gm	Taken amount	Per 100 gm	Taken amount	Per 100 gm	Taken amount	Per 100 gm	Taken amount
• Rice, parboiled milled	50	346	173	79.0	39.5	6.4	3.2	0.4	0.2
• Chicken	100	109	109	-	-	25.9	25.9	0.6	0.6
• Potato	50	97	48.5	22.6	11.3	1.6	0.8	0.1	0.05
• Carrot	50	48	24	10.6	5.3	0.9	0.45	0.2	0.1
• Capsicum	40	18	7.2	2.9	1.16	1.2	0.48	0.2	0.08
• Beans	30	158	47.4	29.8	8.94	7.9	2.22	1.0	0.3
• Onion	100	50	50	11.1	11.1	1.2	1.2	0.1	0.1
• Butter	10	729	72.9	-	-	-	-	81.0	8.1
Total		532		477.3		34.25		9.53	

NUTRITIONAL SIGNIFICANCE OF PISH PASH:

CARBOHYDRATE:

Due to the presence of rice, potato, vegetables, it is a good source of carbohydrate. Rice contains methionine & few others amino acid. This dish contains sufficient amount of carbohydrates which is adequate for a meal.

PROTEIN:

Chicken is a first class protein & contains lysine. Rice is deficient in lysine but rich in methionine & chicken rich in lysine. So, together it provides a balanced protein.

ENERGY:

As this food contains rice, chicken, potato, vegetables, it can provide adequate energy for one meal. One serving of pish pash can provide 532 Kcal of energy.

VITAMINS & MINERALS:

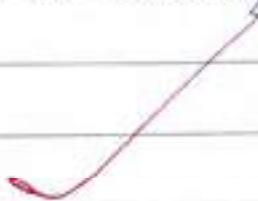
VITAMINS:

Cereal product like rice & various types of vegetables & spices are added to make this item, which contains vitamin B₁, B₂ & B₆, also chicken contains B₁₂.

• MINERALS:

This food item contains various types of minerals such as, zinc, iron, potassium, magnesium, selenium of which selenium & zinc work as antioxidant.

At last it can be said that, this item will fill the stomach in a healthy way.



CALCULATION OF DAILY NEEDS OF MACRONUTRIENT ON THE BASIS OF ESTIMATED AVERAGE REQUIREMENT OF ENERGY:

Page No. 38
Date 23/03/23

EAR of energy for elderly men (> 60 years) = 1700 Kcal.

As requirement of energy decreases 10 Kcal/year (ICMR, 2020).
the adjusted requirement of energy for an elderly man aged 82 years = $1700 - [(82-60) \times 10]$
= 1480 Kcal.

∴ RDA of protein = 51 gm.

Hence, diet should provide at least 64 gm protein

($100 \times \frac{51}{85} = 63.5 = 64$ gm) as digestability of a standard Indian diet is approximately 85% (PDCAAS = 85%).

∴ For elderly men, dietary fat should meet 30-40% of Energy (ICMR, RDA 2020).

∴ As energy requirement decreases with increasing age PE ratio should be raised.

∴ If protein & fat provide 15% and 30% of total energy respectively then,

$$[100 - (15 + 30)]\%$$

= 55% of total energy should come from

carbohydrate.

$1480 \times 30\% = 444$ Kcal should come from fats.

$$\therefore \text{Amount of fat} = \frac{444}{9} = 49.33 \text{ gm}$$

(As 1 gm of fat provides 9 Kcal)

$1480 \times 15\% = 222$ Kcal should come from proteins.

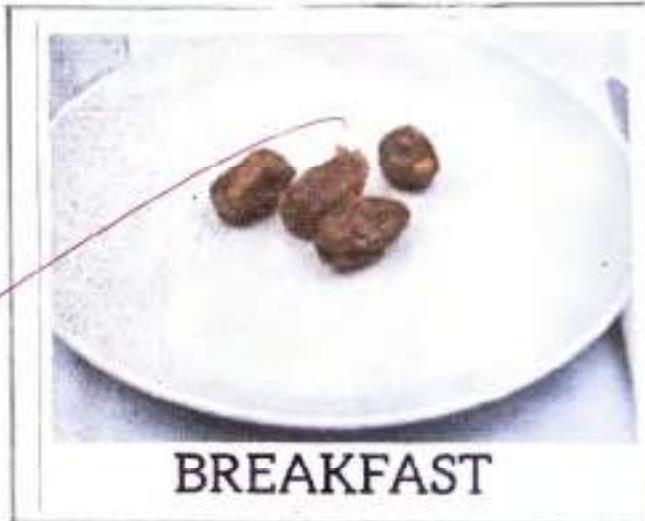
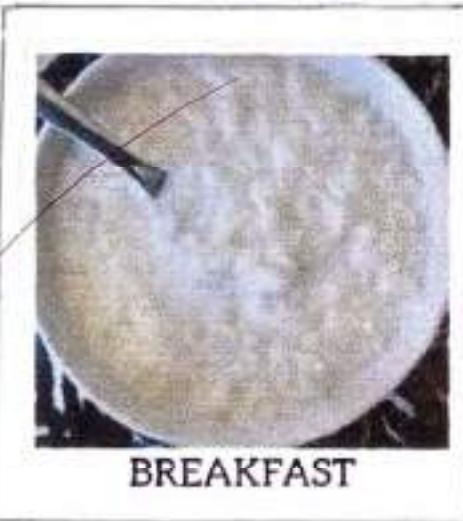
$$\therefore \text{Amount of protein} = \frac{222}{4} = 55.5 \text{ gm}$$

(As 1 gm of protein provides 4 Kcal)

WHOLE DAY MENU PLANNING FOR ELDERLY PERSONS SUFFERING FROM SWALLOWING DIFFICULTIES

Time	Food Items	Quantity.
1. Early Morning (6:30 - 7:00 AM)	• Shallow shake	1 glass.
2. Breakfast (8:30 - 9:00 AM)	• Rice flakes with whole Milk • Dates.	1 bowl 4 pieces.
3. Mid-Morning (11:00 - 11:30 AM)	• Butter Milk • Papaya	1 glass 1 plate
4. Lunch (12:30 - 1:00 PM)	• Veg Khichdi • Fish fry • Curd(1 cup) Fish(1 piece)	1 bowl
5. Afternoon (3:30 - 4:00 PM)	• Black Tea (without Sugar.) • Biscuit	1 cup 1 piece
6. Evening Snacks (5:30 - 6:00 PM)	• Semolina Porridge	1 bowl.
7. Dinner (8:30 - 9:00 PM).	• Veg dal • Roti • Apple stew	1 bowl. 1 piece 1 piece

✓ 05/04/23



ELDERLY MEN SUFFERING FROM SWALLOWING DIFFICULTIES

Food Items	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
<u>1. Early Morning:</u>					
• Shattu shake → Shattu	25	92.25	14.53	5.63	1.3
<u>2. Breakfast:</u>					
• Rice Flakes with milk → Rice Flakes	30	103.8	23.19	1.98	0.36
→ Milk (whole cow milk) → Dates (4 pieces)	200ml	134	8.8	6.4	8.7
	10	14.4	3.38	0.12	0.04
<u>3. Mid-Morning:</u>					
→ Butter Milk → Papaya	200ml	30	1	1.6	2.2
	100	32	7.2	0.6	0.1

Teacher's Signature



LUNCH



AFTERNOON



EVENING SNACKS

Food Items	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
<u>4. Lunch:</u>					
• Khichdi					
→ Rice (Parboiled Milled)	80	103.8	23.7	1.92	0.12
→ Lentil	20	68.6	11.5	5.11	0.14
→ Carrot	25	12	3	0.225	0.005
→ Beans	25	4	2.7	0.8	0.1
→ Pumpkin	25	6.5	1.15	0.35	0.025
• Fish Fry (Rohu)	75	72.75	9.3	12.45	1.05
→ oil	15 ml	135	-	-	15
• Curd	100	60	3	3.1	4
<u>5. Afternoon:</u>					
• Black Tea with out Sugar	-	-	-	-	-
• Biscuit	7	26	6.44	0.81	0.06
<u>6. Evening Snacks:</u>					
• Semolina Porridge					
→ Semolina	30	104.4	22.44	3.12	0.24
→ Milk (whole cow milk)	200 ml	134	8.8	6.1	8.2
→ Jaggery	20	76.6	19	0.08	0.02



DINNER



DINNER

FOOD ITEMS	AMOUNT (gm)	ENERGY (kcal)	CARBOHYDRATE (gm)	PROTEIN (gm)	FAT (gm)
7. Dinner					
• Roti (whole wheat flour)	30	102.3	20.82	3.63	0.51
• Veg Dal					
→ Carrot	20	9.6	2.12	0.18	0.04
→ Beans	30	4.8	3.24	0.96	0.12
→ Lentil	30	102.9	17.7	7.53	0.21
→ Onion	50	20.5	6.3	0.9	0.05
→ oil	5 ml	45	-	-	5
• Apple stew	100	59	13.4	0.2	0.5
Total		1562.95	226.71	63.38	47.69

	Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)
Total	1562.95	63.38, (53.87) 85% digestable	226.71	47.69
EAR	1700	43	-	-
Age-adjusted Requirement of Energy	1480	-	-	-
RDA	-	54	-	-
Macronutrient Distribution (%E)	-	55.5 (15%)	203.5 (55%)	49.33 (30%)
Excess	+ 82.95		+ 23.21	
Deficit		(54-53.87) = - 0.13		- 1.64

Teacher's Signature

[Signature]

Mini Nutritional Assessment

MNA®

Last name **MONDAL**
 Sex **Male** Age **61** Weight, kg **60**

First name **ARUN**
 Height, cm **159** Date **20/05/23**

Complete the screen by filling in the boxes with the appropriate numbers.
 Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

- A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?

0 = severe decrease in food intake
 1 = moderate decrease in food intake
 2 = no decrease in food intake

1

- B Weight loss during the last 3 months

0 = weight loss greater than 3kg (6.6 lbs)
 1 = does not know
 2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
 3 = no weight loss

2

- C Mobility

0 = bed or chair bound
 1 = able to get out of bed / chair but does not go out
 2 = goes out

2

- D Has suffered psychological stress or acute disease in the past 3 months?

0 = yes 2 = no

0

- E Neuropsychological problems

0 = severe dementia or depression
 1 = mild dementia
 2 = no psychological problems

1

- F Body Mass Index (BMI) = weight in kg / (height in m)²

0 = BMI less than 19
 1 = BMI 19 to less than 21
 2 = BMI 21 to less than 23
 3 = BMI 23 or greater

1

0 1

Screening score (subtotal max. 14 points)

12-14 points: Normal nutritional status

8-11 points: At risk of malnutrition

0-7 points: Malnourished

For a more in-depth assessment, continue with questions G-R

Assessment

- G Lives independently (not in nursing home or hospital)

1 = yes 0 = no

1

- H Takes more than 3 prescription drugs per day

0 = yes 1 = no

0

- I Pressure sores or skin ulcers

0 = yes 1 = no

1

References

- Yolas B, Wiels H, Abellan G, et al. Overview of the MNA® - its History and Challenges. *J Nutr Health Aging*. 2006; 10:456-465.
- Robertson LZ, Harker JD, Salas A, Gugaz Y, Yolas B. Screening for Undernutrition in Geriatric Practice: Developing the Short Form Mini-Nutritional Assessment (MNA-SF). *J Geriatr*. 2001; 56A: M105-117.
- Gugaz Y. The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us? *J Nutr Health Aging*. 2000; 10:466-477.
- © Société des Produits Nestlé SA. Trademark Owners
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For more information: www.mna-elderly.com

- J How many full meals does the patient eat daily?

0 = 1 meal
 1 = 2 meals
 2 = 3 meals

2

- K Selected consumption markers for protein intake

- At least one serving of dairy products (milk, cheese, yoghurt) per day
- Two or more servings of legumes or eggs per week
- Meat, fish or poultry every day

yes no

yes no

yes no

0.0 = if 0 or 1 yes
 0.5 = if 2 yes
 1.0 = if 3 yes

1 0

- L Consumes two or more servings of fruit or vegetables per day?

0 = no 1 = yes

0

- M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?

0.0 = less than 3 cups
 0.5 = 3 to 5 cups
 1.0 = more than 5 cups

1

- N Mode of feeding

0 = unable to eat without assistance
 1 = self-fed with some difficulty
 2 = self-fed without any problem

1

- O Self view of nutritional status

0 = views self as being malnourished
 1 = is uncertain of nutritional state
 2 = views self as having no nutritional problem

1

- P In comparison with other people of the same age, how does the patient consider his / her health status?

0.0 = not as good
 0.5 = does not know
 1.0 = as good
 2.0 = better

1

- Q Mid-arm circumference (MAC) in cm

0.0 = MAC less than 21
 0.5 = MAC 21 to 22
 1.0 = MAC greater than 22

0

- R Calf circumference (CC) in cm

0 = CC less than 31
 1 = CC 31 or greater

1

Assessment (max. 16 points)

1 0

0 1

1 0

Screening score

0 1

Total Assessment (max. 30 points)

1 0

Mainnutrition Indicator Score

- | | |
|---------------------|-------------------------------------|
| 24 to 30 points | <input type="checkbox"/> |
| 17 to 23.5 points | <input checked="" type="checkbox"/> |
| Less than 17 points | <input type="checkbox"/> |

Normal nutritional status

At risk of malnutrition

Malnourished

INTERPEATATION OF MNA

Mini Nutritional Assessment (MNA) is a screening tool to help identify elderly persons who are malnourished or at risk of malnutrition.

The full MNA is the original version of the MNA & takes 10-15 minutes to complete. The revised MNA-SF is a short form of the MNA that takes less than 5 minutes to complete. It retains the accuracy & validity of the MNA. Currently, the MNA-SF is the preferred form of the MNA for clinical practice in community, hospital, or long term care settings, due to its ease of use & practicality.

Recommended intervals for screening with the MNA are annually in the community, every three months in institutional settings or in persons who have been identified as malnourished or at risk for malnutrition, and whenever a change in clinical condition occurs. The MNA was developed by Nestle and leading international geriatricians.

The MNA proforma consists of two groups. First group is Screening (A-F) and second group is assessment (G-R). The maximum points for screening is 14 whereas maximum points for assessment is 16. If the person score is between 21-30, it indicates normal.

nutritional status, score between 17-23.5 indicates risk of malnutrition & score less than 17 shows malnutrition among elderly.

In this survey, it was found that the screening score was 08 which indicates at risk of malnutrition.

The assessment score was 10.0 which indicates malnourishment of the person.

Thus total assessment score is 18.0 & the elderly person is at risk of malnutrition.

8/13/23

DIET SURVEY BY 24 HOUR RECALL METHOD (ORAL QUESTIONNAIRE METHOD)

A) GENERAL INFORMATION OF THE SUBJECT

Household No....45.....; Name of the Respondent.....Arun Mondal.....
Village.Pujaki.....District.Saithia.....24.F.B.S.Address P.O.Sakra,Ranad.Date of Visit.,20/5/2023

Name of the Respondent	Arun Mondal
Age	61
Sex	Male
Religion	Hindu
Caste	Gentral
Activity Type	Sedentary Worker - S.W
Educational Level	H.S
Occupation	Retired
Monthly Income(Rs)	₹ 6,000

- Activity Type : a) Sedentary worker-S.W
b) Moderate Worker-M.W
c) Heavy Worker-H.W

MEAL PATTERN (Veg/Non-Veg):

B) SCHEDULE FOR DIET SURVEY

FOOD ALLERGY (Yes/No):

DIETARY PATTERN:

(Foods to be consumed by the subject on the day of survey)

MEAL TIME	FOOD CONSUMED	HOUSEHOLD MEASUREMENT (BOWL/CUP/PLATE/SPOON) AMOUNT	INDIVIDUAL INTAKE OF COOKED QUANTITY (gm/ml)	APPROXIMATE INDIVIDUAL INTAKE OF RAW QUANTITY (gm/ml)
EARLY MORNING	• Milk (Cow's whole) • White bread	• Cow's milk - 1 cup • white bread - 2 pieces		• Cow's milk - 100 gm • white bread - 76 gm
BREAKFAST	• Roti • Boiled dal • Banana	• Roti - 2 pieces • Boiled Dal - 4 bowl • Banana - 1 pieces		• whole wheat flour - 60 gm, Lentil - 30 gm • Mustard oil - 5 gm, Rape Ghee - 3 gm
LUNCH	• Rice • Fish curry	• Rice - 2 bowl • Fish curry - 4 bowl		• Rice - 60 g • Tomato - 20 g • Fish - 50 g • coconut - 25 g • Potato - 30 g • Oil - 5 g
EVENING SNACKS	• Rice Flakes Poha	• Rice Flakes poha - 1 bowl		• Rice Flakes - 55 g • Potato - 50 gm • Ground nut - 10 g • Oil - 5 gm
DINNER	• Roti • Parotta (steamed)	• Roti - 2 pieces • Parotta steamed - 1 bowl		• whole wheat flour - 60 gm • Tomato - 30 gm • Parotta - 30 gm • Oil - 5 g
OTHER MEAL(IF ANY)				

INTAKE OF FOOD IN TERMS OF FOOD GROUP (24 HOUR RECALL METHOD)

1A) CEREALS:

Name of the food stuffs	Intake of food (gm) as per meal timing					Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	
Rice (Parboiled) Milled		60				60
Rice (Raw) Milled						
Wheat Flour (Whole)	60				60	120
Wheat Flour/Maida (Refined)						
Puffed Rice						
Flaked Rice				55		55
Suji(Semolina)						
Bread(<u>white/Brown</u>)	76					76
Semolina						
Others(specify)						
TOTAL CEREAL(gm)						344

Name of the food stuffs

Intake of food (gm) as per meal timing

	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	Other meal (if any)	Total
Green Gram							
Bengal Gram							
Lentil		30				30	
Black gram							
Soyabean							
Others(specify)							
Total pulses & legumes (gm)					30		

[C] ROOT VEGETABLES:

Intake of food (gm) as per meal timing

	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	Other meal (if any)	Total
Potato			30	50	20		100
Radish							

Colocasia / Yam							
Onion							
Carrot			2.5				2.5
Others(Specify)							
			Total Root vegetable (gm)				12.5

(D) LEAFY VEGETABLES:

Name of the food stuffs	Intake of food (gm) as per meal timing					Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	
Cabbage						
Spinach						
Amaranth						
Kalni						
Pumpkin Leaves						
Colocasia Leaves						
Others(Specify)						
						Total Leafy Vegetables(gm)

Name of the food stuffs	Intake of food (gm) as per meal timing					Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	
Brinjal						
Cauliflower						
Papaya(Green)						
Beans						
Pumpkin						
Tomato		2.0			2.0	4.0
Potol(Parwar)					3.0	3.0
Ladies Finger						
Drumstick						
Plantain(green)						
Bottle gourd						
Bitter gourd						
Cucumber						
Others(specify)						
						77.0
						Total Other Vegetables (gm)

| FATS AND OILS & NUTS:

Name of the food stuffs	Intake of food (gm) as per meal timing						Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	Other meal (if any)	
Mustard Oil							20
Groundnut Oil		5	5	5	5		
Butter							
Ghee							
Groundnut					10		10
Cashew nuts							
Gingely seeds							
Others(specific)							
Total Fats & Oils(gm/ml)							30

| MILK AND MILK PRODUCTS:

Name of the food stuffs	Intake of food (gm) as per meal timing						Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	Other meal (if any)	

Cow Buffalo Milk	100						100
Standard Milk							
Skimmed Milk Powder							
Curd							
Channa							
Others							
Total Milk & Milk Products (gm/ml)							100

[H] FLESH FOODS:

Name of the food stuffs	Intake of food (gm) as per meal timing					Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	
Egg(Duck/Hen)						
Fish				50		50
Meat						
Others(Specify)						
Total Flesh foods (gm)						50

Name of the food stuffs	Intake of food (gm) as per meal timing					Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	
Sugar						
Jaggery(specify)						
Others						
	Total Sugar & Jaggery (gm)					

[J] FRUITS:

Name of the food stuffs	Intake of food (gm) as per meal timing					Total
	Early Morning	Breakfast	Lunch	Evening Snacks	Dinner	
Guava						
Ripe Banana						
Ripe Papaya						
Ripe Mango						
Orange						
	Total					80

Sweet lime(Musambi)				
Others(Specify)				
				80

Total Fruits (gm)

CONSUMPTION OF DIFFERENT NUTRIENTS BY THE INDIVIDUAL

Meal Pattern	Food Consumed	Energy (kcal)	Carbohydrate (gm)	Protein (gm)	Fat(gm)	Calcium (mg)	Iron (mg)	Dietary Fibre(gm)
Early Morning		253.2	43.84	9.12	4.63	128.36	1.04	0.152
Breakfast		418.3	81.1	15.75	3.47	63.4	5.49	1.67
Lunch		346.2	59.75	13.025	6.06	257.4	1.38	1.16
Evening Snacks		455.2	12.43	61.81	17.75	23.7	1.55	0.895
Dinner		279	47.54	8.36	6.47	43.8	3.90	2.26
Other meal(if any)	N/A	—	—	—	—	—	—	—
		1751	244.9	108.06	38.08	616.3	23.36	6.137

RESULTS
(RECALL METHOD)
(Nutrient wise)

NUTRIENTS	REQUIREMENT (as per RDA)	CONSUMPTION (gm)	DEFICIENCY (gm)	DEFICIENCY (%)	EXCESS (gm)	EXCESS (%)
Energy(kcal)	1700 (FAO)	1751			51	3
Carbohydrate(gm)	255	244.9	10.1	3.9		
Protein(gm)	54.0 (PDRAS for 3.5g) 85%)	408.06			44.54	82.4
Fat(gm)	56.67	38.08	18.59	32.8		
Iron(mg)	19	23.96			4.36	22.94
Calcium(mg)	1200	616.9	583.7	48.64		
Dietary Fibre(gm)	30	6.137	23.86	79.53		

DIET SURVEY & ITS INTERPRETATION

The diet survey was done using 24 hours recall method.

It was found that the energy intake was 1751 Kcal which was 3% excess than the recommended EAR.

It was found that the carbohydrate intake was 244.9 gm which was 3.9% less than the recommended amount.

It was found that the protein intake was 108.06 gm which was 82.4% excess than the recommended RDA.

It was found that the fat intake was 38.08 gm which was 32.8% less than the recommended amount.

It was found that the iron intake was 23.36 mg which was 22.94% excess than the recommended RDA.

It was found that the calcium intake was 616.3 mg which was 48.64% less than the recommended RDA.

It was found that the Dietary fibre intake was 6.137 gm which was 79.53% less than the

recommended RDA.

It can be concluded that the elderly person dietary intake is various macronutrients and micronutrients deficiency.

The following suggestions can be given to the elderly person for the improvement in nutritional status:

1. As per result of the survey the carbohydrate taken by the elderly person was deficient, hence the energy source was by the increased of the carbohydrate. It can be improved by including complex carbohydrate because complex carbohydrate is better than simple carbohydrate. Complex carbohydrate have low GI index than the simple sugar, so it can be enhanced by including complex carbohydrate like (whole wheat flour) Roti, Brown bread etc, rather than sugar or honey. Complex carbohydrate does not directly increased the glucose level like simple sugar.

2. Fat from plant source (Soyabean oil, rice oil) is included in daily diet proper amount also useful for stop fat deficiency. Sea fish like (Salmon & Sardines) are also rich in required

amount of fat which is helpful in our body). It also helps in lowering the LDL 'bad cholesterol' & increased HDL 'Good cholesterol'. So appropriate amount of fat is necessary for better health as it is required for energy, metabolism of other nutrients & proper absorption of fat soluble vitamins.

3. Calcium is important for maintaining proper bone health & teeth.

Calcium rich food items like milk, fish with bone, calcium rich fruits such as coconut, Banana which help to delay tooth loss and lower the risk of osteopenia (pain in bone) & and osteoporosis (porous like structure in bone).

4. Elderly people have chances to develop constipation and thus dietary fibres are important in daily diet. Soluble fibre is better than insoluble fibre. Soluble fibre has a good water holding capacity and helps in bulk formation & enhances bowel movement and also lowering the risk of constipation. It has a lower GI Index so it has very important role in our proper body function. Whole wheat flour

• fruits and some vegetable have a good source of dietary fibre, by including this type of food items in the diet increased the amount of dietary fibre.



Sem VI ✓
B.Sc. Part III/FHII (Hons.)/Genl Examination 2023.....(CW)
Dept. of Food & Nutrition
Behala College

EXAMINED

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J. C. S. Signature

B.Sc. SEMESTER-V(H)PRACTICAL
EXAMINATION-2022

UNDER CBCS SYSTEM

FOOD & NUTRITION (HONOURS)

PAPER- DSE-A1 (PUBLIC HEALTH)

Roll & No: 203561-11-0013

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INTRODUCTION TO SUPPLEMENTARY FOODS

Supplementary feeding means providing extra food to people or families over & above their home diet & has been used in populations that are food insecure (lack access to adequate & nutritious food) & vulnerable (including women & young children, school aged children, people living with diseases such as tuberculosis, HIV & Alzheimer disease & older people) to improve their health & quality of life.

A dietary supplement is a product for ingestion that contains dietary ingredients intended to add further nutritional value to supplement diet. These dietary ingredients may be one or any combination following

Substances -

- A vitamin
- A mineral
- A herb or other botanical product.
- An amino acid.

A dietary substance for use by people to supplement the diet by increasing the total dietary intake.

- A concentrate, metabolic constituent or extract

Dietary supplements may be found in many forms such as

tablets, capsule, gelcaps, liquids or powder. Some dietary supplements can ensure to get an adequate dietary intake of essential nutrients. Others may be reduce the risk of disease.

•LOW COST SUPPLEMENTARY FOODS:

Indian mothers wean their infants into traditional adult diet because of their ignorance of past cost weaning foods & also because of incapacity to buy expensive commercial foods. Infants at weaning age or period belong to the vulnerable group also who need dietary supplementation.

Infant ready to use infant foods are standardised at coimbatore (cereal 30 gm, pulse 20 gm, roasted groundnut 10 gm, & Jaggery 15 gm.) NIN Hyderabad (Bajra / ragi 60 gm, green gram dal 15 gm, skim milk powder 10 gm, Sugar or salt to taste.) & at Grandhi-gram (groundnut cake biscuits, ragi biscuits).

LOW COST SUPPLEMENTARY FOODS DEVELOPED IN INDIA

Name of the Product	Composition
• Indian Multipurpose food (C.F.T.R.I)	low fat groundnut flour (75:25) fortified with Vit-A, & D, B ₁ , B ₂ & calcium carbonate contains 12% proteins
• Malt Food (C.F.T.R.I)	Cereal malt, low fat groundnut flour, roasted Bengal gram flour (40:40:20) fortified with vitamin & ca salt contains 28% protein
• Balahar (C.F.T.R.I.)	Whole wheat flour, groundnut flour & roasted Bengal gram (70:20:10) fortified with Ca salts & vitamins.
• Supplementary Food (N.T.N)	Roasted wheat flour, green gram flour, groundnut, & sugar or jaggery (80:20:8:20) contains 19.5% protein
• Supplementary Food (A.H.S.C.W)	Roasted maize flour, green gram flour, groundnut and sugar or jaggery (30:20:10:20)
Kuzhandai	This food contains 11.4% proteins
Amudhu	

Teacher's Signature

Name of Supplementary Food	Composition
• Win Food (Grandhigram Rural Institute).	Pearl millet, green gram dal, groundnut flour, and jaggery (50:15:25:25). This food contains 20% proteins.
• Amutham	Rice flour, ragi flour, bengal gram flour, sesame flour, groundnut flour and jaggery (15:15:15:10:10:25). This food contains 14% proteins.
• Poshak	Cereal (wheat, maize, rice or jowar) pulse (chana dal or green gram dal) and oil seed (groundnut) and jaggery (1:2:1:2).
• Poshak (least cost weaning mix)	Some ingredients as poshak but in the proportion of 60:17:14:9
• Kerala Indigenous Food (KIE)	Tapioca, Bulgar wheat and groundnut (25:50:25)

CURRENT SCENARIO OF INDIA:

Health & Nutrition are most important contributing factors for human resources development in the century. India ranks 13th in terms of human development among 189 countries (UNDP, 2020).

- The following table shows the nutritional status of children in India (National Family Health Survey)-5, 2019-2021);

Child bearing practices & Nutritional Status of children	NFHS-5 (%)		
	Urban	Rural	Total
• Children under age 3 yrs. breast fed within one hour of birth.	49.7	40.7	41.8
• Children age 6-8 months receiving solid or semisolid food & breast milk	52.0	43.9	45.9
• Total children age 6-23 month receiving an adequate diet	12.3	11.0	11.3
• Children under 5 yrs. who are stunted (height below Age)	30.1	27.3	35.5
• Children under 5 yrs. who are wasted (weight below height)	18.5	19.5	19.3
• Children under 5 yrs. who are severely wasted (wt. below Ht.)	7.6	7.7	7.7
• Children under 5 yrs. who are underweight (wt. below age)	27.3	33.8	32.1

Teacher's Signature

•PLANNING & PREPARATION LOW COST SUPPLEMENTARY FOODS FOR DIFFERENT AGE GROUP:

After 6 months, increasing needs of calories & proteins of growing children can't be met by diminishing output of mother's milk.

If the body is to maintain the expected rate of growth, remain healthy & well nourished. Supplementary feeding has been restored to around 6 month.

Globally undernutrition is the single biggest contribution to disease. Undernutrition is of particular concern in young children as it can development. According to ICMR-NIN (2020) the requirement of calorie, protein are -

Age group	Expected body wt (approx)(kg)	Calories (Kcal)	Protein (gm)
i) Birth-6 months	5.8	530	8.0
ii) 6 months -1 Yrs.	8.5	680	10.5
iii) 1-3 Yrs.	12.9	1110	12.5
iv) 4-6 Yrs.	18.3	1360	16.0
v) 7-9 Yrs.	25.3	1700	23.0
vi) 10-12 Yrs. (boys)	34.9	2220	32.0
10-12 yrs (Girls)	36.4	2060	33.0

Generally by the time child is 1-1½ yrs old breast milk may not be available to it. Such a child will therefore have to depend solely on other foods based on the rice, wheat or other common cereals.

They are relatively low in protein & only small quantity are usually given to the child. This is the time when the child needs more nutritious food supplying protein & calories.

Supplementary foods provide additional nutrient to children to ameliorate or prevent undernutrition. The focus is usually on increasing the amount of energy & protein a child receives. But supplementary foods can also contain micro-nutrients (Vitamins & minerals).

PRINCIPLES GOVERNING THE FORMATION OF THE RECIPES:

A recipe providing about 400-500 Kcal & 12-14 gm of protein is required to be used as supplement to breast milk to feed the older infant. The quantity is for the whole day per child & the cooked preparation can be distributed in several feeds throughout the day. Most of the supplementary programme in our country provide about 300 Kcal & 9-10 g protein.

The supplementary food should provide about the half of the total daily requirement of protein &

& about $\frac{1}{3}$ the total calorie need.

During Supplementary food planning the following should be kept in mind —

- i) The recipes must be based on locally available food stuff.
- ii) The cooking method must be simple.
- iii) The cost should be minimal.
- iv) The recipes should be acceptable in taste, consistency & bulk to the child as well as the mother.

*Bee
11/9/22*



WHEAT GRAM PORRIDGE

PREPARATION OF LOW COST SUPPLEMENTARY FOODS:

• WHEAT GRAM PORRIDGE:

- Ingredients:
 - i) Roasted whole wheat flour - 20 gm ($\frac{1}{2}$ tbs)
 - ii) Roasted bengal gram - 10 gm
 - iii) Roasted groundnut - 10 gm
 - iv) Spinach - 20 gm
 - v) Sugar or jaggery - 25 gm

• Recipes:

Groundnut, wheat & bengal gram are roasted & powdered. After that all three powders are mixed. Jaggery is dissolved in the water & thin syrup is made. Next a batter of the powders are prepared with the help of this syrup. Spinach is boiled in water till soft. Then it is mashed & strained through a clean cloth. Then the juice is added to the batter & cooked for a few minutes stirring continuously till semi-solid.

• NUTRITIVE VALUE & COST OF WHEAT GRAM PORRIDGE:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Energy (Kcal)	Cost (₹) Per Kg	Actual
• whole wheat flour	20	2.36	0.3	14.24	68.2	Free	Free
• Bengal Gram	10	2.25	0.52	5.81	30.9	80	0.8
• Groundnut	10	2.62	3.98	2.67	57	140	1.4
• Spinach	20	0.4	0.14	0.58	5.2	50	1
• Jaggery	25	0.1	0.025	23.75	95.75	60	1.5
Total		7.73	4.965	47.05	263.05		4.7

SIGNIFICANCE :

• ENERGY :

Wheat gram porridge is a energy rich food, it contains whole wheat, groundnut, Jaggery, bengal gram which are good source of energy. It provides 263.65 Kcal energy in one serving.

• PROTEIN :

Roasted groundnut and roasted bengal gram are such source of protein. Wheat also provides protein. One serving porridge provides 7.73 gm protein.

• VITAMINS :

Whole wheat, roasted bengal gram and other ingredients provides thiamin and other important B-vitamins. They also provide B6 - and folate essential for our health.

This is a very low cost supplementary food and easy to prepare. Hence it could be good, supplementary food for children.



• RICE PORRIDGE:

- Ingredients:
 - i) Rice - 20 gm
 - ii) Powdered roasted groundnut - 10 gm
 - iii) Powdered, roasted greengram dal - 10 gm
 - iv) Sugar or jaggery - 25 gm

• Recipes:

Rice is cooked. Then pulse & groundnut powders are added to the cooked rice. (Any) vegetables are boiled in water & the juice is added to the mixture. Sugar is added & cooked for few minutes.

• NUTRITIVE VALUE & COST OF RICE PORRIDGE:

Ingredients	Amount (g)	Protein (g)	Fat (g)	Carbohydrate dried (g)	Energy Kcal	Cost (₹) Per Kg	Actual
Rice	20	1.28	0.08	15.8	69.2	Free	Free
Groundnut	10	2.62	3.98	2.67	57	140	1.4
Greengram dhal	10	2.45	0.32	5.99	34.8	120	1.2
Sugar	25	0.025	0	24.85	99.5	44	1.1
Total		6.375	4.38	49.31	260.5		3.7

■ SIGNIFICANCE:

• ENERGY:

Rice, Jaggery and green gram dal are good source of energy. This provides 260 Kcal energy which is sufficient to meet the 1/3rd of the total energy requirement of children.

PROTEIN: Green gram dal is rich source of protein. Rice, Jaggery, ground nut also provides protein.

VITAMINS:

Rice porridge is rich source of thiamine B₆ and other essential B-vitamins that is essential for our body.

Hence, it is a good source of low cost supplementary for children suffering from protein-energy malnutrition.



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READY TO USE INFANT WEANING FOOD:

• BAJRA INFANTS FOODS

- Ingredients:
 - i) Bajra - 20gm
 - ii) Roasted green gram dhal - 10gm
 - iii) Roasted decorticated gingelly seeds - 5gm
 - iv) Sugar - 25gm
 - v) Roasted Groundnut - 5gm

• Recipes:

Bajra, green gram dhal, groundnut & gingelly seeds are powdered. The powders are mixed thoroughly. After that it is mixed with hot water before serving to the child. Sugar is added to the mixture. It can either be made into balls in porridge form.

• NUTRITIVE VALUE & COST OF BAJRA INFANTS FOODS:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate rate (gm)	Energy (Kcal)	Cost (₹) Per Kg	Actual
Bajra	20	2.32	1	13.5	72.2	49	0.9
Green gram dhal	10	2.45	0.12	5.99	34.8	120	1.2
Groundnut	5	1.31	1.99	1.335	28.5	140	0.7
Gingelly seeds	5	0.915	2.165	1.25	28.15	240	1.2
Sugar	25	0.025	0	24.85	99.5	19	1.1
Total		7.02	5.275	46.925	263.15		5.1

■ SIGNIFICANCE:

ENERGY: Bajra infant's food contain sugar, gingelly seeds along with bajra, green gram dal which are the good source of energy. One serving of bajra infant's food provide 263.15 kcal energy.

• **Protein:** Bajra infant's food contain green gram dal, groundnut, gingelly seeds which are the good source of protein. One serving of bajra infant's food provide 7.09 gm protein. Hence it could be a supplementary food for children suffering PEM.

• **Micronutrients:** Bajra infant's food contain in bajra, green gram dal and gingelly seeds which are the good source of various micronutrients:

- Bajra Provide vitamin B₁, B₂ and vitamin B₂.
- Green gram dal provide vitamin B₆
- Gingelly seeds provide vitamin B₁
- Bajra infants food contain bajra which is the rich source of calcium.

It is a low cost food and prepared from easily available ingredients and can be prepared very easily.



RAGINA



■ RAGINA:

- Ingredients:
 - i) Ragi (dehusked) - 25gm
 - ii) Roasted bengal gram dhal - 5gm
 - iii) Sugar - 25gm
 - iv) Roasted groundnut - 10gm

• Recipes:

All the roasted ingredients are powdered individually & mixed thoroughly. The mixture can be stored in air-tight containers. Before serving to the child, it is added with hot water & jaggery. It can be made into balls form or it can be made into porridge form.

• NUTRITIVE VALUE & COST OF RAGINA:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Energy (Kcal)	Cost (₹) Per Kg	Actual
Ragi	25	1.825	0.325	18	82	60	1.5
Bengal gram	5	1.125	0.26	2.905	57	80	0.4
Sugar	25	0.025	-	24.85	99.5	11	1.1
Ground nut	10	2.62	3.98	2.67	57	140	1.1
Total		5.595	4.565	48.425	295.5		4.4

• SIGNIFICANCE :

• ENERGY:

Ragini contains Ragi, Bengal gram, sugar, and ground nut which are good source of energy. One Serving of ragina provide 263.15 Kcal energy.

• PROTEIN: Ragina contains Ragi, Bengal gram and groundnut which are the good source of protein. One Serving of ragina provide 5.595 gm protein. Hence it could be a good supplementary food for children suffering from PEM.

• MICRONUTRIENTS:

Vitamin B complex: Ragina contains Ragi, bengal gram and ground nut which are good source of vitamin B complex.

Minerals: Ragina contain Ragi which is the reach source of calcium.

It is a low cost food and prepared from easily available ingredients & can be prepared very easily.



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• SAJINA:

- Ingredients:
 - i) Roasted Bajra - 20gm
 - ii) Roasted green gram dhal - 10gm
 - iii) Sugar - 20gm
 - iv) Groundnut - 5gm

• Recipes: Bajra & greengram dhal are roasted & powdered properly. This powder is mixed well & then sugar & water is added to this mixture & cooked for few minutes.

• NUTRITIVE VALUE & COST OF SAJINA:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Energy (Kcal)	Cost (₹) per Kg	Actual
Bajra	20	2.9	1.25	16.875	90.28	49	0.9
Green gram dhal	10	2.45	0.12	5.99	34.8	100	1.0
Sugar	20	0.02	0	19.88	79.6	44	0.9
Groundnut	5	1.265	2.005	1.335	28.35	140	0.7
Total		6.635	3.375	44.08	233		3.7

■ SIGNIFICANCE:-

• ENERGY:

Sajna provides good amount of energy due to presence of bajra, groundnut, sugar. As a soft food it is good for gradual weaning process of infants. One serving of Sajna provides 223 Kcal.

• PROTEIN:

It consists green gram dal and groundnut which provides second class protein from plant source. This is a good choice for infants which provides good amount and quality of proteins in a meal. As bajra is deficient in lysine but rich in methionine but green gram dhal is rich in lysine and deficient in methionine. So, together it provides a balance protein. If this type of supplementary food we choose, it can help to survive against protein energy malnutrition or other health problems. One serving of Sajna provides 6.6 gm.

• LOADS OF MICRONUTRIENTS:

• VITAMIN B COMPLEX:

All cereals, pulses and nuts present in this meal provides different types of vitamin B. Such as B₁, B₂, B₃ and B₆ which helps to meet the requirement of B vitamins and release energy from food.

MINERALS:

It provides phosphorous, iron, zinc of which
Zinc works as an antioxidant.

✓ ~~for oil~~ ~~oil~~



RECIPES SUITABLE FOR PRE-SCHOOL CHILDREN:

Proper nutritional care of pre-school children aged 1-5 yrs. is very important. Children in this age group require 12.5-16 gm of protein & 1110-1360 Kcal energy daily.

■ BARFI:

- Ingredients:
 - i) Pressed rice - 25gm
 - ii) Roasted groundnut - 25gm
 - iii) Roasted sesame seeds (white) - 10gm
 - iv) Jaggery - 25gm.
- Recipes: The pressed rice is roasted & mixed with the broken groundnuts. A sticky syrup is prepared with Jaggery & water. The beaten rice & nuts are added & mixed quickly. This is spreaded on a greased plate & it is cut into pieces immediately.
- NUTRITIVE VALUE & COST OF BARFI:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Energy (gm)	Cost (₹) Per Kg Actual
Rice	25	1.65	0.3	19.325	86.5	Free Free
Groundnut	25	6.55	9.95	6.675	142.5	140 3.5
Sesame Seeds	10	1.83	4.33	2.5	56.3	240 2.4
Jaggery	25	0.1	0.025	23.75	95.75	60 1.5
Total		10.13	14.60	52.25	381.05	7.4

• SIGNIFICANCE:

• ENERGY:

For infants energy is needed for their growth and increased activity. The food item consists rice which gives the large amount of energy from carbohydrate and also from jaggery, groundnut and sesame seeds. Although one third of the energy requirement can be fulfilled from the one serving barfi that provides 381.05 Kcal.

• PROTEIN:

Barfi contains rice, groundnut, Sesame seeds which are second class protein is included in the meal. Though this is a second class protein and comes from plant source, it is very essential for infants one serving provides 10.12 g.

PROVIDES MICRONUTRIENT:

• VITAMIN-B- Due to presence of cereals & nuts, it provides several B vitamins which helps to meet the requirement of B vitamins and release energy from food.

• MINERALS:

In this food due to presence of sesame seeds and groundnut it consists phosphorus, magnesium, Zinc, iron etc. Jaggery also contains a large amount of iron.

It is a low cost supplementary food and prepared from easily available ingredients.



• WHEAT GRAM LADDU:

- Ingredients:
 - i) whole wheat (roasted flour) - 30gm
 - ii) Green gram dhal - 20gm
 - iii) Groundnut - 15gm
 - iv) Jaggery / Sugar - 30gm

• Recipes: whole wheat, green gram dhal & groundnut are roasted & powdered well. Then jaggery Syrup is prepared & roasted flour mixture is added to it & mixed well. All ingredients are mixed well & made into balls.

• NUTRITIVE VALUE & COST OF WHEAT GRAM LADDUS:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate ate(gm)	Energy (Kcal)	Cost(₹) Per Kg	Actual
whole wheat	30	3.63	0.51	20.82	102.3	Free	Free
Green gram dhal	20	4.9	0.25	11.93	69.6	120	2.1
Groundnut	15	3.8	6.015	3.915	85.05	140	2.1
Jaggery	30	0.32	0.03	28.5	114.7	60	1.8
Total		12.45	6.8	65.21	371.85		6.3
-							

Teacher's Signature.....

■ SIGNIFICANCE:

• ENERGY:

This food provides 371-85 Kcal energy which we get from whole wheat, Green gram dhal, Groundnut, and Jaggery. Jaggery contains high amount of carbohydrate which helps to meet the energy requirement of children.

• PROTEIN:

10.45 gm of protein is provided from this food and Green gram dhal is a rich source of 'lysine' so it fulfill protein requirement of children. Wheat is deficient in lysine but rich in methionine and Green gram dhal is rich in lysine and deficient in methionine. So wheat gram laddu could be a source good quality of protein for children suffering from PEM.

• B-VITAMIN:

Whole wheat contains B₁-Thiamin, B₂-Riboflavin which meet up the requirement of B-Vitamin.

• MINERAL: Jaggery contains calcium, iron and other minerals needed for the growing children.

• It is a low cost food and can be prepared very easily.



WHEAT PAYASM

■ WHEAT PAYASAM:

- Ingredients:
 - i) Whole wheat - 30gm
 - ii) Roasted bengal gram flour - 20gm
 - iii) Sugar - 25gm
 - iv) Groundnut - 15 gm

• Recipes:

Whole wheat & bengal gram are roasted & then powdered separately. Sugar & crushed roasted groundnuts are added with roasted whole wheat & bengal gram flour. Water is added & the mixture is cooked for five minutes.

• NUTRITIVE VALUE & COST OF WHEAT PAYASAM:

Ingredients	Amount (gm)	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Energy (Kcal)	Cost (₹) Per Kg	Actual
Whole wheat	30	3.54	0.45	21.36	109.8	Free	Free
Bengal gram flour	20	45	1.04	11.62	73.8	1.25	2.7
Sugar	25	0.025	0	24.85	99.5	41	1.1
Groundnut	15	2.93	5.97	4.005	85.5	140	2.1
Total		11.995	7.46	64.835	362.6		5.9

■ SIGNIFICANCE:

• ENERGY:

This food provides 362.6 kcal energy which we get from whole wheat, bengal gram flour and Sugar, Groundnut. Sugar contains higher amount of carbohydrate than other ingredients present in the payasam. It gives intense energy to cope up the stress in many conditions especially in PEM.

• PROTEIN:

11.995 gm protein is provided from one serving of this food. Bengal gram flour, groundnut which are present in the food have high amount of protein.

■ MICRONUTRIENTS:

• B-VITAMIN:

Whole wheat contains Vitamin B1-Thiamin, B2-Riboflavin which meet up the children's requirement of B-vitamins.

• It is a low cost food and prepared from easily available ingredients and can be prepared very easily.



NUTRITIOUS SNACKS FOR INFANTS & PRE-SCHOOL CHILDREN:

• GROUNDNUT BISCUITS:

- Ingredients:
 - Roasted groundnut - 20 gm
 - wheat flour (whole) - 30 gm
 - Sugar - 30 gm

■ Recipes: At first roasted groundnut powder & wheat powder were mixed with sugar, then baking powder & salt were added with the mixture & it was kneaded to make a stiff dough. The dough was rolled like chapatis & cut out in desired shapes with tin lids or any other sharp instruments. The biscuits are placed on greased metal trays & baked in an oven or on heated and in a degchi [The degchi should be kept covered with a lid & pieces of live charcoal were kept on the lid to ensure uniform air in baking]. The biscuits were removed from the heat when they were golden brown & it usually takes about 20 min.

• NUTRITIVE VALUE & COST OF GROUNDNUT BISCUITS:

Ingredients	Amount (gm)	Protein (g)	Fat (g)	Carbohydrate (g)	Energy (Kcal)	Cost (₹) Per Kg	Actual
Groundnut	20	5.24	7.96	5.34	114	110	2.8
wheat flour	30	3.6	0.51	20.82	102.3	34	1.02
Sugar	30	0.03	-	29.82	119.4	44	1.32
Total		8.87	8.47	55.98	335.7		5.14

Teacher's Signature

■ SIGNIFICANCE:

i) ENERGY:

Groundnut biscuit supplies our body with a quick source of energy. Groundnut and wheat flour are the major source of energy.

ii) PROTEIN: Ground nuts are the great sources of plant based protein, which are essential to health.

iii) VITAMIN:

In addition to being major source of energy, wheat flour also provides vitamins mostly B-vitamins which play a crucial function in releasing energy.

- Along with health benefits ground nut biscuit are also low cost food which may prepared easily.



• BENGAL SESAME BISCUITS:

- Ingredients: i) Bengal gram flour - 10gm
 ii) Maida - 15 gm
 iii) Sesame - 15 gm
 iv) Sugar - 25 gm
 v) oil - 10 gm.

▪ Recipe: Bengal gram flour, maida & sesame seeds are powdered & mixed well. Then baking powder & salt are added to the mixture is mixed thoroughly. The mixture is kneaded with oil to prepared stiff dough. Small dough are rolled like chapatis & cut out in desired shaped with tinc-lids. The biscuits are placed on metal trays & the tray is placed on the heated out in a degchi & baked well. After 20-30 mins the biscuits are removed from the degchi, when they are golden brown.

• NUTRITIVE VALUE & COST OF BENGAL SESAME BISCUITS:

Ingredients	Amount (gm)	Protein (g)	Fat (g)	Carbohydrate (g)	Energy (Kcal/g)	Cost (₹) per Kg	Actual
Bengal Gram flour	10	2.08	0.56	5.98	37.2	135	1.35
Maida	15	1.65	0.135	11.085	52.2	31	0.51
Sesame	15	2.745	6.435	3.75	84.45	240	3.6
Sugar	25	0.025	-	24.85	99.5	41	1.1
oil	10	-	10	-	90	16.5	1.65
Total		6.5	17.19	45.665	363.35		8.21

■ SIGNIFICANCE:

• ENERGY:

Bengal Sesame biscuit are full of nutrient that our body requires to generate energy. It is a high-energy food. One serving of Bengal sesame food provides 363.85 Kcal energy.

• RICH IN PROTEIN:

Bengal gram are rich source of plant protein. They are also a very good source of folic acid and fibre and contain phytochemical called saponins, which act as antioxidants. Sesame also contain methionine.

• LOADED WITH CALCIUM:

Sesame seeds are one of the major non-dairy foods that contains high amount of calcium and also a excellent source of manganese which helps our bones grow healthy and strong.

- It is low cost supplementary food which can be prepared easily.

Ans
1/12/22

Date - 16/12/2022

P-30

INTEGRATED CHILD DEVELOPMENT SERVICE SCHEME (ICDS)

Date of Visit: 16/12/2022

Teacher Accompanied: Dr. Shruti Agrawal

Address: ICDS Centre
Budge Budge, South 24 Parganas,
West Bengal-700137



INTEGRATED CHILD DEVELOPMENT SERVICE SCHEME (ICDS)

The Integrated Child Development Service Scheme (ICDS) is the country's most comprehensive and multi-dimensional programme. The ICDS was launched on 2 October 1975 under the 5th five-year plan and in pursuance of the National Policy for children in 33 experimental blocks.

The ICDS is the foremost symbol of India's commitment to her children: India's response to the challenge of providing pre-school education on one hand and breaking the vicious cycle of malnutrition, morbidity, reduced learning capacity and mortality on the other.

Objectives

The objectives of the scheme are-

- to improve the nutritional and health status of children in the age-group 0-6 years
- to lay the foundation for proper psychological, physical and social development of the child
- to reduce the incidence of mortality, morbidity, malnutrition and school dropout
- to achieve effective co-ordination of policy and implementation amongst the various departments to promote child development and
- to enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.

Beneficiaries

- Children below six years
- Expectant and nursing mothers
- Adolescent girls
- Women in the age group of 15 to 45 years



Programme Components

The package of services provided by ICDS scheme includes-

- *Supplementary Nutrition*

Supplementary Nutrition Programme is provided to children below 6 year of age, pregnant and nursing mothers and adolescent girls of low income group to improve health and nutritional status. The provision of supplementary nutrition includes supplementary feeding and distribution of nutrient supplements. The scheme is implemented through the network of Anganwadi workers under the ICDS.

Nutritional Contribution of Supplementary Foods Provided By ICDS

Beneficiaries	Energy (Kcal)	Protein (g)
Children (6 months to 72 months)	500	12-15
Severely malnourished Children (6 months- 72 months)	800	20-25
Pregnant and lactating mothers/ adolescent girls (under KSY)	600	18-20

Cost of Supplementary Nutrition provided at Anganwadis

Beneficiaries	Cost of Supplementary Meal (Rs./day/beneficiary)
Children (6-72 months)	8.00
Children (6-72 months) Severely Malnourished	12.00
Pregnant and nursing mothers	9.50

- *Vitamin A Supplementation*

At the AWC children are administered vitamin A at periodic intervals according to their age to prevent vitamin A deficiency.

Age	Dose of Vitamin A
Children (6-11 months)	One dose of 1,00,000 IU of vitamin A orally (measles immunization is good to give a routine dose)
Children (1-5 years)	One dose of 2,00,000 IU of vitamin A orally every six months

- *Iron and Folic acid supplementation*

All pregnant women and children are given Iron and Folic acid (IFA) tablets to prevent anaemia as per the following recommended dose irrespective of their haemoglobin status.

Beneficiaries	Dose	Quantity
Pregnant women	1 Big tablet containing 100 mg elemental iron and 500 microgram Folic acid	1 tablet per day for 100 days (in 3 rd trimester of pregnancy)
Children (1-5 years)	1 Small tablet containing 20 mg elemental iron and 100 microgram Folic acid	1 tablet per day for 100 days

- Growth Monitoring
- Pre-school non-formal education
- Nutrition & health education
- Immunization
- Health check-up and
- Referral services

Conclusion

The ICDS has a huge potential as a platform to provide comprehensive child and maternal services. This visit to the ICDS centre or anganwadi was beneficial for us as we got the opportunity to watch implementation of the low cost supplementary feeding programme where several low cost food ingredients are used to prepare the nutrient dense foods for children and mothers.

See 2
B.Sc. Part III (Hons.) Sem. Examination 2022/2023
Dept. of Food & Nutrition
Behala College

EXAMINED

B.Sc SEMESTER-III(HONOURS) PRACTICAL
EXAMINATION-2022

ROLL NO-213561-11-0013

REGISTRATION NO-561-1211-0310-21

SUBJECT-FOOD & NUTRITION

PAPER-COMMUNITY NUTRITION-**I**
CCG

UNIVERSITY OF CALCUTTA

B.Sc. SEMESTER - III (HONOURS) EXAMINATION - 2022

- ROLL NO - 213561-11-0013
- REGISTRATION NO - 561-1211-0310-21
- DEPARTMENT - FOOD & NUTRITION
- PAPER - CC6
- SUBJECT - COMMUNITY NUTRITION

SL NO	TOPICS	Page. NO	Date	Signature
1.	Introduction to Community	1-3	9/9/22	✓✓✓✓✓
2.	Anthropometric Measurement of Infants weight, Height, chest circumference, MUAC, Underweight, Stunting, Wasting, Overweight	4-21	9/9/22	✓✓✓✓✓
3.	Nutritional Assessment comparison with norms and interpretation • Weight for Age • Height for Age • Weight for Height • MUAC	22-64	13/9/22	✓✓✓✓✓
4.	Body Mass Index (BMI)	68-79	20/9/22	✓✓✓✓✓
5.	Waist-Hip-Ratio (WHR)	80-89	20/9/22	✓✓✓✓✓
6.	Growth Chart and Poverty	90-104	22/9/22	✓✓✓✓✓
7.	Clinical Assessment and Signs of nutrient deficiencies of PEM, vitamin-A and Anaemia	102-105	20/9/22	✓✓✓✓✓
8.	Diet Survey - 24 hours dietary recall methods (3 days)	106-128	10/11/22	✓✓✓✓✓
9.	Integrated Child Development Services Scheme (ICDSS)	129-138	21/11/22	✓✓✓✓✓

-INTRODUCTION TO COMMUNITY-

• Definition of community: The term Community may be defined as a group or collection of groups that inhibit in a limited geographical area & whose members live together in such a way that they share the basic conditions of a common life.

• Characteristics of community: Community refers to " a group of individuals & families living in a defined geographic area, usually comprising a village or town or a city." The basic characteristics of a Community include:

- (i) A group of people.
- (ii) Specific geographical area.
- (iii) The relation of community to locality.
- (iv) Common Social values, norms & other aspects of culture.
- (v) Common set of organization & institution.
- (vi) Some common interests

• Types of community:

Communities can be classified in various ways:

- (i) On the basis of governance: e.g. Nation, State, District.
- (ii) On the basis of locality: e.g. Rural community or urban community.
- (iii) On the basis of family income: e.g. low income group, middle income group and high income group.
- (iv) On the basis of food habits: e.g. vegetarian, Non-vegetarians, vegan and Xenoma eatibitics etc.
- (v) On the basis of age group: e.g. pre-schoolers, Schoolers, adolescent peer groups adult community, aged community.

Q3
Q4
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Q12

NUTRITIONAL ANTHROPOMETRY

Nutritional anthropometry is the tool concerned with the measurement of the variation of the physical dimensions & the gross composition of the human body at different age levels & degrees of nutrition.

■ Application of nutritional anthropometry:

Nutritional anthropometry is a very useful tool. Its application includes:

(i) Assessment of extent of under nutrition in vulnerable group of population.

(ii) Monitoring of individual children at regular intervals (monthly or quarterly) to find out whether there is any faltering in growth during the intervals and to help in early detection & in initiating prompt remedial measures.

(iii) Identification of children who are at risk of under nutrition, to target, and prioritise nutrition action programmes, so as to control the extent of under nutrition.

(iv) Anthropometric measurements are useful in mid-term appraisal or terminal evaluation to assess whether intervention programmers have achieved the objectives or not.

(v) It is also useful in assessing an individual's response to nutritional rehabilitation.

(vi) Anthropometry can be utilized as a tool for nutritional surveillance & for collection of secondary data on indicators, which may directly or indirectly affect the nutritional status.

(vii) It is used to assess the impact of seasonal variation of food supplies on nutritional status of the community. This would also provide data on time trends when measured at regular intervals.

(1) BODY WEIGHT:

Body weight is the simplest reproducible anthropometric measurement for over all nutritional status of individuals especially for children.

■ Equipments & techniques of weight measurement

The choice suitable weighting Scale is vital to obtain accurate measurement of body weight. The weighing scale must be sturdy, inexpensive, easily transportable, & accurate to within the limits required (e.g. 0.1 kg).

Weight should be taken as far as possible with minimum clothing, without shoes, & without holding any support.

In case of infants the weight could be taken with an older person (preferably) mother carrying the infant & subtracting @ the weight of elder to get the correct weight of infant.

The zero errors of the weighing scale should be checked before taking measurement & corrected as & when required.

The mean of 3 successive measurements will give the final body weight of the subject.

(2) Height: Height is a very reliable parameter that reflects that the total increase in size of individual upto the moment it is determined.

Height is affected only by long term nutritional deprivation, it is considered as an indicator of chronic or long term malnutrition.

■ Equipment & technique:

Standing height is measured by Anthropometer rods or stadiometer scales, whereas in case of infant & early pre-school children, recumbent length (crown-heel length) is measured with the help of infantometer.

The infant is laid on the board which is itself on a flat surface. The head is positioned firmly against the fixed head board with eyes looking vertically. The knee are extended, usually by firm pressure applied by an assistant, & the feet are fixed at right angles to the lower legs. The upright sliding foot-piece is moved to obtain firm contact with heels & the length reads to the nearest 0.1 cm.

CHEST CIRCUMFENCE MEASUREMENTS IN FIRST FIVE YEARS OF LIFE

Age (Month)	Chest circumference (cm)
At birth	35.00
03	40.0
06	44.0
12	47.0
18	48.0
24	50.0
36	52.0
48	53.0
60	55.0

[Source: Growth & Development of Children, Fourth ED, by E.H. Weston & G.H. Lowney copyright © 1962 year Book Medical Publishers Inc]

(3) Chest Circumference:

The chest is normally narrow in childhood & grows faster than head during the second & third year of life. As a result the chest circumference overtakes head circumference by cut one year of age. Therefore, between the ages of six month & 5 years, a chest/ head circumference ratio of < 1 may be due to failure to develop or to wasting of muscle & fat of the chest wall, and can be used as community indicator of PEM of early childhood.

■ Equipment & technique:

A narrow, flexible & non-stretch fibre glass tape should be used. Measurement made at the nipple line, preferably in mid inspiration. Measurement should be made to the nearest 0.1 cm.



Chest Circumference

(4) Mid-upper arm circumference (MUAC):

The Mid-Upper Arm circumference (MUAC or MAC) is recognized to indicate the status of muscle development. The MUAC is considered more feasible as it is simpler & easily accessible in any age & gender & is practical to measure.

Instrument & technique: The MUAC is taken on the left hand. The midpoint between the tip of the acromion of scapula & the tip of the olecranon of the fore arm bone ulna with the arm flexed at the elbow at right angle & marked with a marker pen. The hand should hang freely and the measurement is taken using a flexible non-stretch measuring tape made of fibre glass. The tape should not exert too much pressure on soft tissue. The reading is taken to the nearest millimetre with the tape still in position. Reading below 12.5 cm indicates severe PEM, 12.5 to 13.5 moderate PEM & above 13.5 is normal.

- Anthropometric Measurement/
Condition of Boys Children(Boys)-

Sl No	Name	Gender	Age (Yrs)	Wt (Kg)	Ht (cm)	MUAC (cm)
1.	A	M	2.5	11	95	11
2.	B	M	3.2	12	98	11.2
3.	C	M	3.5	12.5	100	12.3
4.	D	M	4	14	102	12
5.	E	M	4.2	13.5	103	12.3

—
C

Underweight:

It can be defined as weight for age < -2 standard deviations (SD) of the WHO Child Growth Standards median. In other words, the child weight is less in comparison to his age.

• Consequences & implications of underweight:

As weight is easy to measure, this is the indicator for which most data have been collected in the past. Evidence has shown that the mortality risk of children who are even mildly underweight is increased. Severely underweight children are at even greater risk.

Stunting:

It can be defined as height for age < -2 SD of the WHO child Growth standards median. In other words, the child height is less in comparison to his age.

• Consequences & implications of stunting:

Children who suffer from growth retardation as a result of poor diet or recurrent infections tend to be at greater risk for illness & death. Stunting is the result of long-

Anthropometric Measurement/condition
of children (Girls) :-

S.I No	Name	Gender	Age (yrs)	wt (kg)	Ht (cm)	MUAC (cm)
1.	F	F	2.8	11.5	95	12.7
2.	G	F	2.2	10	90	13.1
3.	H	F	3.0	12	102	12.8
4.	I	F	3.9	15	100	13.2
5.	J	F	4.6	14.5	110	13.5

long-term nutritional deprivation & often results in delayed mental development, poor school performance & reduced intellectual capacity. This in turn affects economic productivity at national level. Women of short stature are at greater risk for obstetric complications because of a smaller pelvis. Small women are at risk of delivering an infant with low birth weight contributing to the inter-generational cycle of malnutrition, as infants of low birth weight or related intrauterine growth tend to be smaller as adults.

Wasting:

It can be defined as weight for height $< -2\text{SD}$ of the WHO child growth standard median. In other words, the child weight is less in comparison to the standard height.

Consequences & Implication of wasting:

Wasting in children is a symptom of acute undernutrition, usually as a consequence of insufficient food intake or a high incidence of infectious diseases, especially diarrhoea. Wasting in turn impairs the functioning of the immune system & can lead to infections.

sed severity & duration of & susceptibility to infectious diseases & an increased risk for death.

• Overweight: It can be defined as weight for height $> +2SD$ of the WHO child standards-median. In other words, the child weight is more in comparison to the standard height.

■ Consequences and implication of overweight:

childhood obesity is associated with a higher probability of obesity in adulthood, which can lead to a variety of disabilities and diseases, such as diabetes and cardiovascular diseases. The risks for most non-communicable diseases resulting from obesity depend partly on the age at onset and the duration of obesity. obese children & adolescents are likely to suffer from both short-term and long-term health consequences, the most significant being cardiovascular diseases, mainly heart disease and stroke; diabetes; muscle skeletal disorders, especially osteoarthritis and cancers of the endometrium, breast and colon.

NUTRITIONAL ASSESSMENT

- **Definition:** The nutritional assessment is a systematic process in which the state of nutrition & health of individual or group of individuals is determined.
- The goal aims & objectives of nutritional assessment:
 - (i) To map out the magnitude & geographical factors that are directly or indirectly of malnutrition as a public health problem.
 - (ii) To discover & analyze the ecological factors that are directly or indirectly responsible.
 - (iii) To suggest appropriate corrective measure not only for the control & eradication of malnutrition, but also for subsequent food distribution.
- **Methods of nutritional assessment:**

Nutritional status of a community can be assessed by following two types of methods:

Weight-for-age BOYS
Birth to 5 years (z-scores)



World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	+1 SD	+2 SD	+3 SD
0: 0	0	2.1	2.5	2.9	3.3	3.9	4.4	5.0
0: 1	1	2.9	3.4	3.9	4.5	5.1	5.8	6.5
0: 2	2	3.8	4.3	4.9	5.6	6.3	7.1	8.0
0: 3	3	4.4	5.0	5.7	6.4	7.2	8.0	9.0
0: 4	4	4.9	5.6	6.2	7.0	7.8	8.7	9.7
0: 5	5	5.3	6.0	6.7	7.5	8.4	9.3	10.4
0: 6	6	5.7	6.4	7.1	7.9	8.8	9.8	10.9
0: 7	7	5.9	6.7	7.4	8.3	9.2	10.3	11.4
0: 8	8	6.2	6.9	7.7	8.6	9.6	10.7	11.9
0: 9	9	6.4	7.1	8.0	8.9	9.9	11.0	12.3
0:10	10	6.6	7.4	8.2	9.2	10.2	11.4	12.7
0:11	11	6.8	7.6	8.4	9.4	10.5	11.7	13.0
1: 0	12	6.9	7.7	8.5	9.6	10.8	12.0	13.3
1: 1	13	7.1	7.9	8.8	9.9	11.0	12.3	13.7
1: 2	14	7.2	8.1	9.0	10.1	11.3	12.6	14.0
1: 3	15	7.4	8.3	9.2	10.3	11.5	12.8	14.3
1: 4	16	7.5	8.4	9.4	10.5	11.7	13.1	14.6
1: 5	17	7.7	8.6	9.6	10.7	12.0	13.4	14.9
1: 6	18	7.8	8.8	9.8	10.9	12.2	13.7	15.3
1: 7	19	8.0	8.9	10.0	11.1	12.5	13.9	15.6
1: 8	20	8.1	9.1	10.1	11.3	12.7	14.2	15.9
1: 9	21	8.2	9.2	10.3	11.5	12.9	14.5	16.2
1:10	22	8.4	9.4	10.5	11.8	13.2	14.7	16.5
1:11	23	8.5	9.5	10.7	12.0	13.4	15.0	16.8
2: 0	24	8.6	9.7	10.8	12.2	13.6	15.3	17.1
2: 1	25	8.8	9.8	11.0	12.4	13.9	15.5	17.5
2: 2	26	8.9	10.0	11.2	12.5	14.1	15.8	17.8
2: 3	27	9.0	10.1	11.3	12.7	14.3	16.1	18.1
2: 4	28	9.1	10.2	11.5	12.9	14.5	16.3	18.4
2: 5	29	9.2	10.4	11.7	13.1	14.8	16.6	18.7

Weight-for-age BOYS
Birth to 5 years (z-scores)



World Health
Organization

Year	Month	Months	-1 SD	0 SD	+1 SD	Median	-1 SD	0 SD	+1 SD
2	9	30	9.4	10.3	11.8	10.3	15.0	16.9	19.0
2	10	31	9.5	10.7	12.0	10.5	15.2	17.1	19.3
2	11	32	9.6	10.8	12.1	10.7	15.4	17.4	19.6
3	0	33	9.7	10.9	12.3	10.8	15.6	17.6	19.9
3	1	34	9.8	11.0	12.4	11.0	15.8	17.8	20.2
3	2	35	9.9	11.2	12.6	11.2	16.0	18.1	20.4
3	3	36	10.0	11.3	12.7	11.3	16.2	18.3	20.7
3	4	37	10.1	11.4	12.9	11.5	16.4	18.5	21.0
3	5	38	10.2	11.5	13.0	11.7	16.6	18.6	21.3
3	6	39	10.3	11.6	13.1	11.8	16.8	18.8	21.6
3	7	40	10.4	11.8	13.3	12.0	17.0	19.3	21.9
3	8	41	10.5	11.9	13.4	12.2	17.2	19.5	22.1
3	9	42	10.6	12.0	13.6	12.3	17.4	19.7	22.4
3	10	43	10.7	12.1	13.7	12.5	17.6	19.9	22.7
3	11	44	10.8	12.2	13.8	12.7	17.8	20.2	23.0
3	12	45	10.9	12.4	14.0	12.8	18.0	20.5	23.3
4	0	46	11.0	12.5	14.1	13.0	18.2	20.7	23.6
4	1	47	11.1	12.6	14.3	13.2	18.4	20.9	23.9
4	2	48	11.2	12.7	14.4	13.3	18.6	21.2	24.2
4	3	49	11.3	12.8	14.5	13.5	18.8	21.4	24.5
4	4	50	11.4	12.9	14.7	13.7	19.0	21.7	24.8
4	5	51	11.5	13.1	14.8	13.8	19.2	21.9	25.1
4	6	52	11.6	13.2	15.0	14.0	19.4	22.2	25.4
4	7	53	11.7	13.3	15.1	14.2	19.6	22.4	25.7
4	8	54	11.8	13.4	15.2	14.4	19.8	22.7	26.0
4	9	55	11.9	13.5	15.4	14.6	20.0	22.9	26.3
4	10	56	12.0	13.6	15.5	14.8	20.2	23.2	26.6
4	11	57	12.1	13.7	15.6	15.0	20.4	23.4	26.9
4	12	58	12.2	13.8	15.8	15.2	20.6	23.7	27.2
5	0	59	12.3	14.0	15.9	15.4	20.8	23.9	27.5
5	1	60	12.4	14.1	16.0	15.5	21.0	24.2	27.9

WHO Child Growth Standards

1. Indirect methods:

(i) Vital Statistics

(ii) Ecological Factors Assessment

2 Direct methods:

(i) Anthropometry

(ii) Biochemical & laboratory estimation

(iii) Clinical Examination.

(iv) Diet Survey.

• WEIGHT-FOR-AGE

Weight-for-age reflects body weight relative to the child's age on a given day. This indicator is used to assess whether a child is underweight or severely underweight, but it is not used to classify a child as overweight or obese. Because weight is relatively easily measured, this indicator is commonly used, but it cannot be relied upon in situations where the child's age can not be accurately determined.

Weight - For - Age (Boys)

SI No.	Name	Gender	Age (yrs)	wt(kg)	Interpretation	Result
1.	A	M	2.5	11	$< M - 2SD$	Normal
2.	B	M	3.2	12	$< M - 2SD$	Normal
3.	C	M	3.5	12.5	$< M - 2SD$	Normal
4.	D	M	4	14	$< M - 2SD$	Normal
5	E	M	4.2	13.5	$< M - 2SD$	Normal



Measurement of Weight

Weight-for-age GIRLS
Birth to 5 years (z-scores)



World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
0: 0	0	2.0	2.4	2.8	3.2	3.7	4.2	4.8
0: 1	1	2.7	3.2	3.6	4.2	4.8	5.5	6.2
0: 2	2	3.4	3.9	4.5	5.1	5.8	6.6	7.5
0: 3	3	4.0	4.5	5.2	5.8	6.6	7.5	8.5
0: 4	4	4.4	5.0	5.7	6.4	7.3	8.2	9.3
0: 5	5	4.8	5.4	6.1	6.9	7.8	8.8	10.0
0: 6	6	5.1	5.7	6.5	7.3	8.2	9.3	10.6
0: 7	7	5.3	6.0	6.8	7.6	8.6	9.8	11.1
0: 8	8	5.6	6.3	7.0	7.9	9.0	10.2	11.6
0: 9	9	5.8	6.5	7.3	8.2	9.3	10.5	12.0
0: 10	10	5.9	6.7	7.5	8.5	9.6	10.9	12.4
0: 11	11	6.1	6.9	7.7	8.7	9.9	11.2	12.8
1: 0	12	6.3	7.0	7.9	8.9	10.1	11.5	13.1
1: 1	13	6.4	7.2	8.1	9.2	10.4	11.8	13.5
1: 2	14	6.6	7.4	8.3	9.4	10.6	12.1	13.8
1: 3	15	6.7	7.6	8.5	9.6	10.9	12.4	14.1
1: 4	16	6.9	7.7	8.7	9.8	11.1	12.6	14.5
1: 5	17	7.0	7.9	8.9	10.0	11.4	12.9	14.8
1: 6	18	7.2	8.1	9.1	10.2	11.6	13.2	15.1
1: 7	19	7.3	8.2	9.2	10.4	11.8	13.5	15.4
1: 8	20	7.5	8.4	9.4	10.6	12.1	13.7	15.7
1: 9	21	7.6	8.6	9.6	10.9	12.3	14.0	16.0
1: 10	22	7.8	8.7	9.8	11.1	12.5	14.3	16.4
1: 11	23	7.9	8.9	10.0	11.3	12.8	14.6	16.7
2: 0	24	8.1	9.2	10.2	11.5	13.0	14.7	17.0
2: 1	25	8.2	9.2	10.3	11.7	13.3	15.1	17.3
2: 2	26	8.4	9.4	10.5	11.9	13.5	15.4	17.7
2: 3	27	8.5	9.5	10.7	12.1	13.7	15.7	18.0
2: 4	28	8.6	9.7	10.9	12.3	14.0	16.0	18.3
2: 5	29	8.8	9.8	11.1	12.5	14.2	16.2	18.7

Weight-for-age GIRLS
Birth to 5 years (z-scores)



**World Health
Organization**

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
2: 6	30	8.9	10.0	11.2	12.7	14.4	16.5	18.0
2: 7	31	9.0	10.1	11.4	12.9	14.7	16.8	18.3
2: 8	32	9.1	10.3	11.6	13.1	14.9	17.1	19.0
2: 9	33	9.3	10.4	11.7	13.3	15.1	17.3	20.0
2: 10	34	9.4	10.5	11.9	13.5	15.4	17.6	20.3
2: 11	35	9.5	10.7	12.0	13.7	15.6	17.9	20.6
3: 0	36	9.6	10.8	12.2	13.9	15.8	18.1	20.9
3: 1	37	9.7	10.9	12.4	14.0	16.0	18.4	21.3
3: 2	38	9.8	11.1	12.5	14.2	16.3	18.7	21.6
3: 3	39	9.9	11.2	12.7	14.4	16.5	19.0	22.0
3: 4	40	10.1	11.3	12.8	14.6	16.7	19.2	22.3
3: 5	41	10.2	11.5	13.0	14.8	16.9	19.5	22.7
3: 6	42	10.3	11.6	13.1	15.0	17.2	19.8	23.0
3: 7	43	10.4	11.7	13.3	15.2	17.4	20.1	22.4
3: 8	44	10.5	11.8	13.4	15.3	17.6	20.4	22.7
3: 9	45	10.6	12.0	13.6	15.5	17.8	20.7	24.1
3: 10	46	10.7	12.1	13.7	15.7	18.1	20.9	24.5
3: 11	47	10.8	12.2	13.9	15.9	18.3	21.2	24.8
4: 0	48	10.9	12.3	14.0	16.1	18.5	21.5	25.2
4: 1	49	11.0	12.4	14.2	16.3	18.8	21.8	25.5
4: 2	50	11.1	12.6	14.3	16.4	19.0	22.1	25.9
4: 3	51	11.2	12.7	14.5	16.6	19.2	22.4	26.3
4: 4	52	11.3	12.8	14.6	16.8	19.4	22.6	26.6
4: 5	53	11.4	12.9	14.8	17.0	19.7	22.9	27.0
4: 6	54	11.5	13.0	14.9	17.2	19.9	23.2	27.4
4: 7	55	11.6	13.2	15.1	17.3	20.1	23.5	27.7
4: 8	56	11.7	13.3	15.2	17.5	20.3	23.8	28.1
4: 9	57	11.8	13.4	15.3	17.7	20.6	24.1	28.5
4: 10	58	11.9	13.5	15.5	17.9	20.8	24.4	28.8
4: 11	59	12.0	13.6	15.6	18.0	21.0	24.6	29.2
5: 0	60	12.1	13.7	15.8	18.2	21.2	24.9	29.5

WHO Child Growth Standards

Weight - For - Age (Girls)

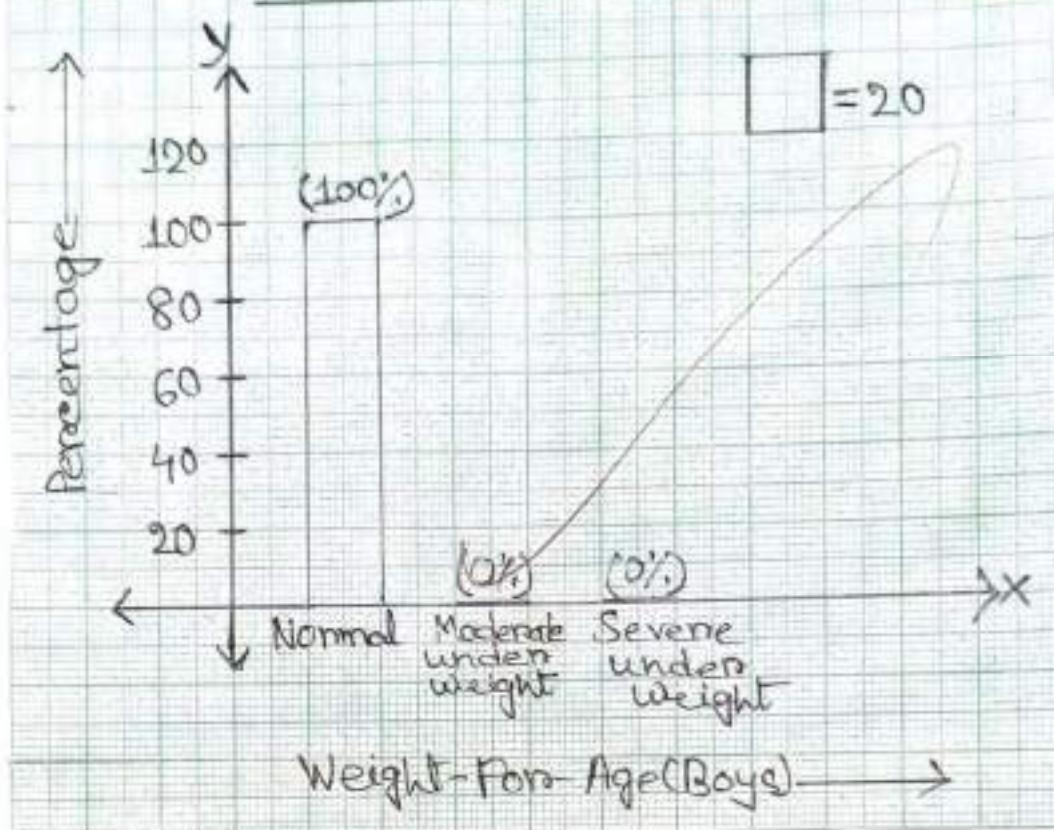
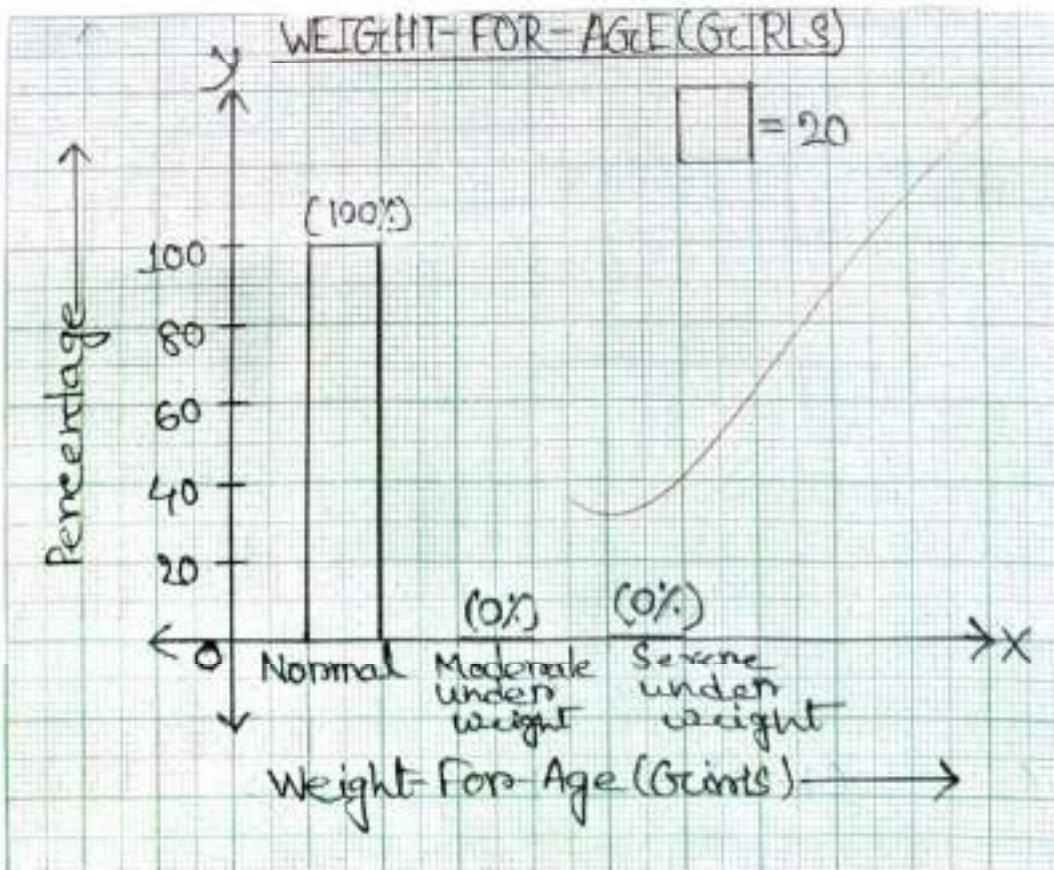
SI NO	Name	Gender	Age (Yrs)	Wt(kg)	Interpretation	Result
1.	F	F	2.8	11.5	$< M - 2SD$	Normal
2.	G	F	2	10	$< M - 2SD$	Normal
3.	H	F	3.6	12	$< M - 2SD$	Normal
4.	I	F	3.9	15	$< M - 2SD$	Normal
5.	J	F	4.6	14.5	$< M - 2SD$	Normal

■ INTERPRETATION For Boys & Girls:

Indicator	Interpretation
Normal	$< M - 2SD$
Moderate underweight	$M - 2SD$ to $< M - 3SD$
Severe Underweight	$< - 3SD$

Challenger

Teacher's Signature.....

WEIGHT-FOR-AGE(BOYS)WEIGHT-FOR-AGE(GIRLS)

■ INTERPRETATION FOR BOYS:

Indicator	Frequency	Percentage
Normal	05	100%
Moderate underweight	00	00%
Severe underweight	00 N=5	00% 100%

■ INTERPRETATION FOR GIRLS:

Indicator	Frequency	Percentage
Normal	05	100%
Moderate underweight	00	00%
Severe underweight	00 N= 05	00% 100%

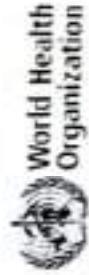
■ CONCLUSION:

Thus, from the above table (Weight-For-Age) 100% boys are normal, NO boys are moderate underweight and NO boys are severe underweight which is expressed through the Bar Diagram.

Thus, from the above table (Weight-For-Age) 100% girls are normal, NO girls are moderate underweight and NO girls are severe underweight which is expressed through the Bar Diagram.

Spd 19/11/2017

Height-for-age BOYS 2 to 5 years (z-scores)

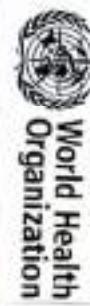


Year	Month	Month	L	M	S	SD	Z-scores (height in cm)						
							3 SD	2 SD	1 SD	Median	-1 SD	-2 SD	-3 SD
2: 0	24	-	87.1161	0.03507	3.0551	78.0	81.0	84.1	87.1	90.2	91.7	93.7	96.1
2: 1	25	-	87.9720	0.03542	3.1160	78.6	81.7	84.9	88.0	91.1	94.2	97.3	97.3
2: 2	26	-	88.8065	0.03576	3.1757	79.3	82.5	85.6	88.8	92.0	95.7	98.3	98.3
2: 3	27	-	89.6197	0.03610	3.2353	79.9	83.1	86.4	89.6	92.9	96.1	99.1	99.1
2: 4	28	-	90.4120	0.03642	3.2978	80.5	83.8	87.1	90.4	94.7	97.0	100.1	100.1
2: 5	29	-	91.1828	0.03674	3.3501	81.1	84.5	87.8	91.2	94.5	97.9	101.2	101.2
2: 6	30	-	91.9327	0.03704	3.4052	81.7	85.1	88.5	91.9	95.3	98.7	102.1	102.1
2: 7	31	-	92.6631	0.03733	3.4591	82.3	85.7	89.2	92.7	96.1	99.6	103.9	103.9
2: 8	32	-	93.3753	0.03761	3.5118	82.8	86.4	89.9	93.4	96.9	100.4	103.9	103.9
2: 9	33	-	94.0711	0.03787	3.5625	83.4	86.9	90.3	94.1	97.6	101.2	104.8	104.8
2: 10	34	-	94.7532	0.03812	3.6120	83.9	87.5	91.1	94.8	98.4	102.0	105.6	105.6
2: 11	35	-	95.4236	0.03836	3.6664	84.4	88.1	91.8	95.4	99.1	102.7	106.4	106.4
3: 0	36	-	96.0835	0.03858	3.7069	85.0	88.7	92.4	96.1	99.8	101.5	107.2	107.2
3: 1	37	-	96.7337	0.03879	3.7523	85.5	89.2	93.0	96.7	100.5	104.2	108.0	108.0
3: 2	38	-	97.3749	0.03900	3.7976	86.0	89.3	93.6	97.4	101.2	105.0	109.5	109.5
3: 3	39	-	98.0073	0.03919	3.8409	86.5	90.3	94.2	98.0	101.8	105.7	110.3	110.3
3: 4	40	-	98.6310	0.03937	3.8831	87.0	90.9	94.7	98.6	102.5	106.4	113.2	113.2
3: 5	41	-	99.3469	0.03954	3.9242	87.5	91.4	95.3	99.2	103.2	107.1	113.9	113.9
3: 6	42	-	99.8515	0.03971	3.9651	88.0	91.9	95.9	99.9	103.8	107.8	111.7	111.7
3: 7	43	-	100.4485	0.03986	4.0039	88.4	92.4	96.4	100.4	104.5	108.5	112.5	112.5
3: 8	44	-	101.0374	0.04002	4.0435	88.9	93.0	97.0	101.0	105.1	109.1	113.2	113.2
3: 9	45	-	101.6186	0.04016	4.0810	89.4	93.5	97.5	101.6	105.7	109.8	113.9	113.9
3: 10	46	-	102.1933	0.04031	4.1194	89.8	94.0	98.1	102.2	106.3	110.4	114.6	114.6
3: 11	47	-	102.7625	0.04045	4.1567	90.3	94.4	98.6	102.8	106.9	111.1	115.2	115.2
4: 0	48	-	103.3273	0.04059	4.1941	90.7	94.9	99.1	103.3	107.5	111.7	115.9	115.9

WHO Child Growth Standards

Height-for-age BOYS

2 to 5 years (z-scores)



Z-scores (Height in cm)

Year: Month	Month	L	M	S	SD	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
4: 1	49	1	103.8886	0.04073	4.2314	91.2	95.4	99.7	103.9	108.1	112.4	116.6
4: 2	50	1	104.4473	0.04086	4.2677	91.6	95.9	100.2	104.4	108.7	113.0	117.3
4: 3	51	1	105.0041	0.04100	4.3052	92.1	96.4	100.7	105.0	109.3	113.6	117.9
4: 4	52	1	105.5596	0.04113	4.3417	92.5	96.9	101.2	105.6	109.9	114.2	118.6
4: 5	53	1	106.1138	0.04126	4.3783	93.0	97.4	101.7	106.1	110.5	114.9	119.2
4: 6	54	1	106.5668	0.04139	4.4149	93.4	97.8	102.3	106.7	111.1	115.5	119.9
4: 7	55	1	107.2188	0.04152	4.4517	93.9	98.3	102.8	107.2	111.7	116.1	120.6
4: 8	56	1	107.7697	0.04165	4.4886	94.3	98.8	103.3	107.8	112.3	116.7	121.2
4: 9	57	1	108.3198	0.04177	4.5245	94.7	99.3	103.8	108.3	112.8	117.4	121.9
4: 10	58	1	108.8689	0.04190	4.5616	95.2	99.7	104.3	108.9	113.4	118.0	122.6
4: 11	59	1	109.4170	0.04202	4.5977	95.6	100.2	104.8	109.4	114.0	118.6	123.2
5: 0	60	1	109.9638	0.04214	4.6339	96.1	100.7	105.3	110.0	114.6	119.2	123.9

WHO Child Growth Standards

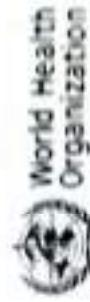
• HEIGHT-FOR-AGE:

Height-for-age reflects attained growth in length or height at the child's age. This indicator can help identify children who are stunted (short) due to prolonged undernutrition or repeated illness. Children who are tall for their age can also be identified, tallness is rarely a problem unless it is excessive & may reflect uncommon endocrine disorders.

~~Height-For-Age (Boys)~~

SI NO	Name	Gender	Age (yrs)	HH(cm)	Interpretation	Result
1.	A	M	2.5	95	$>M + 2SD$	Normal
2.	B	M	3.2	98	$>M + 2SD$	Normal
3.	C	M	3.5	100	$\cancel{>M + 2SD}$	Normal
4.	D	M	4	102	$<M - 2SD$	Normal
5.	E	M	4.2	103	$<M - 2SD$	Normal

Height-for-age GIRLS 2 to 5 years (z-scores)



Age (months)	Month	Year	SD			SD			SD			SD		
			1	2	3	4	5	6	7	8	9	10	11	12
24	24	85.2153	0.03764	3.2287	76.0	79.3	82.5	85.7	88.9	92.3	95.5	98.7	102.0	105.2
25	25	86.4934	0.03786	3.2287	76.0	80.0	83.3	86.6	90.9	95.2	98.4	101.4	104.4	107.4
26	26	87.4462	0.03808	3.3555	76.4	81.8	84.1	87.4	91.8	96.1	99.4	102.4	105.4	108.4
27	27	88.2830	0.03830	3.3812	76.8	81.3	84.9	88.2	92.7	96.4	99.4	102.4	105.4	108.4
28	28	89.1004	0.03851	3.4512	76.8	82.1	85.4	88.1	92.4	96.1	99.1	102.1	105.1	108.1
29	29	89.8991	0.03872	3.4808	76.4	82.9	86.4	89.9	94.2	97.9	100.2	103.2	106.2	109.2
30	30	90.6787	0.03893	3.5212	80.1	83.6	87.1	90.1	94.1	97.1	100.1	103.1	106.1	109.1
31	31	91.4450	0.03913	3.5517	80.7	84.3	87.9	91.4	95.4	98.4	101.4	104.4	107.4	110.4
32	32	92.1986	0.03933	3.5822	81.3	84.9	88.6	91.1	95.2	98.2	101.2	104.2	107.2	110.2
33	33	92.9219	0.03952	3.6124	81.8	85.5	89.2	92.7	96.2	99.2	102.2	105.2	108.2	111.2
34	34	93.6444	0.03971	3.6426	82.3	86.2	90.0	93.6	97.6	100.6	103.6	106.6	109.6	112.6
35	35	94.3573	0.03989	3.6728	82.8	86.8	90.6	94.1	98.1	101.1	104.1	107.1	110.1	113.1
36	36	95.0513	0.04006	3.6978	83.3	87.3	91.1	94.6	98.6	101.6	104.6	107.6	110.6	113.6
37	37	95.7399	0.04024	3.7279	84.2	88.0	91.9	95.2	99.2	102.2	105.2	108.2	111.2	114.2
38	38	96.4187	0.04041	3.7581	84.7	88.6	92.5	95.7	99.7	102.7	105.7	108.7	111.7	114.7
39	39	97.0885	0.04057	3.7884	85.2	89.1	93.1	96.1	99.1	102.1	105.1	108.1	111.1	114.1
40	40	97.7493	0.04073	3.8185	85.8	89.8	93.8	96.8	100.8	103.8	106.8	109.8	112.8	115.8
41	41	98.4015	0.04089	3.8487	86.3	90.3	94.4	97.4	101.4	104.4	107.4	110.4	113.4	116.4
42	42	99.0448	0.04105	3.8688	86.8	90.8	95.0	98.0	102.0	105.0	108.0	111.0	114.0	117.0
43	43	99.6795	0.04120	4.0108	87.4	91.4	95.9	99.9	103.9	107.9	110.9	113.9	116.9	119.9
44	44	100.3058	0.04135	4.1470	87.9	92.0	96.5	100.5	104.5	108.5	111.5	114.5	117.5	120.5
45	45	100.9238	0.04150	4.1832	88.4	92.5	97.0	101.0	105.0	108.9	111.9	114.9	117.9	120.9
46	46	101.5337	0.04164	4.2232	88.9	93.5	97.5	101.5	105.5	109.5	112.5	115.5	118.5	121.5
47	47	102.1360	0.04179	4.2683	89.3	93.9	98.1	102.1	106.1	109.1	112.1	115.1	118.1	121.1
48	48	102.7312	0.04193	4.3175	89.8	94.3	98.6	102.6	106.6	110.6	113.6	116.6	119.6	122.6

WHO Child Growth Standards

World Health Organization



**Height-for-age GIRLS
2 to 5 years (z-scores)**

Age (Month)	Month	1	M	SD	Z-scores (height in cm)							
					-3 SD	-2 SD	0 SD	+2 SD	+3 SD			
4; 1	49	1	103.3197	0.04206	4.3456	90.3	94.6	99.9	103.3	107.7	112.0	116.4
4; 2	50	1	103.9021	0.04220	4.3847	90.7	95.1	99.5	103.9	108.3	112.7	117.1
4; 3	51	1	104.4786	0.04233	4.4226	91.2	95.6	100.1	104.5	108.9	113.3	117.7
4; 4	52	1	105.0494	0.04246	4.4604	91.7	96.1	100.6	105.0	109.5	114.0	118.4
4; 5	53	1	105.6148	0.04259	4.4981	92.1	96.6	101.1	105.6	110.1	114.6	119.1
4; 6	54	1	106.1748	0.04272	4.5358	92.6	97.1	101.6	106.2	110.7	115.2	119.8
4; 7	55	1	106.7295	0.04285	4.5734	93.0	97.6	102.2	106.7	111.3	115.9	120.4
4; 8	56	1	107.2788	0.04298	4.6108	93.4	98.1	102.7	107.3	111.9	116.5	121.1
4; 9	57	1	107.8227	0.04310	4.6472	93.9	98.5	103.2	107.8	112.5	117.1	121.8
4; 10	58	1	108.3613	0.04322	4.6834	94.3	99.0	103.7	108.4	113.0	117.7	122.4
4; 11	59	1	108.8948	0.04334	4.7195	94.7	99.5	104.2	108.9	113.6	118.3	123.1
5; 0	60	1	109.4233	0.04347	4.7566	95.2	99.9	104.7	109.4	114.2	118.9	123.7

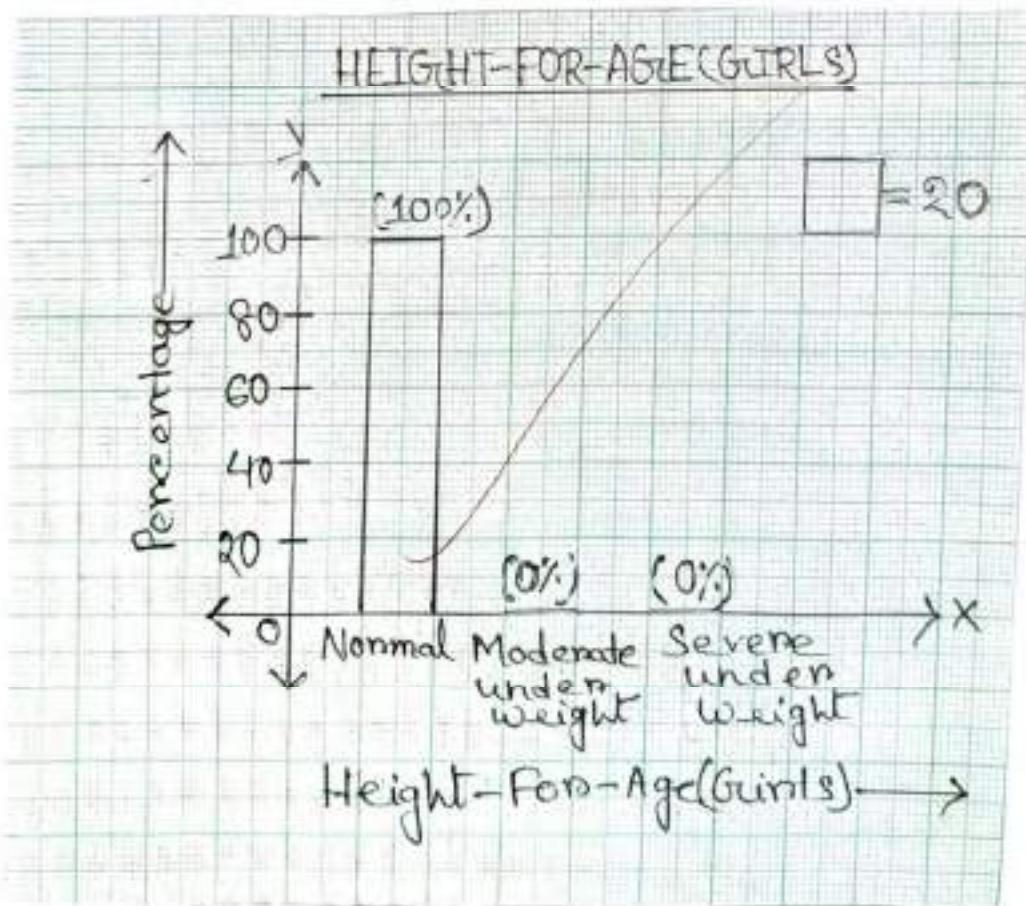
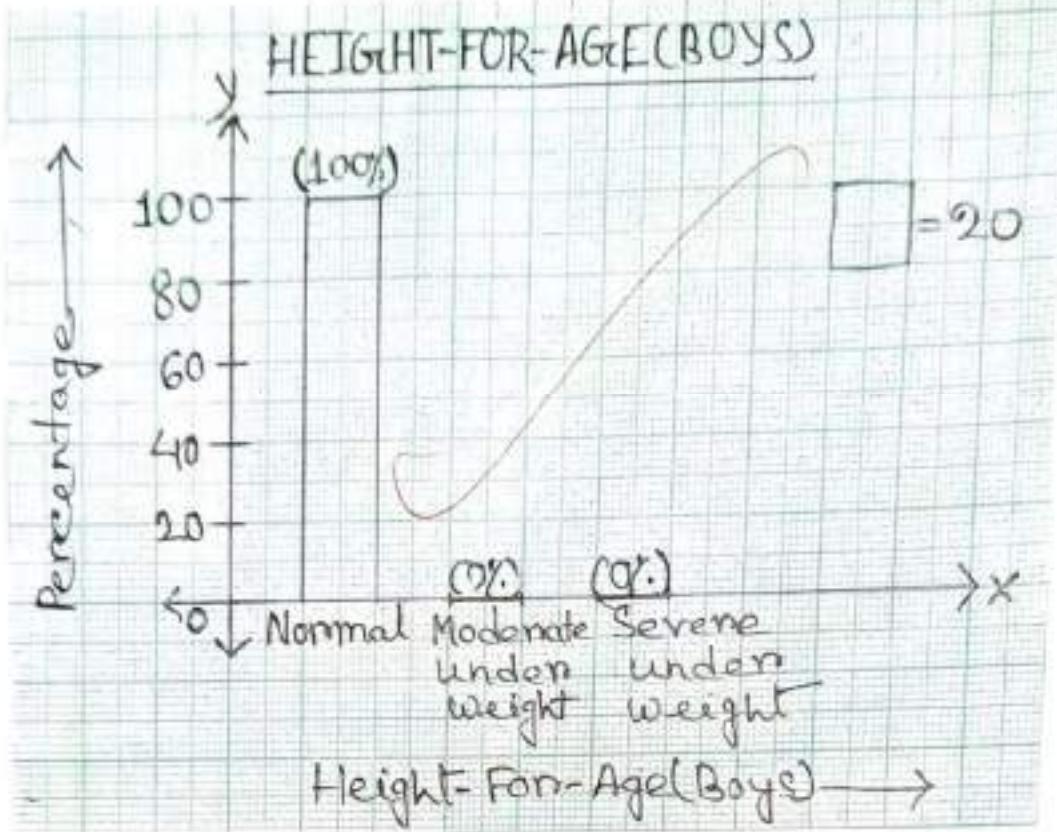
WHO Child Growth Standards

Height - Len. Age (Girls)

Sl No	Name	Gender	Age (Yrs)	Ht (cm)	Interpretation	Result
1.	E	I	2.8	95	$> M + 2SD$	Normal
2.	G	I	2	90	$> M + 2SD$	Normal
3.	H	F	3.6	102	$> M + 2SD$	Normal
4.	I	F	3.9	100	$< M - 2SD$	Normal
5.	J	F	4.6	110	$> M + 2SD$	Normal

 INTERPRETATION FOR Boys & GIRLS

Indicator	Interpretation
Normal	$< M - 2SD$
Moderately stunted	$M - 2SD \text{ to } M - 3SD$
Severely stunted	$> M + 2SD$



INTERPRETATION FOR BOYS:

Indicator	Frequency	Percentage
Normal	05	100%.
Moderate stunted	00	00%.
Severe stunted	00	00%.
	N= 05	100%.

INTERPRETATION FOR GIRLS:

Indicator	Frequency	Percentage
Normal	05	100%.
Moderate stunted	00	00%.
Severe stunted	00	00%.
	N= 05	100%.
Challenger		

CONCLUSION:

Thus, from the above table (Height - For-Age) NO boys are moderate stunted, 10% boys are normal and ~~NO Boys~~ 30% are severe stunted, which is expressed through the Bar-Diagram.

Thus, from the above table (Height - For-Age) 100% girls are normal and NO girls are moderate stunted and ~~NO~~ 0% girls are severe stunted, which is expressed through the Bar-Diagram.

**Weight-for-height BOYS
2 to 5 years (z-scores)**



**World Health
Organization**

cm	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
80.0	8.3	9.0	9.7	10.6	11.5	12.5	13.7
80.5	8.4	9.1	9.8	10.7	11.6	12.7	13.8
81.0	8.5	9.2	9.9	10.8	11.7	12.8	14.0
81.5	8.6	9.3	10.0	10.9	11.8	12.9	14.1
82.0	8.7	9.3	10.1	11.0	11.9	13.0	14.2
82.5	8.7	9.4	10.2	11.1	12.1	13.1	14.4
83.0	8.8	9.5	10.3	11.2	12.2	13.3	14.5
83.5	8.9	9.6	10.4	11.3	12.3	13.4	14.6
84.0	9.0	9.7	10.5	11.4	12.4	13.5	14.8
84.5	9.1	9.9	10.7	11.5	12.5	13.7	14.9
85.0	9.2	10.0	10.8	11.7	12.7	13.8	15.1
85.5	9.3	10.1	10.9	11.8	12.8	13.9	15.2
86.0	9.4	10.2	11.0	11.9	12.9	14.1	15.4
86.5	9.5	10.3	11.1	12.0	13.1	14.2	15.5
87.0	9.6	10.4	11.2	12.2	13.2	14.4	15.7
87.5	9.7	10.5	11.3	12.3	13.3	14.5	15.8
88.0	9.8	10.6	11.5	12.4	13.5	14.7	16.0
88.5	9.9	10.7	11.6	12.5	13.6	14.8	16.1
89.0	10.0	10.8	11.7	12.6	13.7	14.9	16.3
89.5	10.1	10.9	11.8	12.6	13.9	15.1	16.4
90.0	10.2	11.0	11.9	12.8	14.0	15.2	16.6
90.5	10.3	11.1	12.0	13.0	14.1	15.3	16.7
91.0	10.4	11.2	12.1	13.1	14.2	15.5	16.9
91.5	10.5	11.3	12.2	13.2	14.4	15.6	17.0
92.0	10.6	11.4	12.3	13.4	14.5	15.8	17.2
92.5	10.7	11.5	12.4	13.5	14.6	15.9	17.3
93.0	10.8	11.6	12.6	13.6	14.7	16.0	17.5
93.5	10.9	11.7	12.7	13.7	14.9	16.2	17.6
94.0	11.0	11.8	12.8	13.8	15.0	16.3	17.8
94.5	11.1	11.9	12.9	13.9	15.1	16.5	17.9
95.0	11.1	12.0	13.0	14.1	15.3	16.6	18.1

Weight-for-height BOYS
2 to 5 years (z-scores)



**World Health
Organization**

cm	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
95.5	11.2	12.1	13.1	14.2	15.4	16.7	18.3
96.0	11.3	12.2	13.2	14.3	15.5	16.9	18.4
96.5	11.4	12.3	13.3	14.4	15.7	17.0	18.6
97.0	11.5	12.4	13.4	14.5	15.8	17.2	18.8
97.5	11.6	12.5	13.6	14.7	15.9	17.4	18.9
98.0	11.7	12.6	13.7	14.8	16.1	17.5	19.1
98.5	11.8	12.8	13.8	14.9	16.2	17.7	19.3
99.0	11.9	12.9	13.9	15.1	16.4	17.9	19.5
99.5	12.0	13.0	14.0	15.2	16.5	18.0	19.7
100.0	12.1	13.1	14.2	15.4	16.7	18.2	19.9
100.5	12.2	13.2	14.3	15.5	16.9	18.4	20.1
101.0	12.3	13.3	14.4	15.6	17.0	18.5	20.3
101.5	12.4	13.4	14.5	15.8	17.2	18.7	20.5
102.0	12.5	13.5	14.7	15.9	17.3	18.9	20.7
102.5	12.6	13.7	14.8	16.1	17.5	19.1	20.9
103.0	12.8	13.8	14.9	16.2	17.7	19.3	21.1
103.5	12.9	13.9	15.1	16.4	17.8	19.5	21.3
104.0	13.0	14.0	15.2	16.5	18.0	19.7	21.6
104.5	13.1	14.2	15.4	16.7	18.2	19.9	21.8
105.0	13.2	14.3	15.5	16.8	18.4	20.1	22.0
105.5	13.3	14.4	15.6	17.0	18.5	20.3	22.2
106.0	13.4	14.5	15.8	17.2	18.7	20.5	22.5
106.5	13.5	14.7	15.9	17.3	18.9	20.7	22.7
107.0	13.7	14.8	16.1	17.5	19.1	20.9	22.9
107.5	13.8	14.9	16.2	17.7	19.3	21.1	23.2
108.0	13.9	15.1	16.4	17.8	19.5	21.3	23.4
108.5	14.0	15.2	16.5	18.0	19.7	21.5	23.7
109.0	14.1	15.3	16.7	18.2	19.8	21.8	23.9
109.5	14.3	15.5	16.8	18.3	20.0	22.0	24.2
110.0	14.4	15.6	17.0	18.5	20.2	22.2	24.4
110.5	14.5	15.8	17.1	18.7	20.4	22.4	24.7

• WEIGHT-FOR-HEIGHT:

It reflects body weight in proportion to attained growth in length or height. This indicator is especially useful in situations where children's age are unknown. Weight-for-length/height charts help identify children with low weight-for-height who may be wasted or severely wasted. Wasting is usually caused by a recent illness or food shortage that causes acute & severe weight loss, although chronic undernutrition or illness can also cause this condition. These charts also help identify children with weight-for-length/height who may be at risk of becoming overweight or obese.

Weight - For - Height (Boys)

Sl No	Name	Gender	wt(kg)	Ht(cm)	Interpretation	Result
1.	A	M	11	95	<3SD	Severe Wasting
2.	B	M	12	98	LM - 2SD to LM - 3SD	Moderate wasting
3.	C	M	12.5	100	LM - 2SD to LM - 3SD	Moderate wasting
4.	D	M	14	102	LM - 2SD	Normal
5.	E	M	13.5	103	LM - 2SD to LM - 3SD	Moderate wasting

Chaitanya

Weight-for-height GIRLS
2 to 5 years (z-scores)



World Health
Organization

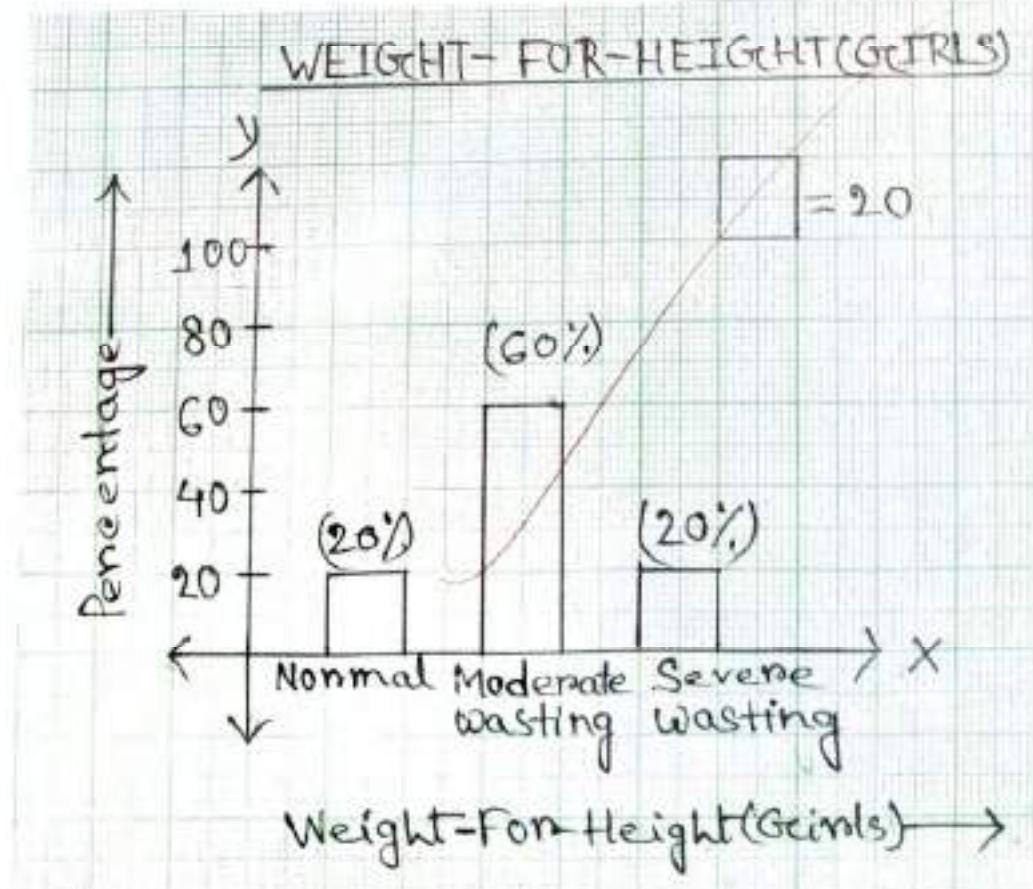
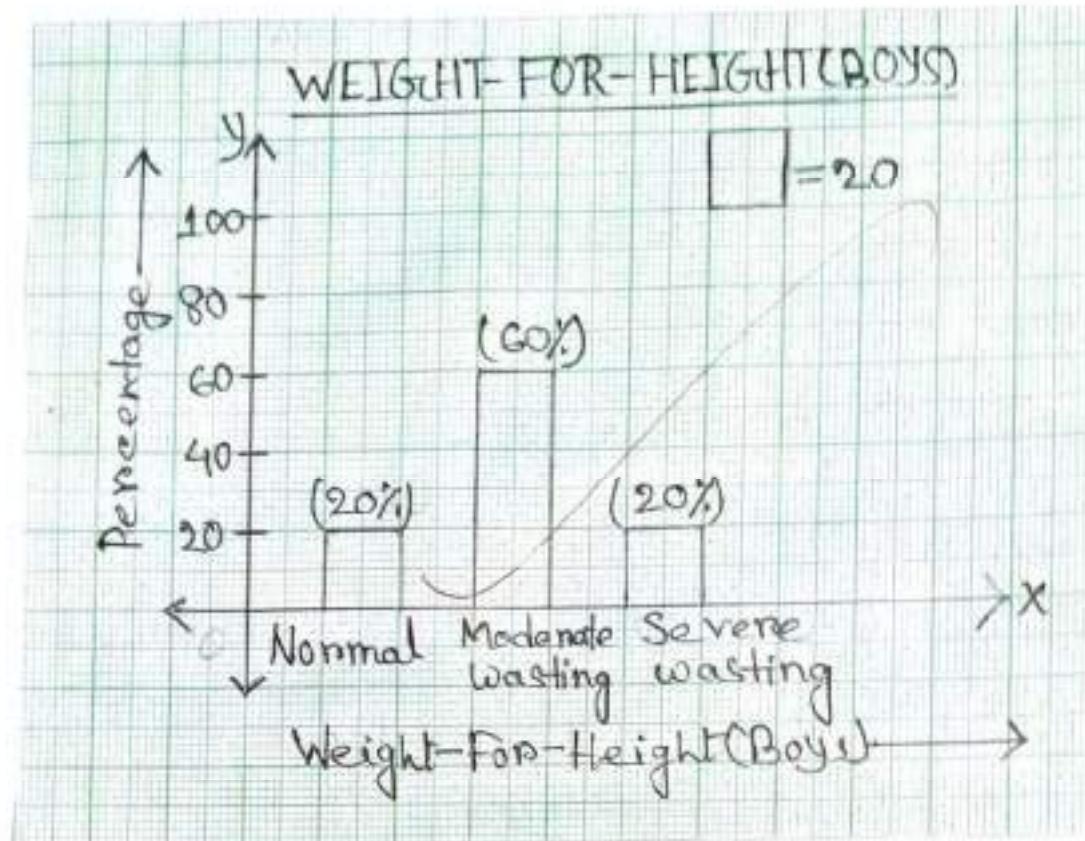
cm	-3 SD	-2 SD	1 SD	Median	1 SD	2 SD	3 SD
80.0	7.9	8.6	9.4	10.2	11.2	12.3	13.6
80.5	8.0	8.7	9.5	10.3	11.3	12.4	13.7
81.0	8.1	8.8	9.6	10.4	11.4	12.6	13.9
81.5	8.2	8.9	9.7	10.6	11.6	12.7	14.0
82.0	8.3	9.0	9.8	10.7	11.7	12.8	14.1
82.5	8.4	9.1	9.9	10.8	11.8	13.0	14.3
83.0	8.5	9.2	10.0	10.9	11.9	13.1	14.5
83.5	8.5	9.3	10.1	11.0	12.1	13.3	14.6
84.0	8.6	9.4	10.2	11.1	12.2	13.4	14.8
84.5	8.7	9.5	10.3	11.3	12.3	13.5	14.9
85.0	8.8	9.6	10.4	11.4	12.5	13.7	15.1
85.5	8.9	9.7	10.6	11.5	12.6	13.8	15.3
86.0	9.0	9.8	10.7	11.6	12.7	14.0	15.4
86.5	9.1	9.9	10.8	11.8	12.9	14.2	15.6
87.0	9.2	10.0	10.9	11.9	13.0	14.3	15.8
87.5	9.3	10.1	11.0	12.0	13.2	14.5	15.9
88.0	9.4	10.2	11.1	12.1	13.3	14.6	16.1
88.5	9.5	10.3	11.2	12.3	13.4	14.8	16.3
89.0	9.6	10.4	11.4	12.4	13.6	14.9	16.4
89.5	9.7	10.5	11.5	12.5	13.7	15.1	16.6
90.0	9.8	10.6	11.6	12.6	13.8	15.2	16.8
90.5	9.9	10.7	11.7	12.8	14.0	15.4	16.9
91.0	10.0	10.9	11.8	12.9	14.1	15.5	17.1
91.5	10.1	11.0	11.9	13.0	14.3	15.7	17.3
92.0	10.2	11.1	12.0	13.1	14.4	15.8	17.4
92.5	10.3	11.2	12.1	13.3	14.5	16.0	17.6
93.0	10.4	11.3	12.3	13.4	14.7	16.1	17.8
93.5	10.5	11.4	12.4	13.5	14.8	16.3	17.9
94.0	10.6	11.5	12.5	13.6	14.9	16.4	18.1
94.5	10.7	11.6	12.6	13.8	15.1	16.6	18.3
95.0	10.8	11.7	12.7	13.9	15.2	16.7	18.5

Weight - For - Height (Girls)

No.	Name	Gender	Wt (kg)	Ht (cm)	Interpretation	Result
1.	F	F	11.5	95	$<M-2SD$ to $<M-3SD$	Moderate wasting
2.	G	F	10	90	$<M-2SD$ to $<M-3SD$	Moderate wasting
3.	H	F	12	102	$<-3SD$	Severe wasting
4.	I	F	15	100	$<M-2SD$	Normal
5.	J	F	14.5	110	$<M-2SD$ to $<M-3SD$	Moderate wasting

■ INTERPRETATION FOR BOYS & GIRLS:

Indicator	Interpretation
Normal	$(M-2SD)$
Moderate wasting	$(M-2SD)$ to $(M-3SD)$
Severe wasting	$<M-3SD$



■ INTERPRETATION FOR BOYS:

Indicator	Frequency	Percentage
Normal	01	20%
Moderate wasting	03	60%
Severe wasting	01 N= 05	20% 100%

■ INTERPRETATION FOR GIRLS:

Indicator	Frequency	Percentage
Normal	01	20%
Moderate wasting	03	60%
Severe wasting	01 N= 05	20% 100%

■ CONCLUSION:

Thus, from the above table (Weight-For-Height) 20% boys are normal and 60% boys are moderate wasting and 20% boys are severe wasting, which is expressed through the Bar-diagram.

Thus, from the above table (Weight-For-Height) 20% girls are normal and 60% girls are moderate wasting and 20% girls are severe wasting, which is expressed through the Bar-diagram.

CBSE
2017

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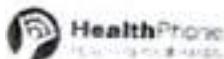
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Early Detection and Referral of Children with Malnutrition

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Detection and Referral of Children with Acute Malnutrition

MUAC Resources - Sources for MUAC straps

Interpretation of Mid-Upper Arm Circumference MUAC indicators

- MUAC less than 110mm (11.0cm), RED COLOUR, indicates Severe Acute Malnutrition (SAM). The child should be immediately referred for treatment.
- MUAC of between 110mm (11.0cm) and 125mm (12.5cm), RED COLOUR (3-colour Tape) or ORANGE COLOUR (4-colour Tape), indicates Moderate Acute Malnutrition (MAM). The child should be immediately referred for supplementation.
- MUAC of between 125mm (12.5cm) and 135mm (13.5cm), YELLOW COLOUR, indicates that the child is at risk for acute malnutrition and should be counselled and followed-up for Growth Promotion and Monitoring (GPM).
- MUAC over 135mm (13.5cm), GREEN COLOUR, indicates that the child is well nourished.

■ INTERPRETATION OF MID-UPPER ARM CIRCUMFERENCE MUAC INDICATORS:

- MUAC less than 110mm(11.0cm), RED colour, indicates Severe Acute Malnutrition (SAM). The child should be immediately referred for treatment.
- MUAC of between 110mm(11.0cm) & 125mm(12.5cm), RED colour (3-colour Tape) or ORANGE colour (4-colour Tape), indicates Moderate Acute Malnutrition (MAM). The child should be immediately referred for supplementation.
- MUAC of between 125mm(12.5cm) & 135mm(13.5cm) YELLOW colour indicates that the child is at risk for acute malnutrition & should be counselled and followed up for Growth Promotion & Monitoring (GPM).
- MUAC over 135mm(13.5cm), GREEN colour indicates that the child is well nourished.

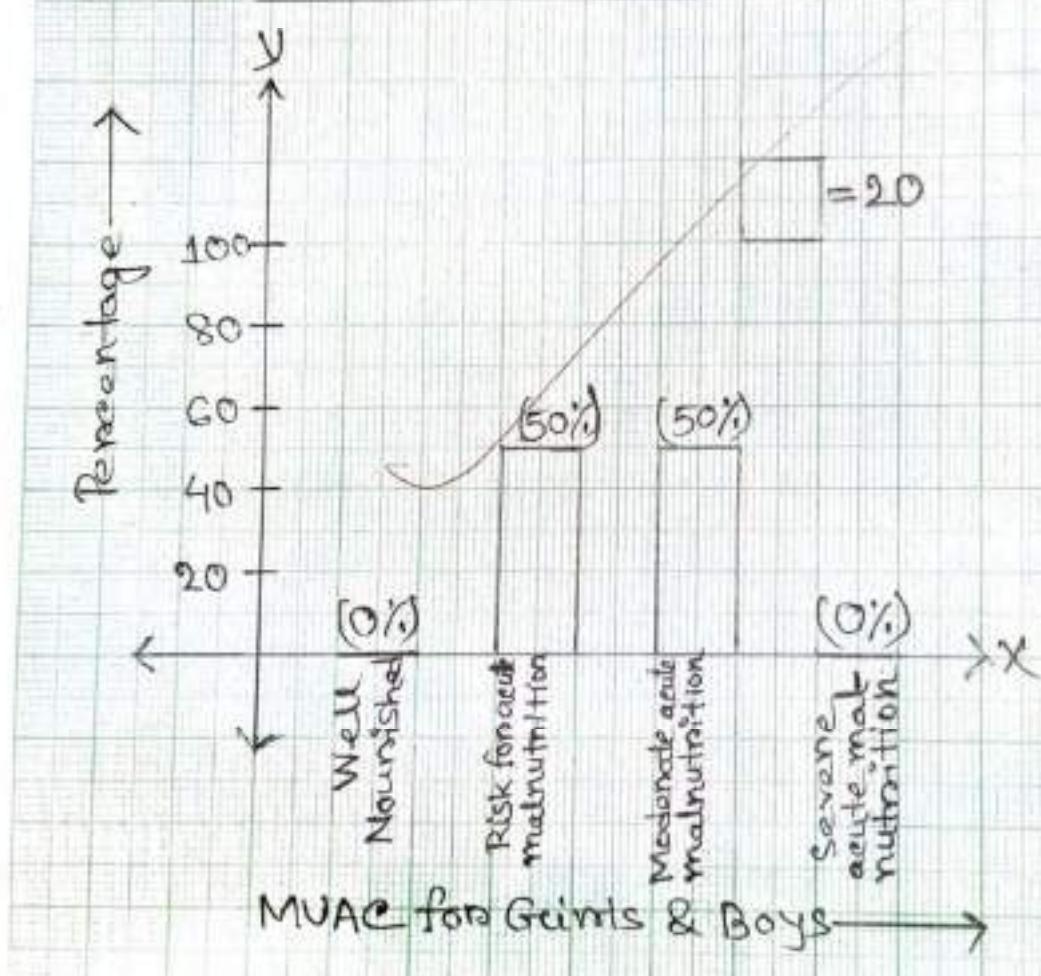
• MUAC For Boys

SI No	Name	Gender	MUAC (cm)	Interpretation	Result
1	A	M	11	11.0cm-12.5cm (orange)	Moderate Acute Malnutrition
2	B	M	11.2	11.0cm-12.5cm (orange)	Moderate Acute Malnutrition
3	C	M	12.3	11.0cm-12.5cm (orange)	Moderate Acute Malnutrition
4	D	M	12	11.0cm-12.5cm (orange)	Moderate Acute Malnutrition
5	E	M	12.3	11.0cm-12.5cm (orange)	Moderate Acute Malnutrition

• MUAC For Girls

SI No	Name	Gender	MUAC (cm)	Interpretation	Result
1.	F	F	12.7	12.5cm-13.5cm (Yellow)	Risk for Acute Malnutrition
2.	G	F	13.1	12.5cm-13.5cm (Yellow)	Risk for Acute Malnutrition
3.	H	F	12.8	12.5cm-13.5cm (Yellow)	Risk for Acute Malnutrition
4.	I	F	13.2	12.5cm-13.5cm (Yellow)	Risk for Acute Malnutrition
5.	J	F	13.5	12.5cm-13.5cm (Yellow)	Risk for Acute Malnutrition

MUAC FOR BOYS & GIRLS



INTERPRETATION FOR BOYS & GIRLS:

Indicator	Colour	Interpretation
Well nourished	Green	13.5 cm
Risk for Acute malnutrition	Yellow	12.5 cm - 13.5 cm
Moderate Acute malnutrition (MAM)	Orange	11.0 cm - 12.5 cm
Severe Acute malnutrition (SAM)	Red	< 11.0 cm

INTERPRETATION FOR BOYS & GIRLS:

Indicator	Frequency	Percentage
Well nourished	00	00%
Risk for Acute Malnutrition	05	50%
Moderate Acute Malnutrition	05	50%
Severe Total Acute Malnutrition	00	00%
Total	N=10	100%



Measurement of MUAC

CONCLUSION:

Thus, from the above table (MUAC) no one are wellnourished, 50% are Risk for acute malnutrition, 50% are Moderate acute malnutrition & 0% are Severe acute malnutrition, which is expressed through the Bar diagram.



Lot
2019/20

ASSESSMENT OF BMI OF AN ADULT

- Measurement of the body weight:

Body weight is the most widely used & the sensitive & simplest reproducible anthropometric measurement for the evaluation of nutritional status of young children. BMI is proportional to body weight. A BMI of 18.50-24.99 may indicate optimal weight. BMI indicates optimal weight. BMI lower than 18.50 suggests the person is underweight while a number above 25 may indicate the person is over weight. A person may have BMI below 18.50 due to disease or weight excess or deficiency may impact be occurred form by body fat (adipose tissue) although other factors such as muscularities affect BMI significantly.

- Measurement of height:

The height of an individual is influenced both by genetic & environmental factors. Height is affected only by long term nutritional deprivation. It is considered an index of chronic or long duration malnutrition.

BMI is inversely proportional to the square of height. Pandermal index is based on this natural scaling of weight the third power of the height.

• Calculation of BMI:

The body BMI is also called Quellet index is a heuristic proxy for human body fat based on an individual's weight & height. It does not actually measure the percentage of body fat. BMI is defined as the individual's body weight divided by the square of his/her height. The index does not require any standard table.

$$\text{BMI} = \frac{\text{Body Weight (kg)}}{\text{Height (m)}^2}$$

■ ADVANTAGES OF BMI:

- It is very useful indicator for the assessment of health status of adults. BMI has a good correlation with fatness.
- It may be used as an indicators of health risk. It may be widely used for individual diagnosis despite its inappropriateness.

- A frequent use of BMI is to assess how much an individual's body weight departs from what is normal or desirable for a person of his/her weight. The BMI is used by general mass & can serve as vague means of estimating adiposity.
 - It has been used by the WHO as the standard for recording obesity statistics.
 - It also used as a measure of underweight owing to advocacy on health behalf of those suffering with eating disorder such as anorexia, bulimia, bulimianorexia.
- LIMITATION:

BMI is disadvantageous as this does not distinguish between overweight due to ~~Obesity~~ & muscular hypertrophy as it happens in athletics.

		BMI(Kg/m ²)
Classification	Principle cut-off Points	Additional cut-off Points
Underweight	<18.50	<18.50
Severe thinness	<16.00	<16.00
Moderate thinness	16.00 - 16.99	16.00 - 16.99
Mild thinness	17.00 - 18.49	17.00 - 18.49
Normal range	18.50 - 24.99	18.50 - 22.99 13.00 - 24.99
Overweight	> 25.00	> 25.00
Pre-obese	25.00 - 29.99	25.00 - 27.49 27.50 - 29.99
Obese	≥ 30.00	≥ 30.00
Obese class I	30.00 - 34.99	30.00 - 32.49 32.50 - 34.99
Obese class II	35.00 - 39.99	35.00 - 37.49 37.50 - 39.99
Obese class III	≥ 40.00	≥ 40.00

~~Source : Adapted from WHO, 1995, WHO 2000 & WHO 2004~~

ASSESSMENT OF BMI OF ADULTS :

SI NO	Name	Gen der	Age (yrs)	Ht (cm)	Wt (kg)	BMI (kg/m ²)	Interpretation
1.	Ashik Iktbal Molla	M	19	167.6	58.5	20.24	Normal
2.	Anisha Khatun	F	18	149.9	47	18.91	Normal
3.	Borsa Khamansu	F	19	152.4	47	20.23	Normal
4.	Rupsa Ghosh	F	19	152.4	45	19.48	Normal
5.	Trisita Mondal	F	19	165.1	59	21.67	Normal
6.	Monjja Mollick	F	19	149.8	40	18.01	Underweight
7.	Priya Mondal	F	19	157.4	62	25.2	Pre-obese
8.	Rimita Pramanick	F	19	157.4	62	25.2	Pre- obese Normal
9.	Piyasa Ghosh	F	18	154.9	50	21.0	Under Normal
10.	Nishat Selch	F	19	154.9	40	16.87	Underweight
11.	Srijita Das	F	19	157.4	54	21.90	Normal
12.	Sreemoyee Sengupta	F	18	149.8	44.5	20.04	Normal
13.	Mahek Shaw	F	18	160.0	58	22.05	Normal
14.	Septadipn Hazra	F	19	151	49	21.47	Normal
15.	Sheha Ghose	F	19	164.5	41	15.24	Severe thinness
16.	Sahina	F	18	167.6	49	27.57	Mild thinness

Interpretation of BMI (kg/m ²)	Frequency	Percentage
1. Underweight	4	25%
2. Normal	10	62.5%
3. Overweight	0	00%
4. Pre-obese	2	12.5%
Total	Total - 16	100%

Conclusion:

Thus it can be seen that 25% person are underweight, 62.5% person are Normal, No one person are overweight & 12.5% are pre obese, which is expressed through the Bar-Diagram

WAIST & HIP RATIO OF ADULTS:

To calculate muscle circumference on abdomen lay a belt over the appropriate value for arm circumference & muscle are for the middleline waist-hip ratio gives distribution of fat in human body. A waist-hip ratio greater than 0.95 in men 0.8 in women is indicative of android obesity & increases the risk of atherosclerosis.

The predominant distribution of fat in obese person, whether in the upper part or the lower part of the body may determine the disease pattern.

The normal ratio = $\frac{\text{Waist}}{\text{Hip}} = 0.7$

But upper body obesity the ratio is 0.85 in women & greater than 0.95 in men.

Abdominal obesity do not always go hand with over weight or obesity.

■ Measurement of waist circumference:

It was measured using measuring tape. The tape was passed mid way between the lower rib margin & iliac crest.

■ Measurement of hip circumference:

It was measured with passing over maximum protuberance on buttocks.



Measurement of Waist-Hip Ratio

ASSESSMENT OF WAIST & HIP RATIO OF ADULTS:

Sl No	Name	Gender	Age	Waist Circum- ference (@m)	Hip Circum- ference (@m)	Waist/Hip Ratio Waist/ Hip	Interpre- tation
1.	Anisha Khatun	F	18	62	73.5	0.84	Normal
2.	Barsha Khamaru	F	19	69	82	0.84	Normal
3.	Rupsa Ghosh	F	19	69	83	0.83	Normal
4.	Troisita Mondal	F	19	74.5	90	0.82	Normal
5.	Monija Mollick	F	19	62	69	0.89	Obesity
6.	Priya Mondal	F	19	94	100	0.94	Obesity
7.	Rimita Roamaniek	F	19	94	105	0.89	Obesity
8.	Piyasa Ghosh	F	18	79	86	0.91	Obesity
9.	Nishat Sekh	F	19	62	63.5	0.97	Obesity
10.	Srijita Das	F	19	76	85	0.89	Obesity
11.	Sneemoyee Sen Gupta	F	18	70	76	0.92	Obesity
12.	Mahsk Shaw	F	18	82	90	0.91	Obesity
13.	Saptadipa Hazra	F	19	78	84	0.92	Obesity
14.	Sneha Ghose	F	19	69	77	0.89	Obesity
15.	Sahina	F	18	68	79	0.86	Obesity

ASSESSMENT OF WAIST & HIP RATIO OF AN ADULTS:

SI NO	Name	Gender	Age (Yrs)	Waist Circumference	Hip Circumference	Waist/Hip Ratio	Interpretation
				(cm)	(cm)	Waist Hip	
1.	Ashik Iqbal Molla	M	73	80	0.91	Obesity Normal	

● WHR For Female:-

Interpretation of WHR (Females)	Frequency	Percentage %
1. Normal	04	26.66%
2. Substantially increased (Obesity)	11	73.33%
	N = 15	

● WHR For Male:-

Interpretation of WHR (Males)	Frequency	Percentage %
1. Normal	01	100%
2. Substantially increased (Obesity)	0	0
	N = 1	

■ CONCLUSION: Thus it can be concluded that females were having normal WHR whereas 73.33% having higher WHR which is expressed through the Bar-Diagram

Thus, it can be concluded that 100% males were having normal WHR whereas no one having higher WHR which is expressed through Bar-Diagram

■ GROWTH CHART:

Growth chart is also called ~~Ped~~ to health chart. The central purpose of the growth chart with its reference curves, is to provide a visual representation of the growth of individual children. It cannot be emphasized too strongly that the growth curve is of vital importance, both as a diagnostic tool & as an educational tool for mothers, in promoting appropriate growth & stimulating & guiding preventive & corrective actions.

It must again be stressed that the direction of growth is of prime importance. The growth curve can take three directions, as follows:

(1) Upwards: If a child's growth curve is climbing upwards in the same direction as the reference curves, this is good. The child is growing adequately.

(2) Horizontal: If the growth curve is horizontal, this means the child is not putting on weight. He has stopped growing. Because all healthy children put on weight as they grow, this is a warning sign.

(3) Downwards:

If the growth curve is moving downwards, the child is losing weight. This is very dangerous. The child needs immediate help. The direction of the curve should also help in evaluating the effectiveness of corrective measures.

A growth curve is formed by joining the plotted points on a growth chart. Direction of growth curve indicates whether the child is growing or not & is more important than the actual weight of the child at a given point of weighing. On each growth chart, there are 3 printed growth curves. These are called Reference Lines or Z Score Lines & are used to compare & interpret the growth pattern of the child & assess her/his nutritional status. The 1st top curve line on the growth chart i.e. upper border of green band is the median which is generally speaking, the average. Second line is the junction of green & yellow bands & 3rd line is the junction of yellow & orange bands. Weight of all normal & healthy children, when plotted on the growth chart, fall above 2nd curve (green band). Weight of moderately underweight children fall below the 2nd curve to 3rd curve.

(Yellow band); & weight of Severely underweight children fall below the 3rd curve (Orange band)

Plotting the child's weight, taken every month or quarter, on the growth chart & joining these weight points with a line to form the growth curve, makes the growth of the child visible. The growth curve is a useful tool in many ways & enables to:

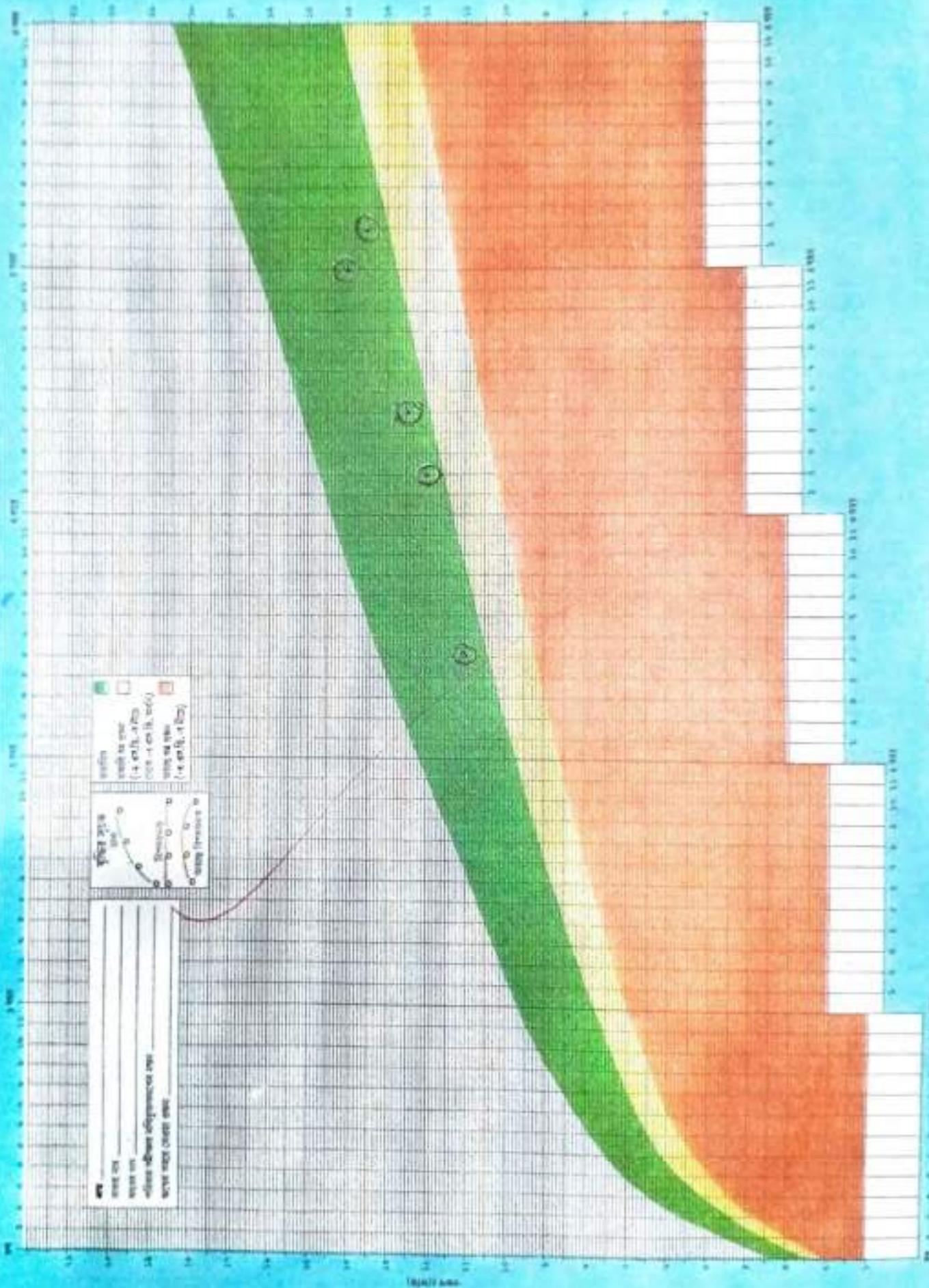
- Detect early growth faltering & prevent underweight.
- Identify underweight children who need special care & feeding at home; in addition to supplementary nutrition received at the AWC.
- Identify severely underweight children who need special care & feeding at home & to provide referral advice, in addition to Micronutrient-fortified food/Energy-dense food supplementation at the AWC.
- Identify causes of weight loss or lack of growth i.e. illness such as fever, diarrhoea & acute respiratory infections; inadequate or

insufficient diet; mother's illness etc. to take corrective & timely actions, he

- Educate, counsel & support mothers & families for optimal nutrition, health care & development of their children.



ହେଲୋ ମାରା କାଳିଶାର୍କ ଉପରେ ଯିବାକୁ ପାଞ୍ଜାବୀ କାଳିଶାର୍କ କାଳିଶାର୍କ କାଳିଶାର୍କ କାଳିଶାର୍କ କାଳିଶାର୍କ



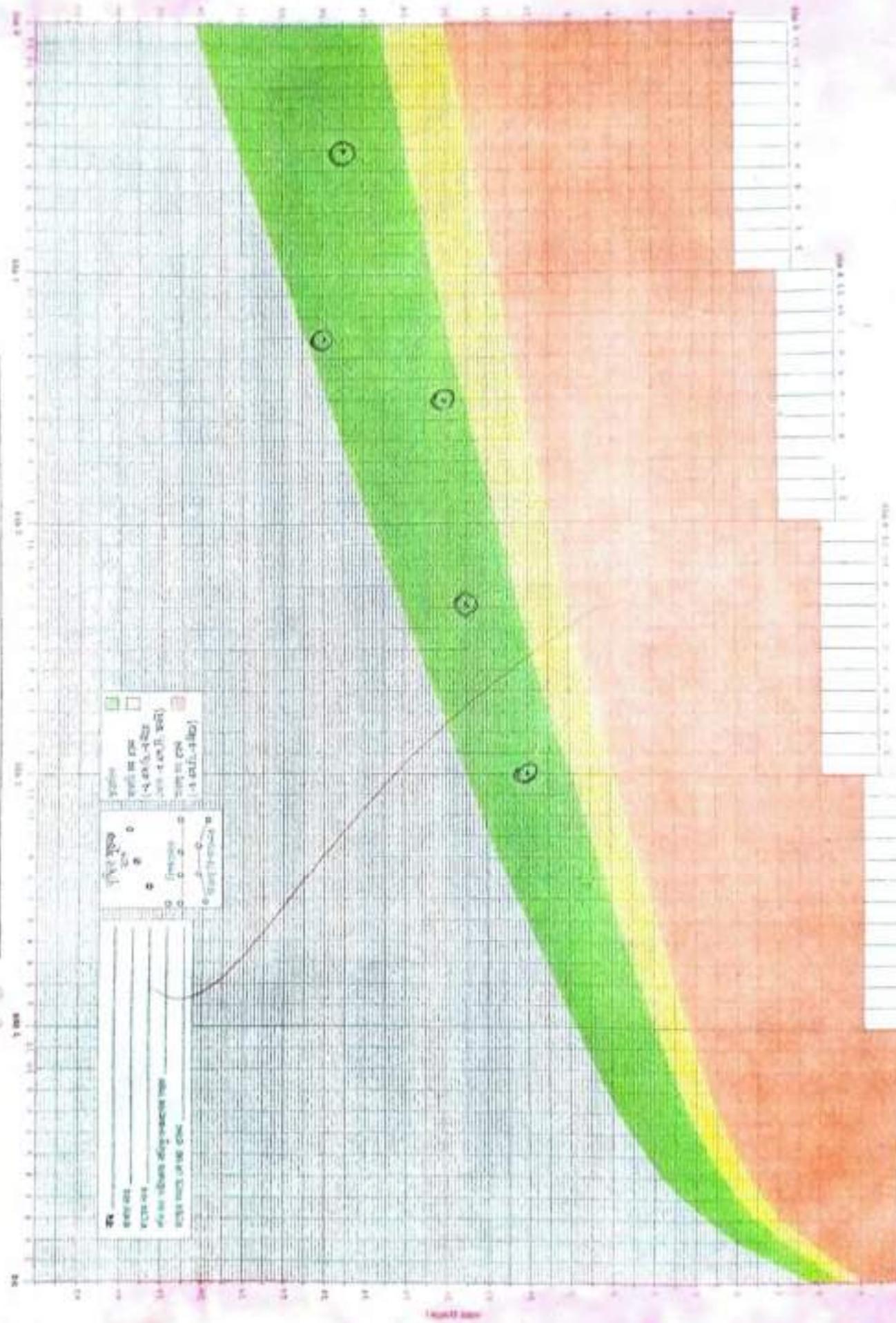
• Interpretation of growth chart for boys:-

ST NO	Name	Gender	Age (Yrs)	wt(kg)	Interpretation	Result
1.	A	M	2.5	11	Green	Normal
2.	B	M	3.2	12	Green	Normal
3.	C	M	3.5	12.5	Green	Normal
4.	D	M	4	14	Green	Normal
5.	E	M	4.2	13.5	Green	Normal



ବୋଲି ବସୁନ୍ଧା ମହାତ୍ମା ଗାନ୍ଧୀଙ୍କୁ ଆଶ୍ରମରେ ପାଦପଥରେ ପାଦପଥରେ ଆଶ୍ରମରେ ଆଶ୍ରମରେ

(ବିଶ୍ୱାସାଂଶୁକୁ ଆଶ୍ରମରେ ଆଶ୍ରମରେ ଆଶ୍ରମରେ ଆଶ୍ରମରେ ଆଶ୍ରମରେ)



• Interpretation of 'growth chart for girls':—

SI NO	Name	Gender	Age(Yrs)	Wt(kg)	Interpretation	Result
1.	F	F	2.8	11.5	Green	Normal
2.	G	F	2	10	Green	Normal
3.	H	F	3.6	12	Green	Normal
4.	I	F	3.9	15	Green	Normal
5.	J	F	4.6	14.5	Green	Normal

■ CLINICAL ASSESSMENT:

The WHO classification helps to identify particular nutritional deficiencies when the survey is limited & aimed at rapid clinical screening of the community. In clinical assessment the physical signs should be recorded as precisely & systematically by well-trained personnel & the interpretation of results (signs) should be based on standardized definition of a particular sign.

■ ADVANTAGES OF CLINICAL ASSESSMENT:

(i) Clinical examination is relatively inexpensive method as neither elaborate field equipment nor costly laboratory is needed.

(ii) With very careful training & continuing supervision even junior personnel can be taught to recognize certain crucial signs.

(iii) It is the simplest and most practical method when two or more signs/characteristics of a deficiency disease are present simultaneously.

(iv) Clinical assessment gives valuable if approximate objective information to public health workers.

CLASSIFIED LIST OF SIGNS USED IN NUTRITIONAL ASSESSMENT

	Group I Signs known to be of value in nutritional assessment	Group II Signs that need further investigation	Group III Some signs not related to nutrition
Hair	Lack of lustre, Thinness and Sparseness, Straightness, Dyspigmentation, Flag sign Easy pluckability		Alopecia, Artificial discolouration
Face	Diffuse depigmentation Nasolabial dyssebacea, Moon-face	Molar and supra pigmentation	Acne vulgaris, Acne rosacea, Chloasma
Eyes	Pale conjunctiva, Bitot's spots, Conjunctival xerosis Keratomalacia, Angular palpebritis	Conjunctival infection, Conjunctival and Scleral pigmentation corneal vascularization, Circumcorneal Infection, corneal Opacities and acars.	Follicular-conjunctivitis Blepharitis Pingueculae pterygium pannus
Lips	Angular stomatitis, Angular Scar Cheilosis	Chronic depigmentation of lower lip	Chapping from exposure to harsh climates
Tongue	Oedema, Scarlet and raw Tongue, Megenta tongue Atrophic papillae	Hyperaemic and hypertrophic papillae, Fissures, Geographical tongue, Pigmented tongue	Aphous ulcer, Leukoplakia
Teeth	Mottled enamel	Caries, Attrition, Enamel hypoplasia, Enamel erosion	Malocclusion
Gums	Spongy, bleeding Gums	Recession of gum	Pyorrhoea
Glands	Thyroid Enlargement, parotid enlargement	Gynaecomastia	
Skin	Xerosis, Follicular Hyperkeratosis (type I & II) petechiae, pellagrous dermalosis, Flaky-paint dermatosis, scrotal or vulval dermatosis	Mosaic dermatosis Thickening and pigmentation of pressure points, Intertiginous lesions	Icthyosis, Acneiform eruption, Miliaria, Epidermophytoses sunburn, onchocercal dermatosis
Nails	Koilonychias	Brittle, ridged nails	-
Subcutaneous tissue	Oedema, Amount of subcutaneous fat	-	-

(B) Clinical Features [✓ Tick the appropriate sign]

- I. General Appearance 0 Good
 1 Fair
 2 Poor
 3 Very poor

II. Eyes

(a) Conjunctiva

- Xerosis 0 Absent glistening and moist
 1 Slightly dry on exposure for a minute, lack of lustre
 2 Conjunctiva dry and wrinkled
 3 Conjunctiva very dry and Bitot's spots present
- Pigmentation 0 Normal color
 1 Slight discolouration
 2 Moderate browning in patches
 3 Severely earthy discolouration
- Discharge 0 Absent
 1 Watery, excessive lachrymation
 2 Muco purulent
 3 Purulent

(b) Cornea

- Xerosis 0 Absent
 1 Slight dryness and diminished sensibility
 2 Haze and diminished transparency
 3 Ulceration
- Vascularization 0 Absent
 1 Circumcorneal infection
 2 Vascularization of cornea

(c) Lids

- Excoriation 0 Absent
 1 Slight excoriation
 2 Blepharitis

(d) Functional

- Night blindness 0 Absent
 1 Present

III. Mouth

- (a) Lips condition 0 Normal
 1 Angular stomatitis (mild)
 2 Angular stomatitis (severe)

(b) Tongue

- Colour 0 Normal
 1 Pale
 2 Red
 3 Red and Raw

• Surface	0 Normal	<input checked="" type="checkbox"/>
	1 Fissured	<input type="checkbox"/>
	2 Ulcerated	<input type="checkbox"/>
	3 Glazed & atrophic	<input type="checkbox"/>
(c) Gum		
• Condition	0 Normal	<input checked="" type="checkbox"/>
	1 Bleeding and / or gingivitis	<input type="checkbox"/>
	2 Pyorrhoea	<input type="checkbox"/>
	3 Retracted	<input type="checkbox"/>
(d) Teeth		
• Fluorosis	0 Absent	<input checked="" type="checkbox"/>
	1 Chalky teeth	<input type="checkbox"/>
	2 Pitting of teeth	<input type="checkbox"/>
	3 Mottled & discoloured teeth	<input type="checkbox"/>
• Carries	0 Absent	<input checked="" type="checkbox"/>
	1 Slight	<input type="checkbox"/>
	2 Marked	<input type="checkbox"/>
IV. Hair		
• Condition	0 Normal	<input checked="" type="checkbox"/>
	1 Loss of lustre	<input type="checkbox"/>
	2 Discoloured and dry	<input type="checkbox"/>
	3 Sparse and brittle	<input type="checkbox"/>
V. Skin		
• General appearance	0 Normal	<input checked="" type="checkbox"/>
	1 Less lustre	<input type="checkbox"/>
	2 Dry and rough or crazy	<input type="checkbox"/>
	3 Hyperkaratosis/Phrynoderma	<input type="checkbox"/>
• Elasticity	0 Normal	<input checked="" type="checkbox"/>
	1 Diminished	<input type="checkbox"/>
	2 Wrinkled skin	<input type="checkbox"/>
VI. Oedema		
• Distribution	0 Absent	<input checked="" type="checkbox"/>
	1 Oedema on dependent parts	<input type="checkbox"/>
	2 Oedema on face & down parts	<input type="checkbox"/>
	3 General (whole body)	<input type="checkbox"/>
VII. Bones		
• Condition	0 Normal	<input checked="" type="checkbox"/>
	1 Stigma of past	<input type="checkbox"/>
VIII. Anaemia		
• Anaemia	0 Absent	<input checked="" type="checkbox"/>
	1 Present	<input type="checkbox"/>
IX. Alimentary system		
• Stools	0 Normal evacuation	<input checked="" type="checkbox"/>
	1 Diarrhoea	<input type="checkbox"/>
X. Nervous system		
• Calf tenderness	0 Absent	<input checked="" type="checkbox"/>
	1 Present	<input type="checkbox"/>

DIET SURVEY

Diet is a vital part in determining the health & nutritional status. A diet Survey provides a record of a person's eating habits & food intake, & can thus help to identify possible nutritional imbalance in a community. It indicates relative dietary inadequacy or excess, which is helpful in planning health education programme activities, & changes needed in agriculture & food production industries.

• Scope & Purpose:

(i) Diet Survey is a systematic enquiry into the food supplies & food consumption of individuals & population groups is made through this nutritional assessment.

(ii) Diet Survey is an important part of nutritional assessment, but, it cannot be used alone to make a diagnosis nutritional health.

(iii) It is an aid in the interpretation of anthropometric, clinical & laboratory

findings & provides a foundation for dietary counseling. However, obtaining accurate data have been problem for many years.

(iv) Rapid cost effective screening may be conducted by trained para-professional to identify person's at-risk in a community. A comprehensive assessment requires much more time, is more expensive & in a clinic/hospital setting is reserved for those patients are 'at-risk' & who require intensive nutritional rehabilitation.

(v) Diet assessment is also an important aspect of survey of nutritional status of population group.

(vi) The methods used in their instance must be appropriate for the purpose intended

• Methods of diet Survey:

The diet survey methods include

- (i) Weighment method.
- (ii) 24 hours recall method (oral questionnaire method)
- (iii) Diet history method.
- (iv) Food Intake record / food diary
- (v) Expenditure pattern method /written questionnaire..
- (vi) Food Inventory Method
- (vii) Food frequency check list.
- (viii) Chemical analysis/duplicate sample method.
- (ix) Dietary Score

SCHEDULE FOR DIET SURVEY
FORM NO. 2

Cluster _____ District _____ Block _____
Village in City / Ward _____ Household No. _____
Name of the Respondent _____
Type of the Family _____

INTAKE OF FOOD

(By weightment of Raw foods to be consumed by the family on the day of survey)

Name of Food Stuffs & Serial No.	Intake of Food			Total	Average
	1 st Day	2 nd Day	3 rd Day		
A. CEREALS					
Rice Parboiled Milled 10	60 gm	60 gm	$\frac{60+60}{=120}$ gm	240	80
Rice Raw Milled 12					
Wheat Flour Whole 21	50 gm	50 gm	50 gm	150	50
Maida 22					
Puffed Rice 13	30 gm	—	—	30	10
Fished Rice 14					
Soji 24					
Other specify Biscuits	15 gm	15 gm	15 gm	45	15
Bread	80 gm	80 gm	—	160	53.3
				725	241.63
B. PULSES & LEGUMES					
Lentil 18	20 gm	20 gm	—	40	13.33
Black Gram 11					
Green Gram 15	—	—	15 gm	15	5
Bengal Gram 25	15 gm	—	—	15	5
Other specify				70	23.33

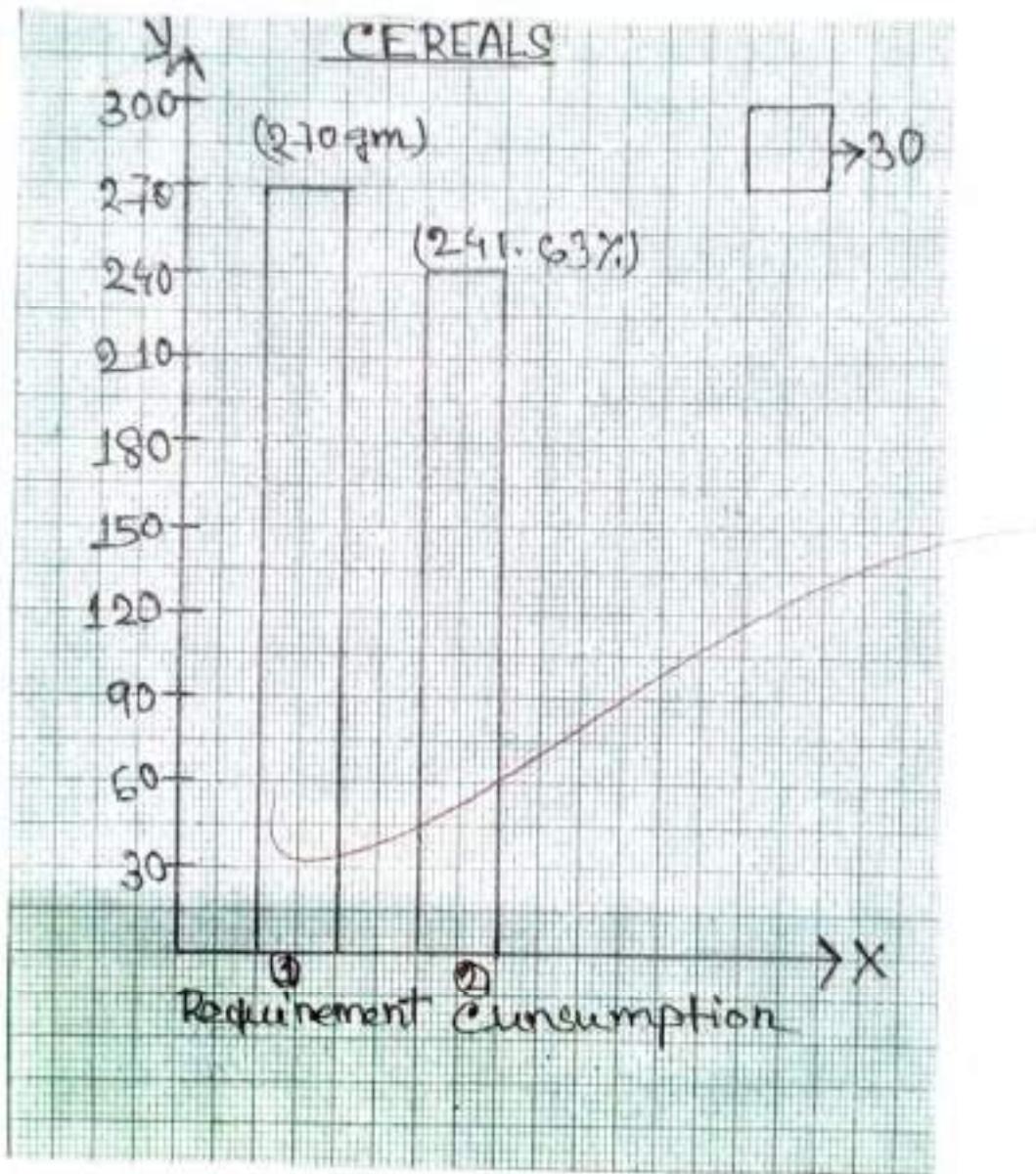
Name of Food Stuffs & Serial No.	Intake of Food			Total	Average
	1 st Day	2 nd Day	3 rd Day		
C. ROOT VEGETABLES					
Potato (125)	50 gm	50 gm	50 gm	150 gm	50 gm
Radish (129)	—	—	—	—	—
Carrot (130) Yam (130) 134	—	—	—	—	—
Chana (122)	50 gm	50 gm	50 gm	150 gm	50 gm
Karor (133)	—	—	—	—	—
Others (specify) —	—	—	—	—	—
				150 gm	50 gm
D. LEAFY VEGETABLES					
Spinach (11)	—	—	—	—	—
Tomato (1)	—	—	—	—	—
Carrot (8)	—	—	—	100 gm	100 gm
Moringa Leaves (102)	—	—	—	—	—
Amaranth Leaves (73)	—	—	—	—	—
Others (specify) —	—	—	—	—	—
				100 gm	100 gm
E. OTHER VEGETABLES					
Banana (141)	—	—	—	—	—
Sunflower (144)	—	—	—	10 gm	10 gm
Drumstick (151)	—	—	—	—	—
Ladies Finger (160)	—	—	—	—	—
Plantain Green (176)	—	—	—	—	—
Pearl Green (172)	—	—	—	—	—
Bitter Gourd (158)	—	—	—	10 gm	10 gm
Bottle Gourd (141)	—	—	—	—	—
Potol (parwani) (173)	50 gm	—	—	50 gm	16.6
Others (specify) —	—	—	—	—	—
				70 gm	23.33

Name of Food Stuffs & Serial No.	Intake of Food			Total	Average
	1 st Day	2 nd Day	3 rd Day		
F. FATS & OILS					
Mustard Oil (438)	54515±15	56515±15	51515±15 = 30	60	20
Ground Nut Oil (438)					
Others (specify)				60	20
G. MILK & MILK PRODUCTS					
Cow / Buffalo Milk (420 / 419)	200	100+100 = 200	200	600	200
Standard Milk					
Skimmed Milk Powder (432)					
Any Other (specify) -				600	200
H. FLESH FOODS					
Egg (Duck / Hen) (401 / 402)	50 gm	50 gm	—	100	33.3
Fish (specify)	—	—	50 gm	50	16.6
Meat (specify)	—	50 gm	—	50	16.6
Others (specify)				200	66.6
I. SUGAR & JAGGERY					
Sugar (439)	5 gm	5+2 gm	5 gm	18	6
Jaggery (specify)	—	5 gm	5 gm	10	3.33
Others (specify)				28	9.33
J. FRUITS & NUTS					
Guava (261)					
Ripe Papaya (287)					
Ripe Banana (245)	—	—	80 gm	80	26.6
Ripe Mango (278)					
Orange (283)					
Groundnut (202)					
Any Other (specify)	100 gm	100 gm	—	200	66.66
				200	66.66
K. COMMON SALT (By Test)					
i. Iodised -<15ppm, -15ppm	10 gm	10 gm	10 gm	30	10
ii. Non-Iodised					

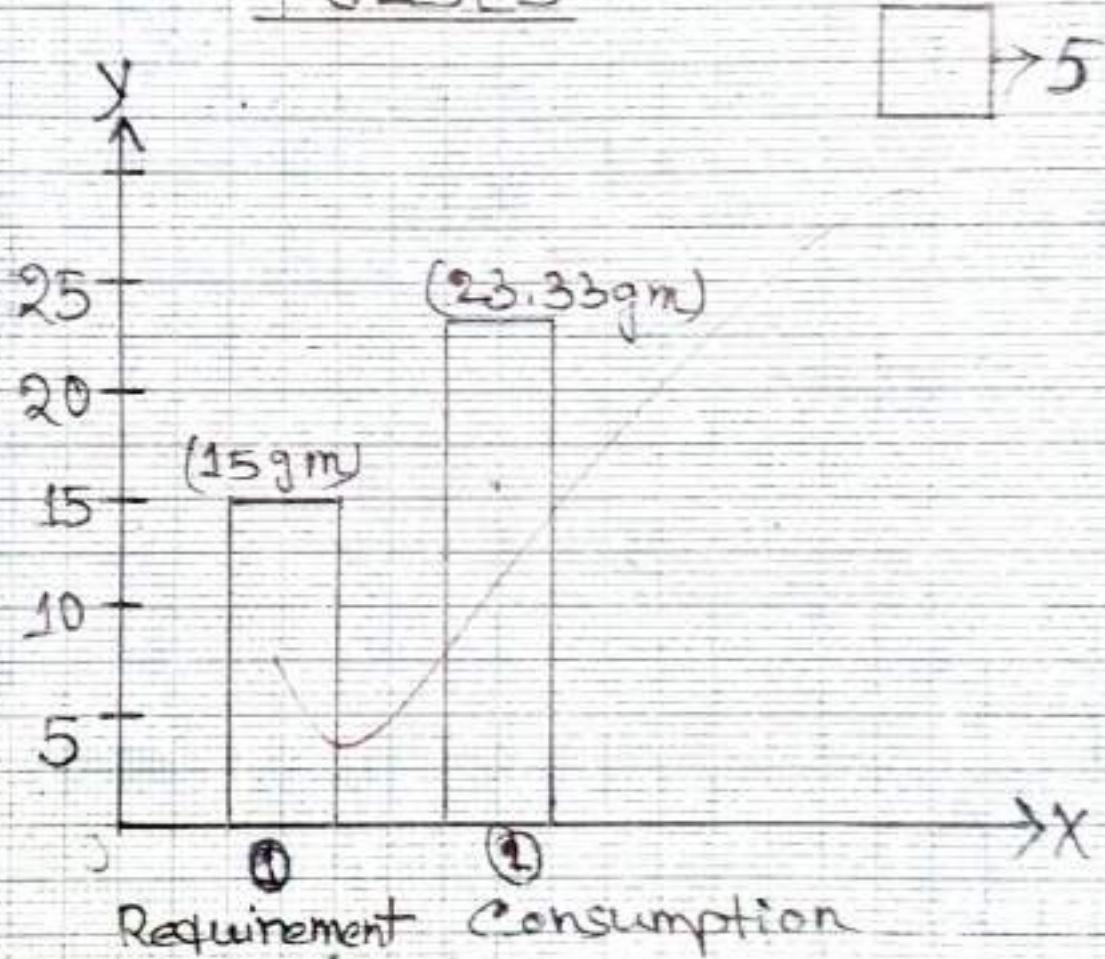
RESULTS

(NATIONAL / STATE, METHOD)
(Food Group Wise)

	Cereals (gm)	Pulses (gm)	Risks & Tubers (gm)	Leafy Veg. (gm)	Other Veg. (gm)	Fat & oil (gm)	Milk & Milk Product (gm)	Flesh Food (gm)	Sugar & Jaggery (gm)	Fruits & Nuts (gm)	Egg (gm)
Requirement											
Total	270	15	200	100	100	20	300	25	20	100	50
Consumption	Total	241.63	23.33	204.9	33.33	23.26	20	200	33.2	9.33	93.26
Deficiency	Total	28.37	—	—	66.67	74.74	—	100	—	10.67	16.74
Excess	Percentage	10.54%	—	—	66.67%	74.74%	—	66.67%	—	53.35%	33.4
Excess	Total	—	8.33	4.9	—	—	—	—	8.32	—	—
Excess	Percentage	—	55.53%	2.45%	—	—	—	—	33.28%	—	—

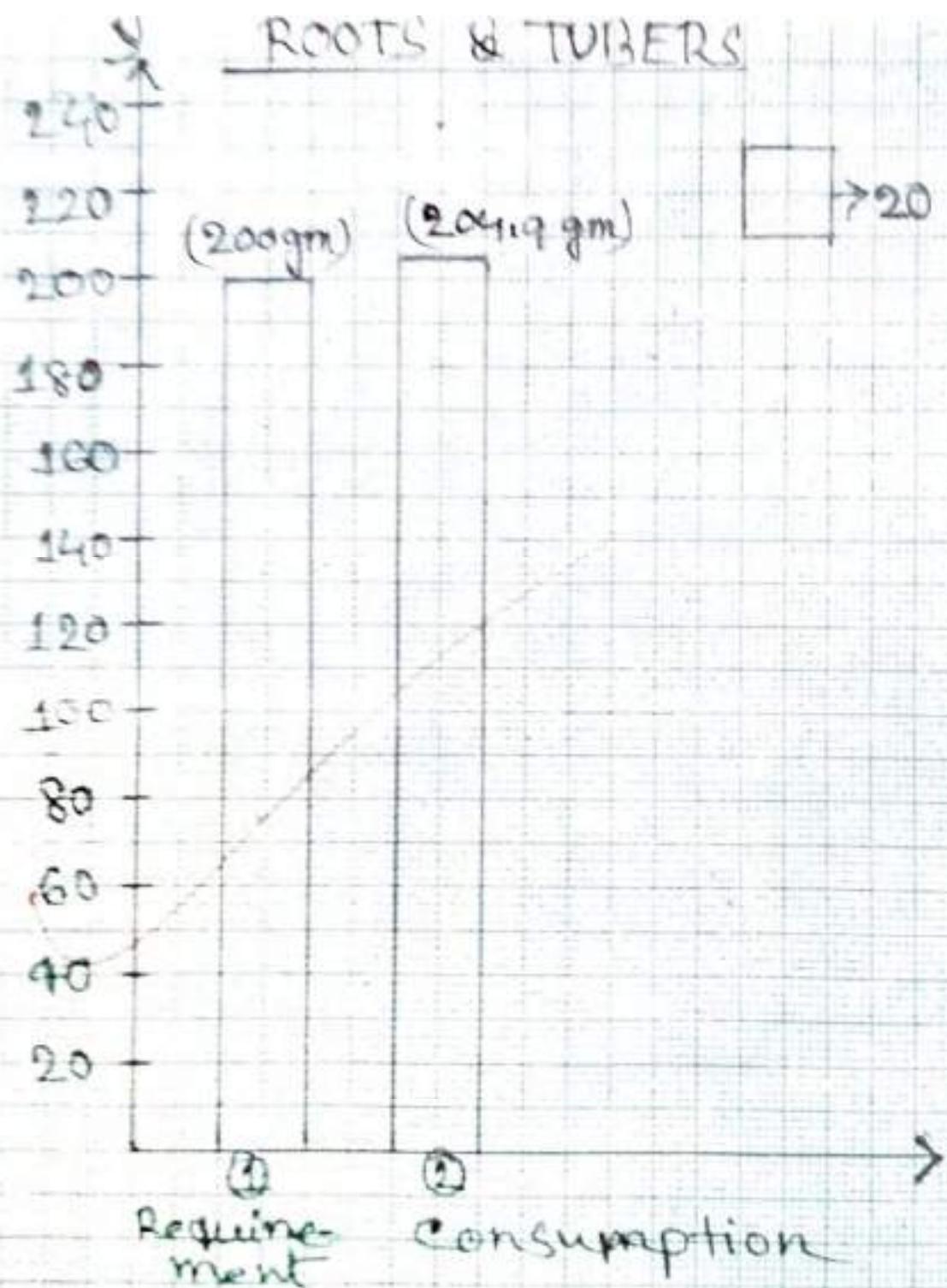


PULSES

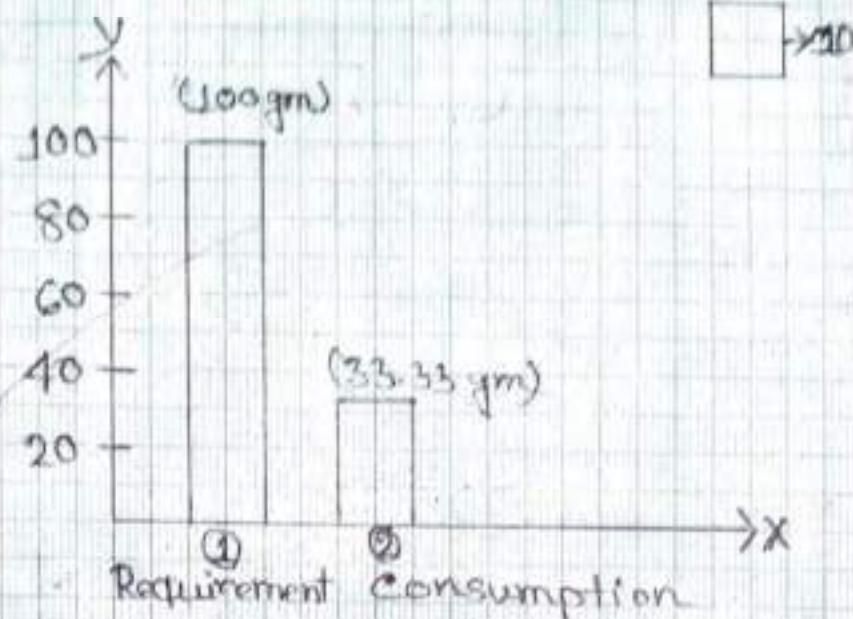
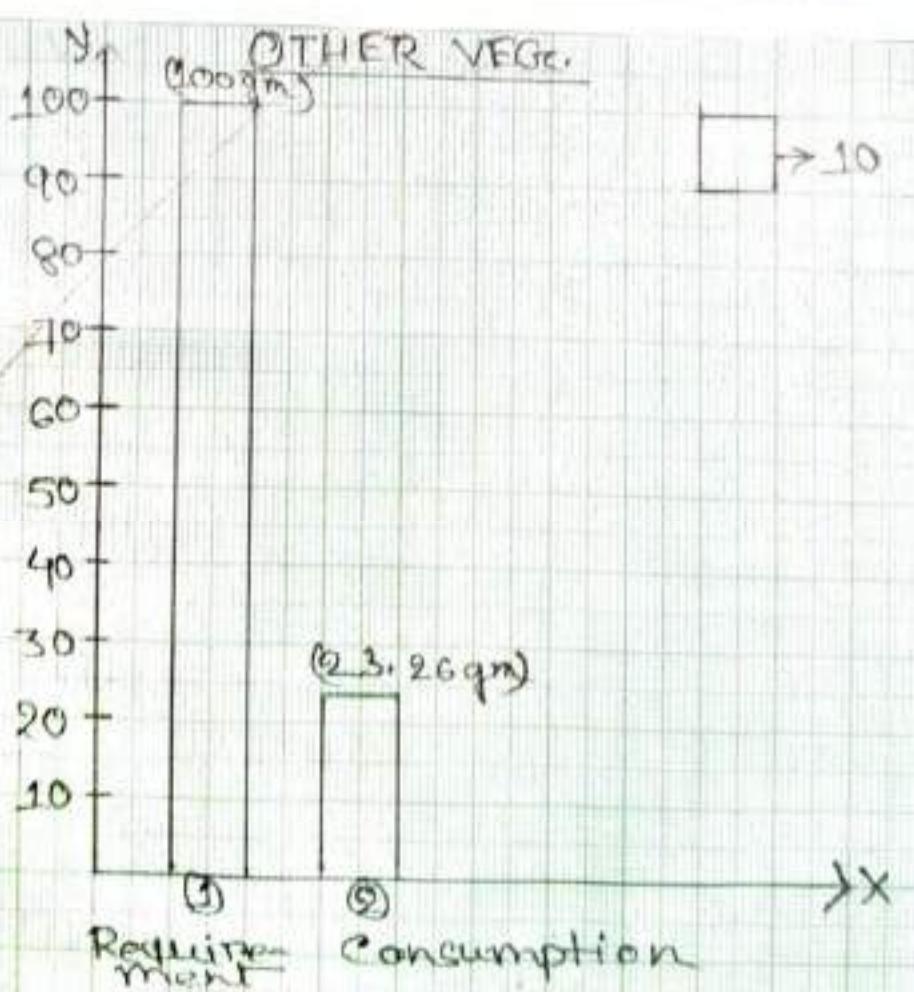


Whole Menu Of First Day

Time	Food Items	Amount
• Early-morning	① Tea with sugar ② Biscuit	150ml + 5 gm sugar. 2 Pieces = 15 gm
• Breakfast	① Brown bread ② Egg ③ Milk	4 Slice = 80 gm 1 Piece = 50 gm 200 gm
• Mid-morning	① Apple	100 gm
• Lunch	① Roti ② Potato Parwal curry → Potato → Parwal → Onion → Oil ③ Tea	2 Pieces = 50 gm 50 gm 50 gm 50 gm 5 gm

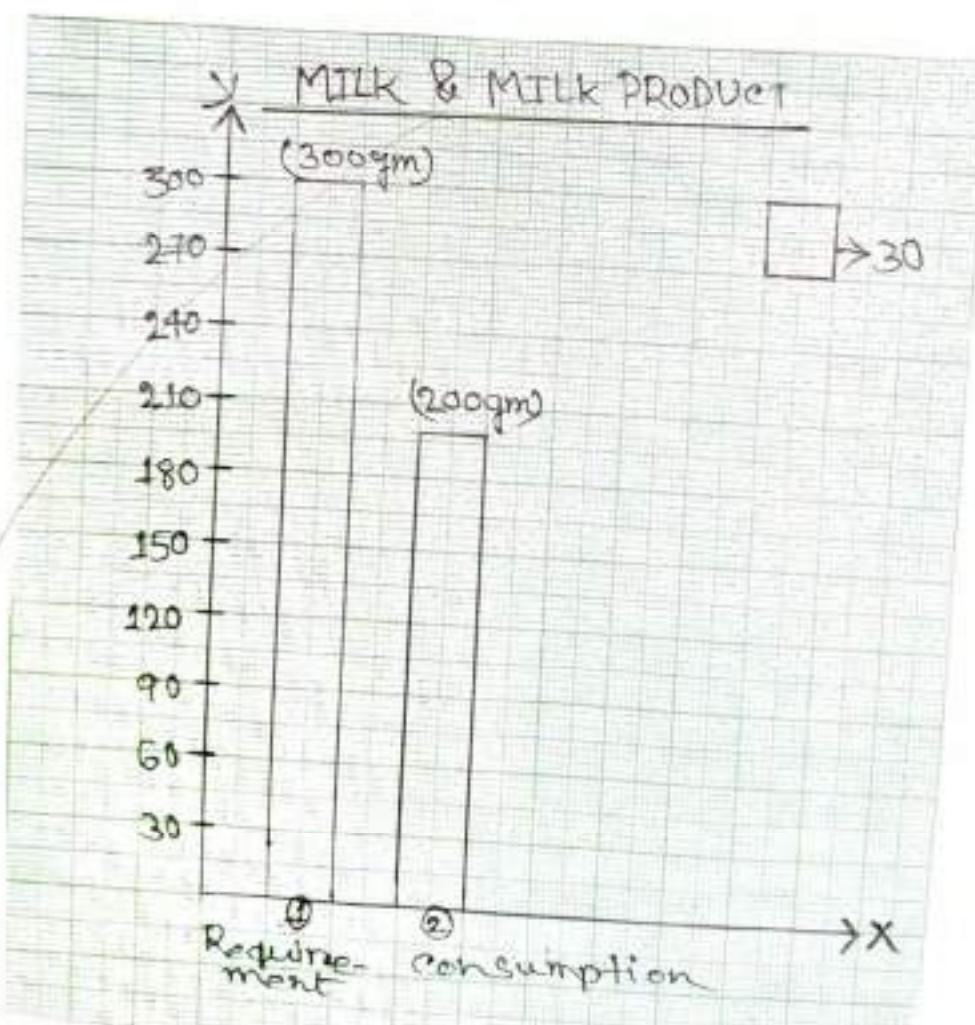
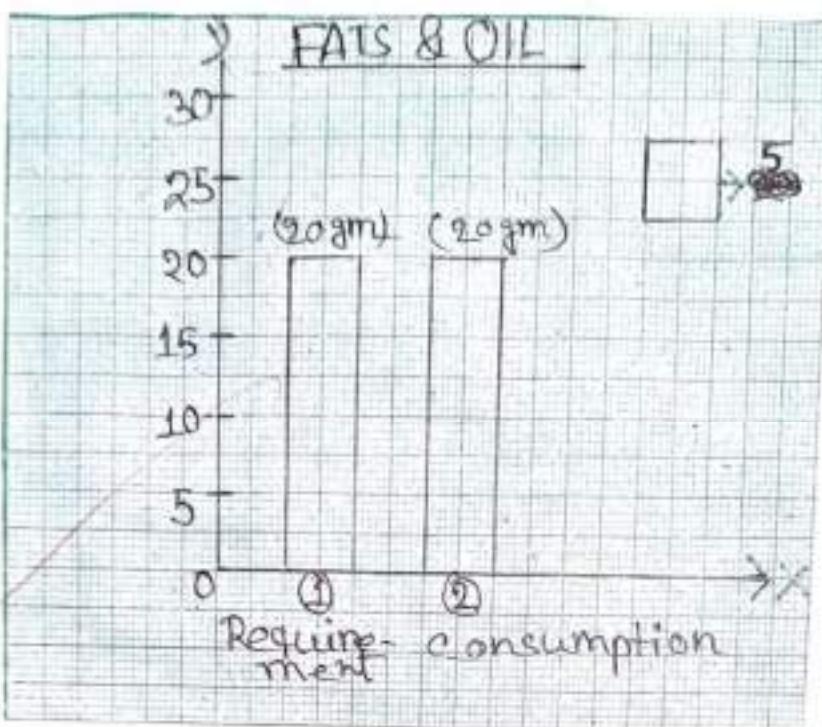


Time	Food Items	Amount
	① Puffed rice	30 gm
	② Sprouted pulse → Bengal Gram	15 gm
	③ Ground nut	20 gm
Dinner	① Rice	60 gm
	② Veg. dal → Lentil	20 gm
	→ Oil	5 gm
	③ Soyabean curry → Potato	30 gm
	→ Soyabean chunk	20 gm
	→ Onion	25 gm
	→ Cil	5 gm

LEAFY VEG.OTHER VEG.

Whole Menu Of Second Day

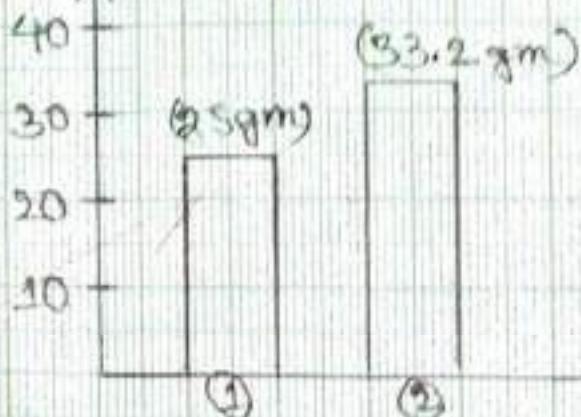
Time	Food Items	Amount
• Early-morning	① Tea with sugar ② Biscuit	150ml + 5 gm Sugar 2 Pieces = 15 gm
• Breakfast	① Brown bread ② Milk ③ Sugar	4 Slice = 80 gm 100 gm 3 gm
• Mid-morning	① Apple	100 gm
• Lunch	① Roti ② Vegetable Curry → Potato → Pumpkin → Onion → Oil	2 Pieces = 50 gm 50 gm 30 gm 50 gm 5 gm
	① Flacked rice ② Milk ③ Jaggery	50 gm 100 gm 5 gm



Time	Food Items	Amount
Dinner	① Rice	60 gm
	② veg dal → Dal (Lentil)	20 gm
	→ oil	5 gm
	③ Egg curry → Potato	50 gm
	→ Onion	50 gm
	→ egg	50 gm
	→ oil	5 gm

FLESH FOOD

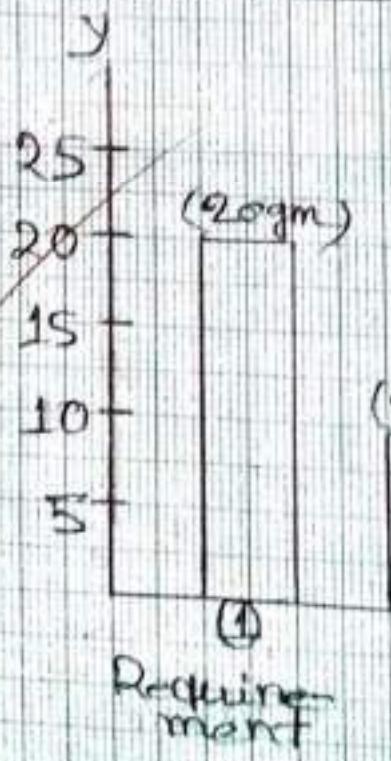
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Requirement Consumption

SUGAR & JAGGERY

> 5



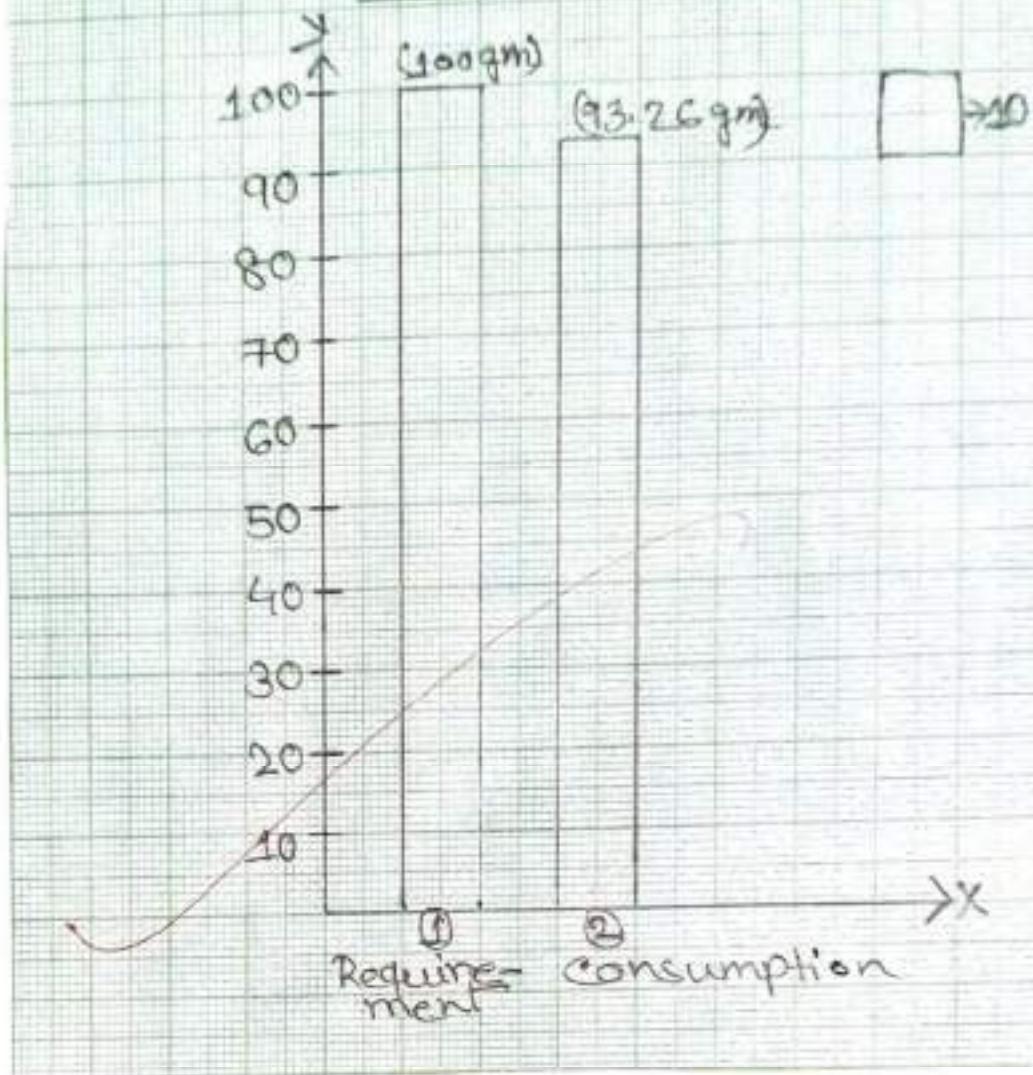
Requirement

Consumption

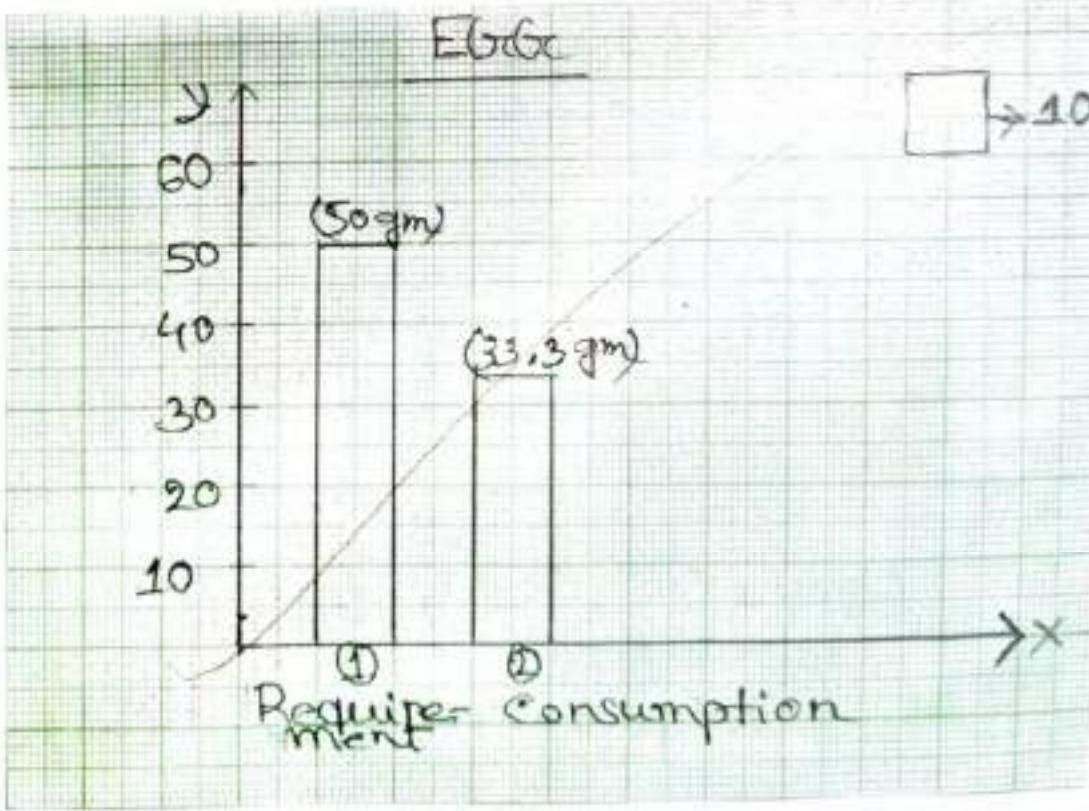
Whole Menu Of Third Day

Time	Food Items	Amount
• Early-morning	① Tea with Sugar ② Biscuit	150 ml + 1 gm sugar 2 pieces, 1.5 gm
• Breakfast	① Roti ② vegetable curry → Potato → Onion → Carrot → Oil & Oil	50 gm 30 gm 20 gm 20 gm 5 gm
• Mid-morning	① Banana	60 gm
• Lunch	① Rice ② Fried Kalmi → Oil ③ veg dal → Ghee or Garam → Beans → Cauliflower	60 gm 100 gm 5 gm 15 gm 10 gm 10 gm

FRUITS & NUT



EGG



Time	Food Items	Amount
	→ Cannel	10 gm
	→ Oil	5 gm
	① chicken curmy	
	→ Potato	50 gm
	→ Onion	50 gm
	→ Chicken	50 gm
	→ Ginger	10 gm
	→ Garlic	10 gm
	→ Oil	10 gm
	① Flaked rice	50 gm
	② Milk	200 gm
	③ Jaggery	5 gm
• Dinner	① Rice	60 gm
	② Fish curmy	
	→ Fish	50 gm
	→ Potato	50 gm
	→ Onion	50 gm
	→ Oil	10 gm



ICDS (INTEGRATED CHILD DEVELOPMENT SERVICES SCHEME) VISIT :

Date Of Visit : 21/11/2022

Teacher Accompanied : Dr. Shanti Agarwal

Address : ICDS Centre,
Budge Budge,
South 24 Parganas - 700131

INTEGRATED CHILD DEVELOPMENT SERVICES SCHEME (ICDS)

The Integrated Child Development Services (ICDS) Scheme is the country's most comprehensive and multi-dimensional programme.

The ICDS Scheme (one of the world's largest and most unique programme for early child development) was launched on 2nd October 1975 under the 5th five year plan and in pursuance of the National policy for children in 33 experimental blocks.

The ICDS is the foremost symbol of India's commitment to her children; India's response to the challenge of providing pre school education on one hand and breaking the vicious cycle of malnutrition, morbidity reduced learning capacity and mortality on the other.

Objectives of ICDS:- The objectives of ICDS Scheme are-

- To improve the nutritional and health status of in the age group of 0 to 6 years.
- To lay the foundations for proper psychological, physical and social development of the child.
- To reduce the incidence of mortality, morbidity malnutrition and school dropout.
- To achieve effective co-ordination of policy and implementation amongst the various department to promote child development and
- To enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education

Beneficiaries:-

- Children below six years
- Expectant and Nursing mothers
- Adolescent girls.
- Women in the age group 15 to 45 years.

ICDS SUPPLEMENTARY FOODS RECOMMENDATION

Beneficiaries	Nutritional contribution	
	Energy (kcal)	Protein (g)
Children (6 to 3 years) (3 to 6 years)	500	12 to 15
Severely malnourished children (6 months to 72 months)	800	20 to 25
Pregnant women and nursing mothers/ado- lescent girls (under 18y)	600	18 to 20

ICDS MEAL COST ALLOCATED TO BENEFICIARIES

Beneficiaries	Cost of supplementary meal
Child (6 to 72 months)	Rs. 8.00 per child per day.
Child (6 to 72 months), severely malnourished	Rs. 12.00 per child per day.
Pregnant and nursing woman	Rs. 9.50 per benefici- ary per day.

Programme Components :-

The package of services provided by ICDS Scheme includes:

- **Supplementary nutrition:** The supplementary nutrition is given to children below 6 years of age old pregnant and nursing mothers from low income families. The provision of supplementary nutrition includes supplementary feeding and distribution of nutrient supplements.

Age	Dose of vitamin-A
Children (6 to 11 months)	One dose of 100,000 I.U of vitamin-A orally (measles immunization is a good to give a routine dose)
Children (1 to 5 years)	One dose of 2,00,000 I.U of vitamin-A orally every six months.

Beneficiaries	Dose	Quantity
Pregnant woman	1 Big tablet (each tablet containing 100 mg of elemental iron and 0.5 mg (500mcg) folic acid.)	1 tablet/day for 100 days (In 3rd trimester of pregnancy)
Children (1 to 5 years)	1 small tablet (each tablet containing 20 mg elemental iron and 0.1 mg (100mcg) folic acid.)	1 tablet/day for 100 days every year.

Vitamin-A Supplementation: At the AWC Children are administered vitamin-A at periodic intervals according to their age to prevent vitamin-A deficiency.

Tinon and folic acid supplementation:

All pregnant women and children are given Tinon and Folic Acid (TFA) tablets to prevent anaemia as per the following recommended dose irrespective of their haemoglobin status.

- Growth monitoring.
- Health check-up.
- Referral Services.
- Immunization
- Early childhood care and non-formal pre-school education
- Health and nutrition education
- Supportive services.
- Adolescent girls' scheme.

B.Sc. SEMESTER-VI (H) PRACTICAL
EXAMINATION - 2023
(UNDER CBCS)

FOOD & NUTRITION (HONOURS)

PAPER: CC14 (FOOD PRESERVATION)

ROLL & NO: 203561-11-0013

REGISTRATION NO: 561-1211-0375 - 20

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INTRODUCTION TO FOOD PRESERVATION

INTRODUCTION:

When food is available more than the present use it is further consumption. Foods such as fruits & vegetables have a short growing season & preservation make them available to use through all the year & avoid wastage of crops.

Preservation in some cases produces a different from the product e.g grapes when dried produced raisin. Preserved food is easier to distribute and can be made available in all places and some types of treatment.

METHOD OF FOOD PRESERVATION:

Preservation methods are designed to inhibit the growth of organism, the removal of organism & killing the organism. Food preservation should also arrest the biochemical breakdown of tissues & transformation of its cell content.

All methods used for preservation of foods are based upon the general principles of preventing or retarding the cause of spoilage microbial decomposition, enzymatic and non-enzymatic cause, insects and rodents.

■ PRINCIPLE OF FOOD PRESERVATION:

- Preservation or delay of microbial decomposition -

 - By keeping micro-organism

 - By removal of micro-organism e.g. by filtration.

 - By hindering the growth of micro-organism & activity of micro-organisms

 - By low temperature, drying, anaerobic condition or chemicals.

 - By killing the micro-organisms, e.g. by heat or radiation

- Preservation or delay of salt decomposition of food -

 - By destruction or inactivation of food enzyme e.g. by blanching.

 - By delay of chemical reaction e.g. by preservation of oxidation by means of an antioxidant.

■ DIFFERENT METHODS OF PRESERVATION:

- Preservation by low temperature

- Preservation by high temperature

- Preservation by preservatives.

- Preservation by osmotic pressure.

PURPOSE OF PRESERVATION:

Food supply has to keep pace with the needs by the population. There is always a shortage of foods in developing countries like India because of the damage of the increasing population. Increasing food preparation to meet this storage results in wastage due to inadequate facilities for the storage & preservation of food.

Preservation of food helps in -

- Increasing the shelf life of food thus increasing the supply.
- Making the seasonal food available throughout year adding the variety of the diet.
- Saving the time by reducing preparation time & energy.
- Preservation increases availability of food thus improving the nutritional state of the people. Availability of seasonal foods throughout the year also help in stabilising crisis of such foods.

■ PRELIMINARY TREATMENT OF FOOD PRESERVATION:

- Washing: Fruits, vegetables, fish, meat, egg, whole grain etc are washed properly before preservation.
- Peeling, Cutting, stricing, Cubing: Fruits & vegetable are peeled, cut and cubed before preservation.
- Grinding & milling: Spices, nuts & cereal grain milled before preservation.
- Soaking: Rice & legumes are soaked.
- Fermentation: Cereals, pulses & their mixture.
- Germination: Dals & legumes.
- Roasting: Whole cereals, legumes, nuts, & spices.
- Mixing: All ingredients used in preparation of preserved food.

DIFFERENT METHODS OF FOOD PRESERVATION

• **DRYING:** Preservation of foods by drying has been practiced for many years. Drying means of preservation can be observed in cereals, grains, legumes, & nuts etc.

The word 'drying' usually comprises the use of controlled condition of heating.

Dry foods can be preserved as the available of moisture level is low so that micro-organism can not grow & enzyme activity is controlled. Moisture removal also results in concentration of food.

• **SUN DRYING:**

It is limited to climates with a hot sun & odway temperature & to certain foods such as raisins, peaches. It is a slow process. Food preserved by sun drying-

→ Papad.

→ Vegetables like cluster beans, chillies.

→ Fruits like jackfruits.

• **Treatment of Food before Drying:**

→ Selection and sorting for size, maturity & soundness.

- Washing especially fruits & vegetables.
- Peeling of fruits and vegetables.
- Subdivision into halves, slices or cubes.
- Blanching or soaking of vegetables and fruits.

▪ Advantages:

- (1) Make the water availability less for microbial growth.
- (2) Do not destroy nutrient.
- (3) Produce concentrated form of foods.

▪ Disadvantages:

- (1) Increase salt & sugar concentration of food.
- (2) Can cause destruction of particular nutrients like vitamin C & thiamine.

FLOW CHART OF MAKING POTATO CHIPS:

Potato was washed, peeled and sliced
↓
water was boiled and salt is added
Sliced potato was added to boiling water
↓
cooked for 2-3 min (not over cooked)
↓
Strained
↓
Sundried for 2-3 days.



POTATO CHIPS

POTATO CHIPS

- Ingredients:
 - Potato - 250 gm.
 - Salt - 1 tsp.

- Procedure: Medium sized potato was taken. It was peeled and sliced in the slicer in the form of chips. Water was boil in a big pan, salt was added & sliced potato was added to it & cooked for 2-3 min until it become soft but care was taken that it does not burn boiling). After that potato chips are strained into the strainer & after removing water it was sundried for 2-3 days.

- Nutritive Value of Potato chips:

Food stuff	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Potato	250	242.5	56.5	4	0.25

Teacher's Signature

GTA/23
P/28/23

■FREEZING METHODS:

- Freezing may preserve food for long period of time provide the quality of the food is good to begin with & the temperature of storage is low enough below the actual freezing temperature of food for long preservation.
- Some micro-organisms are destroyed during storage if the temperature much above -18°C .
- In vegetables enzyme action may still produce undesirable effects on flavour & texture during freezing. The enzymes therefore must be destroyed by heating before the vegetables are frozen.

■EFFECTS OF FREEZING ON NUTRITIVE VALUE:

- Freezing itself has little effect on the nutritive value of foods. There is some loss of freezing water soluble vitamins in the preparation of vegetables for freezing because of blanching & subsequent chilling.
- Loss of ascorbic acid occurs during storage if the temperature is much above -18°C .

■ Advantages:

- (1) Makes the water unavailable for microbial growth.
- (2) Process do not destroy nutrients.
- (3) Produce concentrated form of foods.

■ Disadvantages:

Increased salts and more sugar concentration of food can cause destruction of particular nutrients like Vitamin-C.

FLOW CHART OF MAKING KULFI:

Milk was boiled
↓
continuously stirred
↓
Reduced to half
↓
Sugar added
↓
Cardamom powder & vanilla Essence added
↓
Allowed to cooled
↓
Powered into the Kulfi mould.
Kept in deep freeze for 3-4 hours to set.



KULFI

KULFI

- Ingredients:
 - Milk - 500 ml
 - Sugar - 50 gm
 - Vanilla - 1-2 drops.
 - Cardamom powder - 1 pinch
 - Almonds, cashews, and pistachios for decoration (optional).

■ Procedure: The milk is heated. The milk be stirred continuously until it reduced to half. When it is thickened sugar will be added and let it boiled for a few minutes. Other ingredients vanilla, cardamom powder will be added. The mixture will be allowed to cool and will be poured in a Kulfi mold and will be kept in deep freezer for setting.

■ Nutritive Value:

Food Stuff	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Milk	500	335	22	16	20.5
Sugar	50	199	49.7	0.05	-
Total		534	71.7	16.05	20.5

• FRYING METHOD:

In this method food is cooked in fats or oil. This makes the food product crispy outside and soft & tender inside. The absorption of fat may be by the food increase the calorific value of food.

Frying) method are of two types -

a) Shallow frying)

b) Deep frying).

a) Shallow Frying): Here the food is cooked in fat & oil but not enough to cover it. Heat is transferred to the food partially by conduction by contact with the heated pan & partially by the convection currents. This prevents local burning of food by keeping away the intense heat.

b) Deep Frying):

Food is totally immersed in hot oil & cooked by vigorous convection and cooking) conduction on all sides of foods. Cooking) can be rapidly completed because the temperature used is $180^{\circ}\text{-}220^{\circ}\text{C}$.

• Advantages:

- (1) It is most common method to preserve food.
(2) It is a process in which food can be preserved for long time.

• Disadvantages:

In this process preservation & sealing both is very important. Faulty sealing may result deterioration of food.

FLOW CHART OF MAKING BRINJAL PICKLE:

Brinjal was washed & cut into 8 pieces
↓
Deep fried in oil
↓
Salt & other spices were added.
↓
Jar was greased properly with oil
↓
Pickle was filled when cooled.



BRINJAL PICKLE

- Ingredients:
- Brinjal - 200 gm
 - Dry mango powder - 10 gm.
 - Salt - To taste
 - Turmeric - 1 tsp.
 - oil - 100 gm
 - Mustard Seed (Roasted) - 2 tsp.
 - Anised (Roasted) - 1 tsp.
 - Black Cumin (Roasted) - $\frac{1}{2}$ tsp.
 - Fenugreek Seed (Roasted) - $\frac{1}{4}$ tsp.

■ Procedure:

Brinjal will be cut into pieces & was deep fried. All the ingredients were mixed one by one. Pickle is ready. Now grease the containers with oil properly & put the mixture it & sealed it.

■ Nutritive Value:

Food Stuff	Amount (gm)	Energy (kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Brinjal	200	48	8	2.8	0.6
Mango Powder	25	33.7	6.4	0.28	0.78
Turmeric	5	17.45	3.47	0.315	0.25
oil	100ml	900	-	-	100
Mustard Seed	10	51.1	2.98	2	3.97
Black Cumin	2.5	8.9	0.91	0.16	0.37
Fenugreek	2.5	8.32	1.10	0.65	0.16
Total		1070.47	22.26	6.505	106.11

■ CANNING:

Canning involves the application of temperature of food that are high enough to destroy essentially all micro-organism present in tight sealing in sterilised container to prevent re-contamination. The degree of heat & the length of the time of heating vary with the type of food & the kinds of micro-organisms that are likely to occur in it. Most canning is in tin cans which are made of tin coated steel or in glass container but increasing use in being made of containers that are partially or wholly of aluminium or plastics or pouches or solid containers.

■ Types of food which preserved by Canning:

→ Canning of acid foods:

Tomatoes, Fruits, juices & those having a pH of 4.

→ Canning of non-acid foods: Meat, fish etc.

■ STORAGE TEMPERATURE:

The rate of chemical reaction increase as the temperature is raised and the reaction rate doubles per each 10°C increase in temperature. To minimize under stable reactions such as non enzymatic browning in canned foods storing temperature below.

FLOW CHART OF MAKING CHILLI PICKLE:

Green chillies were wiped with moist cloth
Kept in sun for 1/2 hour
Cut into small round pieces.
All spices, oil & salt were added
Pickle is ready
Jar/container was greased properly with oil.
Pickle was filled into the jar
Processed & sealed



CHILLI PICKLE

- Ingredients:
 - Chillies - 100 gm
 - Dry mango powder - 25 gm
 - Salt - To taste.
 - Turmeric - 1 tsp.
 - oil - 100 gm
 - Mustard oil - 2 tsp.
 - Aniseed, black cumin, Fenugreek Seed (Roasted) - 1/4 tsp.

Procedure:

Wipe the chillies with a wet cloth. Put in the sun for 1/2 hours. Cut into small round pieces. All the ingredients were mixed one by one. Pickle is ready. Now the containers with oil properly & put the mixture into it & sealed it.

Nutritive Value:

Food Stuff	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Chillies	100	29	3.0	2.9	0.65
Mango Powder	25	84.25	16	0.7	1.95
oil	100	900	-	-	1.00
Total		1013.25	19	3.6	102.55

BOTTLING

Bottling) is a method of preserving by heat in a sealed container. Food is preserved in a bottle which is vacuumed first. Bottling should be carried out with care, as the lack of quality control organism. In the process souce, jelly etc are produced.

■ ADVANTAGES:

- 1) It is the most common method to preserved food.
- 2) In this process food are preserved for a long time.

■ DISADVANTAGES:

In this process of preservation, sealing of bottles is important. Faulty sealing may result deterioration of foods.

FLOW CHART OF MAKING LEMON SQUASH

Juices was extracted from Lemon
↓
Sugar was dissolved in water to make syrup.
↓
Heated to dissolve the sugar.
↓
Boiled & cooled
↓
The sugar syrup was strained, through moisten cloth
↓
Lemon juice was added
↓
The squash was poured into clean sterilized bottle.
↓
Sealed and stored in cool dry place.



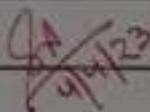
LEMON SQUASH

- Ingredients:
 - Lemon juice - 300ml.
 - Water - 360 ml.
 - Sugar - 600 gm.
 - Acetic acid - small amount.

- Procedure: Lemon juice was extracted & measured the sugar will added twice or double. The amount of lemon juice was 300 ml & sugar was 600 gm. Now 300 ml of water is added to make a little of squash. It is now cooled and poured in clean containers.

Nutritive Value:

Food Stuff	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Lemon	300	171	33.3	3	2.7
Sugar	600	2388	516.4	-	-
Total		2559	629.7	3	2.7



ASEPTIC HANDLING & SOURCE OF CONTAMINATION:

It is sterilizing a product & filling it in & sealing the sterile container in a steril environment so that microbes do not enter the product. When the product is commercially sterile, the microbes remaining cannot grow, thus making sure the product doesn't spoil while in storage.

This ensures that the product can remain in ambient conditions for a very long time. Like canning this is also a thermal process but the difference is that the product is filled in the container after processing. This allows the product to maintain its nutritional & sensory qualities.

The process of canning takes a considerable amount of time as the heat needs to travel from the sides of the can to its centre while passing through food. In aseptic processing, the processing is done at temperatures around 125 to 135°C for a few seconds. This is called the UHT (Ultra High Temperature) process. Since the temperature is high, the duration needed for sterilization is very short. While it is very effective in killing microbes, it does not cause extensive damage to the nutrients, colour or flavour of the food. So the quality of those products is superior in comparison to canned foods.

After the UHT process, the food is filled in packages. The most commonly used is a 6 layer composite having paper, plastic and aluminium, but can also be packed in bags, pouches, jars or metal cans. The filling must also be done aseptically without allowing the entry of micro-organism into the cans.

PRE-REQUISITE CONDITION FOR ASEPTIC PACKAGING:

- 1) It should contain the product.
- 2) It should prevent physical damage to packaged product.
- 3) It should ensure aseptic filling cans.
- 4) It should survive packaging process.
- 5) It should avoid dirt & contamination.
- 6) It should be easy to handle throughout distribution process.
- 7) It should be able to protect the product from odours & traits.
- 8) It should be resistant to rodent attack.
- 9) It should be compatible to food stuff.
- 10) It should be biologically safe & non-toxic.
- 11) It should be able to protect rot infestation.
- 12) It should maintain sterility of product.
- 13) It should prevent entry of micro-organisms.
- 14) It should show evidence of tempering.
- 15) It should contain moisture loss or gain.

- 16) It should offer a barrier of oxygen.
- 17) It should be protective against the light.
- 18) It should maintain gas atmosphere i.e. CO_2 , N_2 .
- 19) It should communicate all the information regarding product and manufacture.
- 20) It should be easy to open & handle.
- 21) It should have good sales appeal.
- 22) It should be cost efficient.

PRECAUTION TO BE TAKEN:

Since aseptic packaging systems are complex, there is considerable scope for packaging faults to occur which will lead to spoiled products. Thus following precautions are to be taken-

(1) Packages should be inspected regularly to ensure that they are air tight, again focusing upon those more critical parts of the process, such as start up, shut down, product change overs & for carton system, reel splices & paper splices.

(2) Pipes, storage tanks & surfaces of the packaging machine come into contact with the sterilized product have to be sterilized.

(3) Sterilization procedures should be verified.

(4) The seal integrity of package should be monitored as well as the overall microbial quality of packaging material itself.

(5) Care should be taken to minimize contamination during subsequent handling). All these could result in an increase in spoilage rate.

(6) Rinsing, cleaning & disinfecting procedures are also very important, especially the removal of fouling deposits, which may provide a breeding ground for the growth of micro-organism especially thermophiles.

Sources Of Contamination:

Complex & multiple operations in food systems increase the chances of contamination. By the time of food reaches us, it has several handling from food grower processor to supplier to finally us multiplies the chances of food contamination.

(a) Firstly) the food could have been contaminated at the source - food grower, food processor, food packaging - through poor control methods or mishandling.

(b) Most if not all food products go through addition steps of warehousing & storage, distribution & retail thus adding to another layer for food to become contaminated.

(c) Finally) the food reaches the final food processing facility or our home & it is here that we need to protect it from the point of receiving through storage to its

intended use & upto consumption by us.

The few steps that the food travels before it reaches us are primary production, Purchase, storage, preparation (preparation & packaging), distribution and delivery and service. Each of these steps offers opportunity for contamination if they are performed improperly. Controls at each of these steps needed to be built into process that the food is safe right upto the time it is consumed by us.

1. Primary Production:

Agricultural production & animals have a wide range of microbes on them or in them at the time of harvest or slaughter. Then the number and types of microbes that comprise the primary contamination of the food varies from one commodity to another, with geographic regions and with the methods employed for harvesting & slaughtering.

2 Purchase:

Purchasing safe food is an important step in keeping it soft and safe. Purchase from reputable approved supplies, proper checking during receiving & accepting only those ingredients that the organisation has the potential to process & handle with respect to food quality & safety are important requirement for purchase & receiving, which gives an assurance that what is received is what had been ordered.

3. Storage:

Until is the food is not going to be processed it must be handled and stored safely. Storage is where many break-downs in hygienic conditions occurs.

~~4. Production: (Preparation and packaging) Food safety~~
hazards in food are normally controlled by exclusion or removal, inhibition of growth or by destruction. The process to be employed depends on the sensitivity & the type of hazards to be control & the food itself. Microbes in particular production / processing under unhygienic conditions may lead to not only contamination of the food. While processing failures lead to survival of such microbes their toxins and coupled with time and temperature abuse pathogenic bacteria and moulds are allowed to multiply & proliferate.

5. Distribution & Delivery:

~~Food may become contaminated, or may not reach its destination in a suitable condition for consumption on account of inadvertent variations in conditions of temperature, moisture, content (water activity) & integrity of the packaged product due to inappropriate handling, damaging and resulting increase of moisture and temperature during storage & transportation.~~

6. Service:

Step of service in case of restaurant / hotel /
hostel / hospital / in flight etc which provides one more
opportunity for safe food to become unsafe at the very
final step of consumption. The opportunities at this
stage may not be as great as the earlier ones, but they
exist nonetheless.

METHODS OF PREPARATION OF PICKLES:

■ Introduction:

The preservation of food in common salt or in vinegar is known as pickling. It is one of the most ancient methods of preserving foods, fruits, & vegetables. Pickles are good appetizers & add to the palatability of a meal. They stimulate the flow of gastric juice & thus helps in digestion.

Sodium chloride is an indispensable component of food. At lower concentrations it contributes significantly to the flavour. At higher concentrations it exhibits an important bacteriostatic action.

Pickling is the result of fermentation by lactic acid forming bacterial which are generally present in large numbers on the surface of fresh vegetables and fruits. These bacteria can grow in acid medium & in the presence of 8-10% salt solution whereas the growth of majority of undesirable organisms is inhibited. Some fruits like lime, mango etc. are also preserved with salt.

■ Types of Pickle:

There are generally three classes of pickles based on ingredients and on the method of preparation.

(1) Oil Pickles:

Oil pickles are prepared from whole or sliced fruits or vegetables with salt, spices and oil. Sometimes vinegar or lemon juice may be used. Mango & lime are common oil pickles.

(2) Fresh Pack or Quick Process Pickle:

These pickles are made by covering the whole or sliced fruit or vegetable with boiling hot vinegar, spices and seasoning. Sometimes, the product may be put in salt water (brine) for several hours then drained before being covered with the pickling liquid. These pickles are easy to prepare.

(3) Bruned Pickles or Fermented Pickles:

These go through a curing process in brine (salt & water) for one or more weeks. Curing changes the colour, flavour & the texture of the product. Some pickles are fermented in low salt content for few days.

Sauerkraut is a common example of fermented pickles.

MANGO PICKLE

- Ingredients:
 - Mango pieces - 1 Kg
 - Salt - 150 gm
 - Saunf - 15 gm
 - Methi - 25 gm
 - Red chilli - 20 gm
 - Kalonji - 15 gm
 - Turmeric - 20 gm
 - Mustard oil - 350 gm

- Procedure:
 - 1) Mango pieces are taken in large wide bowl or Jar.
 - 2) All the ingredients are poured over them except oil.
 - 3) They are mixed very well with clean dry hands or wooden spatula.
 - 4) It is kept in sun for 4 days.
 - 5) Heat oil very well till smoky.
 - 6) It is then cooled to almost room temperature.
oil is added to pickle & mixed well.
 - 7) Then it is poured into clean dry pickle jars
is pressed down firmly with back of the spoon.
 - 8) There should be enough oil to form a layer
over surface of pickle.

FLOW CHART OF MAKING MANGO PICKLE

Raw Mango
↓
Washing
↓
Peeling
↓
Deseeding & cutting into 8 pieces
↓
Mixing salt & spices
↓
Keeping in sun for 4 days
↓
Adding hot & cooled oil
↓
Greasing the jar
↓
Filling in the jar
↓
Adding oil on the top if required
↓
Pressing firmly
↓
Covering the lid
↓
Storage in ambient condition.



MANGO PICKLE

■ Nutritive Value:

Ingredients	Amount	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Mango	1 Kg	110	10.1	7	1
Saunt	15 Kg	-	-	-	-
Methi	25 gm	83.25	11.025	6.25	1.45
Red chilli	20 gm	49.2	6.32	3.18	1.24
Kalonji	15 gm	-	-	-	-
Turmeric	20 gm	69.8	13.88	1.26	1.02
Mustard oil	350 gm	3150	-	-	350
Total		3792.25	132.225	17.69	354.71

• Saunt & Kalonji only has fibre.

Do's & Don'ts during Pickle Preparation:

DO'S

DON'TS

Select tender vegetables & firm fruit just before pickling. Sort fruits.

the fruits & vegetables &

Select the size best suited for the specific recipe.

Wash well, especially around the stems. Soil trapped here can be a source of bacteria responsible for the softening of pickles.

Do not take fruits & vegetables that show even slight evidence of mold or spoilage.

Use cider or white vinegar at 5% acidity. This is the range of acidity for most bottled vinegars.

Do not use homemade vinegar or vinegar of unknown acidity in pickling.

Use stainless steel vessel for fermenting) pickles or Sauerkraut.

Do not use aluminium, copper, brass, galvanized or iron containers.

DO'S

In mango & lime pickles,
15-20% salt should be used.

DON'TS

Do not use less than 15%
salt for making mango &
lime pickles.

Always submerge the pickles
in brine or oil.

Do not use oil lesser than
specified in recipe.

METHODS OF PREPARATION OF DIFFERENT SAUCES

Sauces are the culinary preparation used as an adj.

A range of fruits & vegetables can be used to make sauce, ketchup and chutney.

Tomatoes are good for making sauce as they are acid so preserve well. Spices, other vegetables, chillies can be added while preparing Sauces.

PRINCIPLE:

The basic principle of making sauce is the addition of sugar or salt & acetic acid or vinegar combined with the concentration of the mixture by heating to reduce the water content.

The list of common fruits & vegetables used for Sauces & chutneys:

Tomatoes

Chillies

Carrots

Onions

Coriander

Mint

Lemon.

MINIMUM SPECIFICATION OF SAUCE / KETCHUP (FP0):

- 1) Minimum TSS - 25 %.
- 2) Minimum Acidity - 1 %.
- 3) Mould count - Not in excess of 10% of field examined.
- 4) Substances allowed - Tomato Juice / puree / pulp.
 - Sugar.
 - Salt.
 - Vinegar.
 - Acetic acid.
 - Onion.
 - Garlic.
 - Permitted preservatives.

TOMATO SAUCE

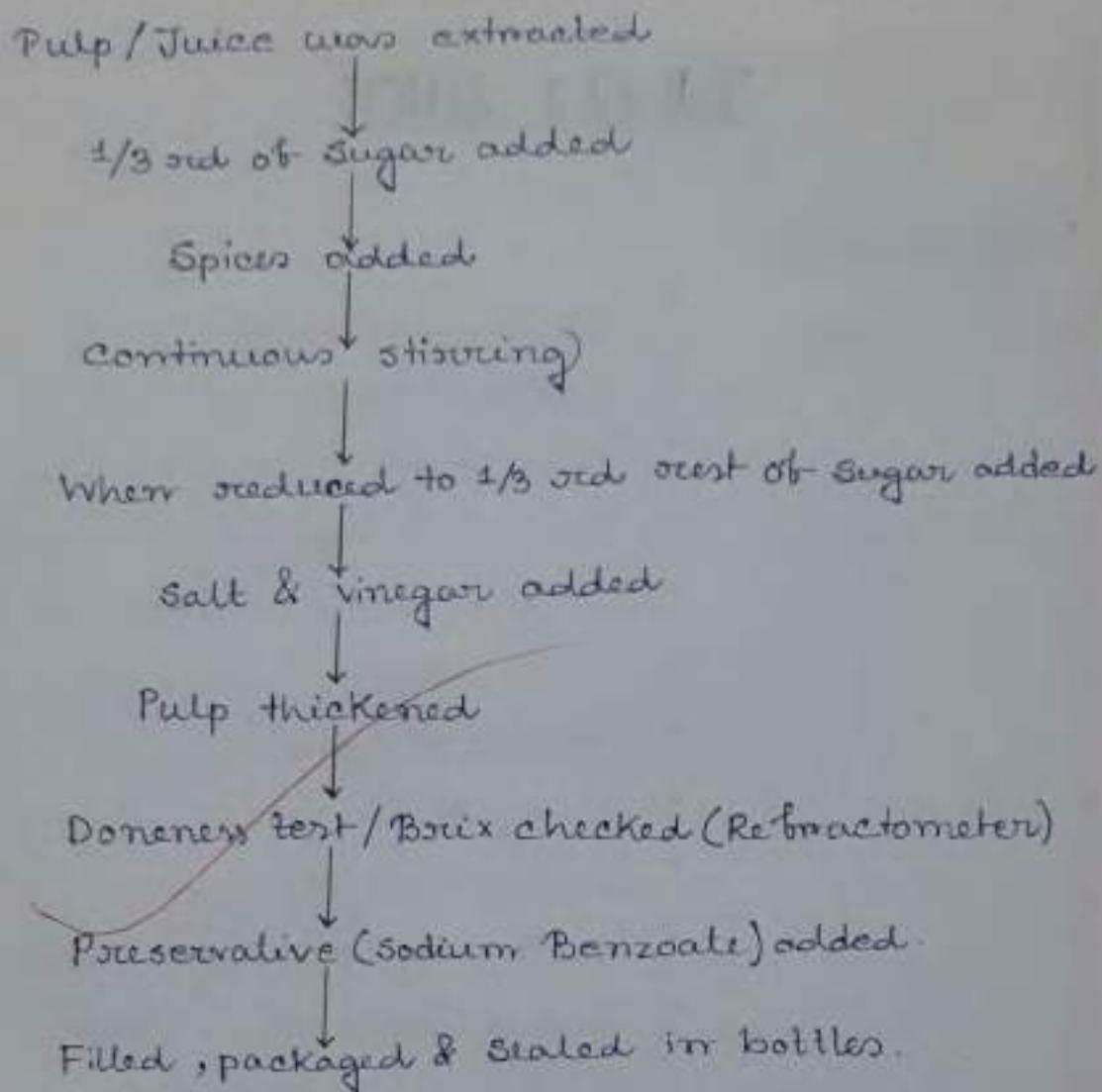
▪ Ingredients:

- Tomato Juice - 1 kg.
- Sugar - 70 gm.
- Salt - 10 gm.
- Red chilli - 1 gm.
- Vinegar - 2.5 ml
- Onion - 15 gm
- Cloves - 0.5 gm
- Cinnamon - 0.5 gm
- Cumin - 0.5 gm.
- Black pepper - 0.5 gm.
- Sodium Benzoate - 0.25 gm.

▪ Procedure:

- 1) Tomato juice will be extracted. Juice should have 6% total soluble solids. Tomato puree (15% TSS) can also be used to save time & energy.
- 2) One third of the sugar will be added to the juice and will be heated for concentrating.
- 3) All the spices should be put into a small muslin bag & can be added to the pulp.
- 4) Continuous stirring will be done and brux of the pulp will be checked.

Flow Chart Of Making Tomato Sauce:



- 5) If one third of the juice remains or brix comes to 20%, rest of the sugar will be added.
- 6) After further concentration, salt & vinegar will be added.
- 7) When the pulp thickness, plate test can be done to check whether sauce is done or not.
- 8) Alternately, brix can also be checked, if it reaches 32%, the sauce is done.
- 9) Sodium benzoate will be dissolved in a little quantity of water and will be added to the sauce.
- 10) Now it is ready to be filled, packaged and sealed in previous cleaned & dried jar / bottles.

Nutritive Value:

Ingredients	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Tomato	1 Kg	200	36	9	2
Sugar	70	278.6	69.58	0.01	-
Red chilli	1	2.46	0.316	0.159	0.062
Onion	15	7.5	1.665	0.18	0.015
Cloves	0.5	1.43	0.28	0.0275	0.0105
Cumin	0.5	1.78	0.183	0.0935	0.075
Cinnamon	0.5	24.7	8.1	0.4	0.12
Black pepper	0.5	1.52	0.246	0.0575	0.034
Total		517.99	116.24	9.9875	2.3505

Teacher's Signature

P. 01/23



VISIT IN CANNING INDUSTRY

METHODS OF PREPARATION JELLY:

Jelly is a mixture of fruit juice (pectin extract) & sugar that is clear & firm enough to hold its shape.

It is a product that is made from fruit extract instead of the whole fruit mass as in case of jam. The common ingredients used in making jelly / Jam are fruit, acid, pectin, sugar and water.

Principle:

The basic principle of making jelly is the addition of sugar, acid & pectin combined together with the mixture of to achieve concentration which aids in gel formation.

Pectin helps in forming gel. All fruits contains pectin but if the amount of pectin is less in the fruit, it is added synthetically to set a good gel.

Acids and sugar aids in gel formation. If there is too little acid, the gel will not set & if there is too much acid. The gel set will be loose, liqued (weep). Generally 0.8-1.0% of citric acid is used. Sugar acts as a preservation & about 25 kg Sugar is added to every 20 kg of pulp to make a good jam/jelly.

- The list of common fruits used for making Jam/Jellies:

Apple

Guava

Mango

Plum

Pineapple

Strawberry

FSSAI SPECIFICATION FOR JAM & JELLY (2011):

- JAM: Fruit pulp - 15%.

Total soluble solid (TSS) - 65%.

Citric acid - 5gm

Preservatives - 40 ppm of SO₂ or 600 ppm of Benzoic acid.

- JELLY: Fruit pulp - 15%.

TSS - 65%.

Citric acid - 2gm / Kg.

Preservatives - 40 ppm of SO₂ or 600 ppm of Benzoic acid.

• TEST FOR CHECKING & POINT OR GEL THICKNESS:

1) SHEET OR SPOON TEST:

A cool metal spoon is dipped into the boiling jelly mixture. It is raised about 12 inches above the pan. The spoon is turned in such a way that the liquid runs off from the side. The jelly is done if the syrup forms two drops that blow together & sheet or hang off the edge of the spoon.

2) FREEZER TEST:

Jelly is removed from the heat & poured on a cold plate in a small amount. The plate is put in the freezer in a refrigerator for a minutes. It sets, it is done.

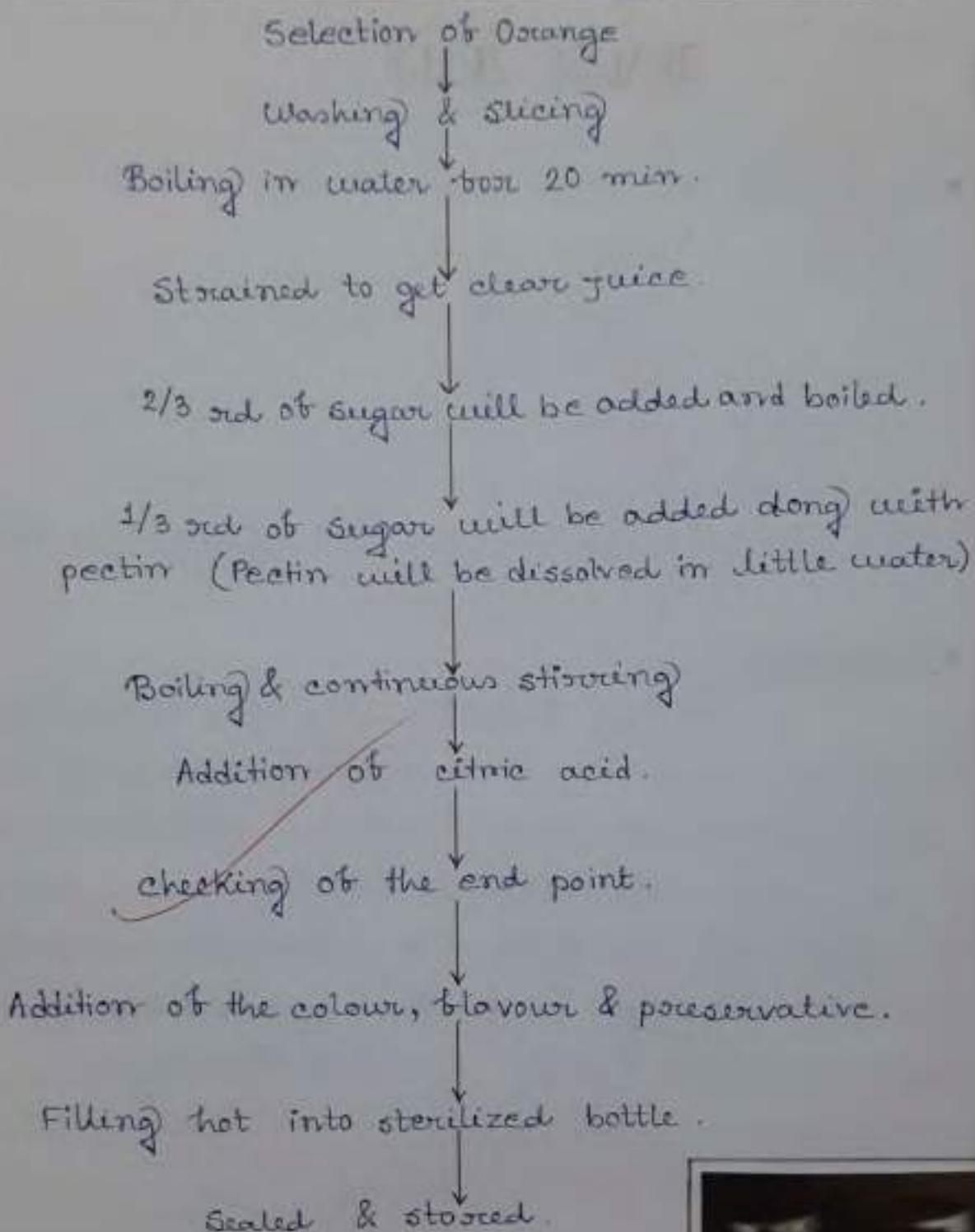
ORANGE JELLY

- Ingredients:
 - Orange Juice - $1\frac{1}{2}$ Kg.
 - Water - 200ml.
 - Sugar - 2 Kg.
 - Pectin - 35gm.
 - Citric acid - 10gm.
 - Flavour - 5ml/Kg ~ i.e. 7.5 ml.
 - Sodium benzoate - 300 mg/Kg ~ i.e. 450mg

■ Procedure:

Orange Juice & water was boiled $\frac{2}{3}$ rd of the sugar was added to it. After sometime rest of $\frac{1}{3}$ rd of sugar & pectin was mixed together & added to the mixture & was cooked until thickened. Citric acid was added. Dish or spoon taste was performed. Colour, Flavour and sodium benzoate was added. The finished product was poured in a glass jar where it sets in the form of jelly.

FLOW CHART OF MAKING ORANGE JELLY



• Nutritive Value:

Ingredients	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Orange Juice	1500	135	28.5	3	1.5
Sugar	2000	7960	1988	2	-
Total		8095	2016.5	5	1.5

Teacher's Signature

CJ
10/4/23

PINEAPPLE JAM

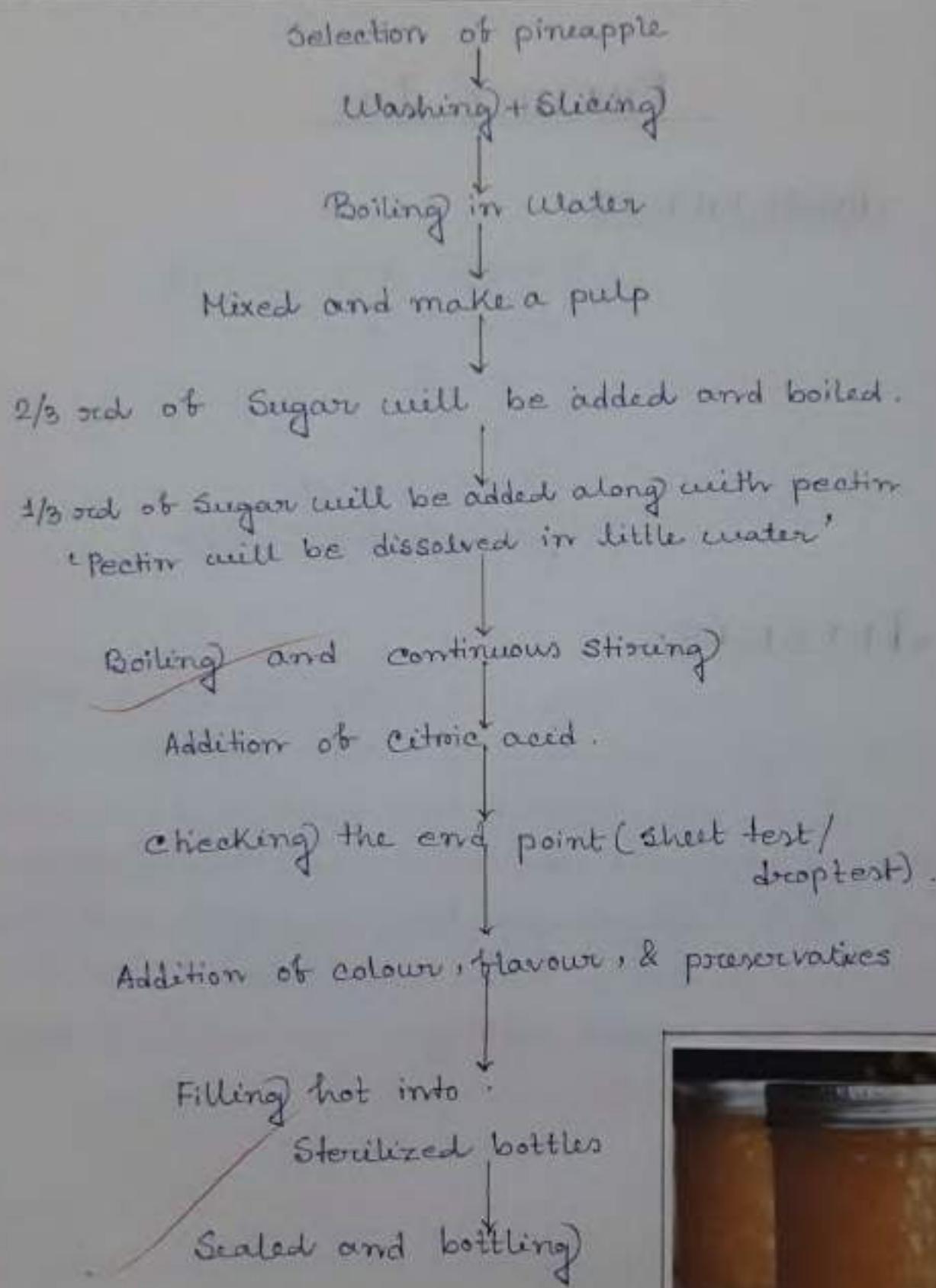
■ INGREDIENTS:

- Pineapple pulp - 2 $\frac{1}{2}$ kg.
- Sugar - 3 Kg
- Water - 100 ml.
- Pectin - 35 gm.
- Citric acid - 15 gm
- Sodium benzoate - 1 gm.

■ PROCEDURE:

Pineapple pulp and water was boiled. 2/3 rd of the sugar was added to it. After sometime rest of 1/3 rd of sugar & pectin was mixed together & added to the mixture and was cooked until thickend. Citric acid was added. Dish on spoon taste was performed. Colour, flavour and sodium benzoate was added. The finished product was poured in a glass jar where it sets in the form of jam.

Flow Chart For Making PINEAPPLE JAM:



PINEAPPLE JAM

NUTRITIVE VALUE:

Ingredients	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Pineapple pulp	2.5 Kg	1150	270	10	2.5
Sugar	3 Kg	11940	2982	3	-
Total		13090	3252	13	2.5

METHODS OF PREPARATION OF TOMATO PUREE:

Tomato puree is a commercial product in which pulp is used without skin or seeds with or without added salt & contains not less than 8.37% of salt free tomato solids. If the puree contains 12% tomato soluble solids, it is known as medium tomato puree.

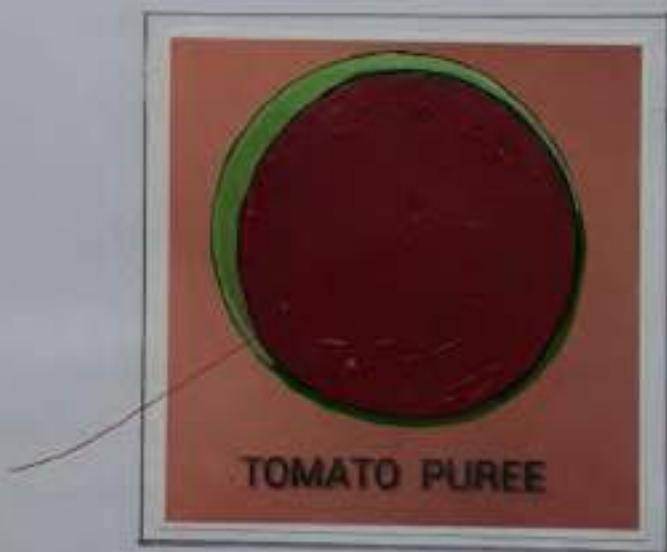
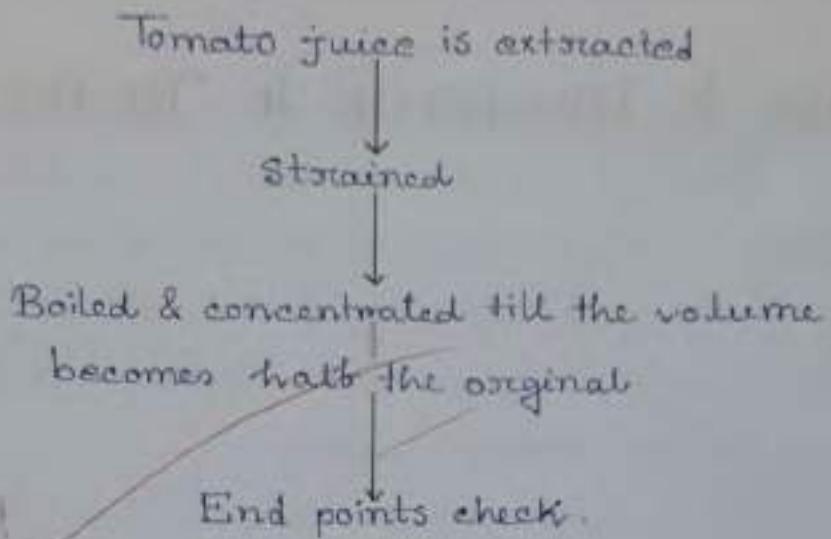
Tomato puree can be stored for a long period & is used in preparing curries, ketchup, chutneys & many more food items.

- Ingredients:
 - Tomato pulp - 1 kg
 - Salt - 10 gm
 - Vinegar - 1 tsp.

■ Procedure:

- 1 Tomato juice or pulp is extracted. It is strained to remove skin or seeds.
- 2 The strained juice is heated or concentrated continuously until the volume reduced to half of the original.
- 3 Salt & vinegar is added.
- 4 Added salt & vinegar & now it is filled in the container. The temperature of filling is normally kept around 82-88°C.

FLOW CHART FOR MAKING TOMATO PUREE:



■ Nutritive Value:

Ingredient	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Tomato Pulp	100	200	36	9	2
Salt	10	-	-	-	-
Total		200	36	9	2

Teacher's Signature

JAT
24/4/23

METHODS OF PREPARATION OF SQUASH:

Squash is the most popular beverage. It contains fruit juice or pulp, 10-50% sugar & 1% acid. Various types of fruits - mango, lemon, orange, litchi, mixed fruit, wood apple can be used for making squash. It is diluted before drinking. 3 parts of water is added to 1 part of squash to make a cool & refreshing drink.

■ PRINCIPLE:

The basic principles of making squash is the addition of sugar & acid which acts as preservatives.

■ FSSAI Specification for fruit Squash:

1) Minimum Juice - 25%.

2) Minimum TSS - 10%.

3) Substances allowed - Juice/pulp, water, sugar, citric acid, permitted colour, flavour & preservatives

MANGO SQUASH

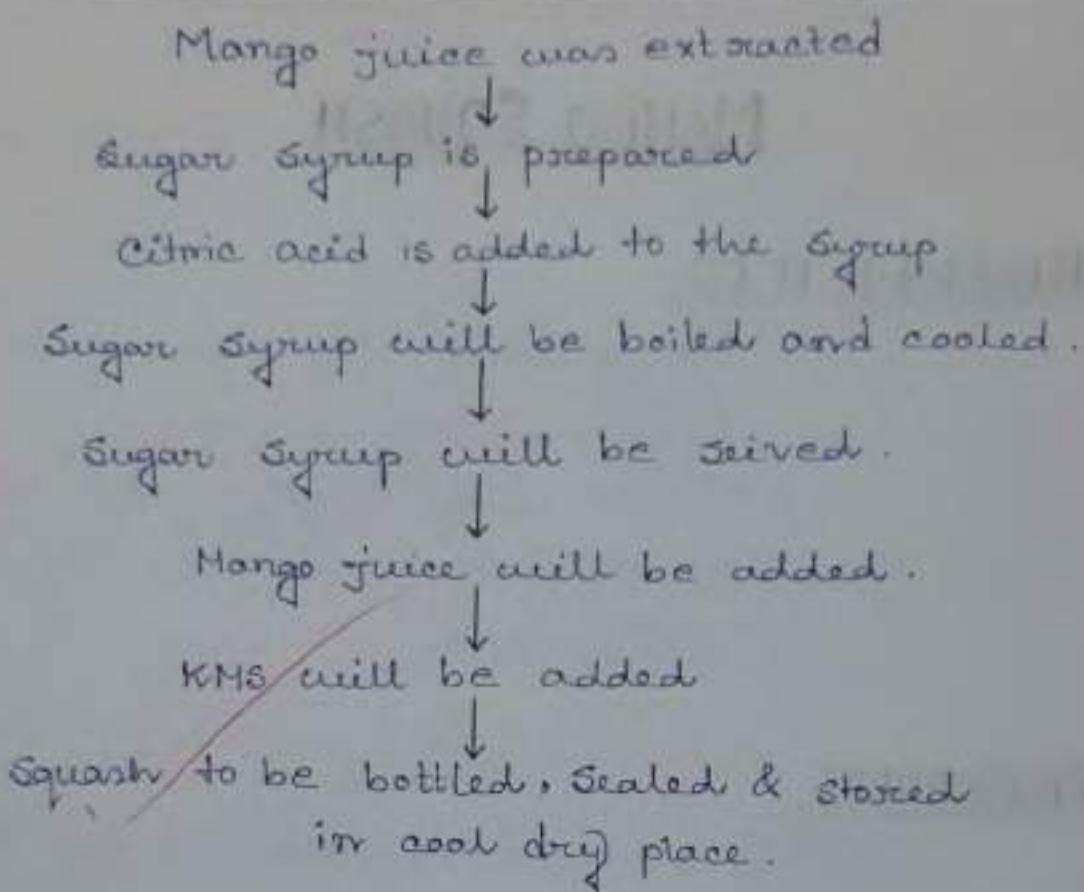
• INGREDIENTS:

- Mango Juice - 1 Kg
- Sugar - 1.75 Kg
- Citric acid - 20 gm
- Water - 1 lit
- KMS - 2.5 gm

• PROCEDURE:

- 1) Juice is extracted from orange through a machine.
- 2) Sugar is dissolved in water to make syrup.
- 3) The syrup will not be thickened, instead it will be heated only to dissolve the sugar.
- 4) Citric acid is added to the sugar syrup.
- 5) It will be boiled and cooled.
- 6) The sugar syrup will be sieved through a muslin cloth.
- 7) Now mango juice will be added.
- 8) At last potassium metabisulphate will be added.
- 9) The squash is now ready to pour in a clean sterilized bottles. It can be sealed and stored in cool dry place.

■ FLOW CHART FOR MAKING MANGO SQUASH:



NUTRITIVE VALUE:

Ingredient	Amount (gm)	Energy (Kcal)	Carbohydrate (gm)	Protein (gm)	Fat (gm)
Mango	1 Kg	740	169	6	1
Sugar	1.5 Kg	7000	1750	-	-
Total		7740	1919	6	1

DO'S & DON'T FOR PREPARING FRUIT SQUASH:

DO'S	DON'TS
1. Juice should be processed at 90°C for at least 1 min.	Juice should not be processed below 90°C.
2. Juice should be packed in glass bottles.	Plastic bottles should not be for storing juices.
3. The pH of juice should be below 4.5 before heat processing.	Juice should not be heated with pH higher than 4.5. pH should be brought down to 4.5 by adding citric acid.
4. Always leave ahead space while preserving juice with KMS.	Never fill the juice to the head of the bottle.
5. Preservatives should be dissolved in water before adding or mixing it to the juice.	The preservatives should not be added directly or in solid form to the juice.

B.A. & B.Sc. Geography Honours

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UNIVERSITY OF CALCUTTA

Notification No. CSR/ 12 /18

It is notified for information of all concerned that the Syndicate in its meeting held on 28.05.2018 (vide Item No.14) approved the Syllabi of different subjects in Undergraduate Honours / General / Major courses of studies (CBCS) under this University, as laid down in the accompanying pamphlet:

List of the subjects

<u>Sl. No.</u>	<u>Subject</u>	<u>Sl. No.</u>	<u>Subject</u>
1	Anthropology (Honours / General)	29	Mathematics (Honours / General)
2	Arabic (Honours / General)	30	Microbiology (Honours / General)
3	Persian (Honours / General)	31	Mol. Biology (General)
4	Bengali (Honours / General /LCC2 /AECC1)	32	Philosophy (Honours / General)
5	Bio-Chemistry (Honours / General)	33	Physical Education (General)
6	Botany (Honours / General)	34	Physics (Honours / General)
7	Chemistry (Honours / General)	35	Physiology (Honours / General)
8	Computer Science (Honours / General)	36	Political Science (Honours / General)
9	Defence Studies (General)	37	Psychology (Honours / General)
10	Economics (Honours / General)	38	Sanskrit (Honours / General)
11	Education (Honours / General)	39	Social Science (General)
12	Electronics (Honours / General)	40	Sociology (Honours / General)
13	English ((Honours / General/ LCC1/ LCC2/AECC1))	41	Statistics (Honours / General)
14	Environmental Science (Honours / General)	42	Urdu (Honours / General /LCC2 /AECC1)
15	Environmental Studies (AECC2)	43	Women Studies (General)
16	Film Studies (General)	44	Zoology (Honours / General)
17	Food Nutrition (Honours / General)	45	Industrial Fish and Fisheries - IFFV (Major)
18	French (General)	46	Sericulture - SRTV (Major)
19	Geography (Honours / General)	47	Computer Applications – CMAV (Major)
20	Geology (Honours / General)	48	Tourism and Travel Management – TTIV (Major)
21	Hindi (Honours / General /LCC2 /AECC1)	49	Advertising Sales Promotion and Sales Management – ASPV (Major)
22	History (Honours / General)	50	Communicative English –CMEV (Major)
23	Islamic History Culture (Honours / General)	51	Clinical Nutrition and Dietetics CNDV (Major)
24	Home Science Extension Education (General)	52	Bachelor of Business Administration (BBA) (Honours)
25	House Hold Art (General)	53	Bachelor of Fashion and Apparel Design – (B.F.A.D.) (Honours)
26	Human Development (Honours / General)	54	Bachelor of Fine Art (B.F.A.) (Honours)
27	Human Rights (General)	55	B. Music (Honours / General) and Music (General)
28	Journalism and Mass Communication (Honours / General)		

The above shall be effective from the academic session 2018-2019.

SENATE HOUSE
KOLKATA-700073
The 4th June, 2018

Paul
4/6/18
(Dr. Santanu Paul)
Deputy Registrar



CBCS Syllabus for Undergraduate Courses in Geography

TO BE EFFECTIVE FROM THE ACADEMIC SESSION 2018-19



University of Calcutta
May, 2018

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1.4 Honours Course: Core Subjects

- GEO-A-CC-1-01-TH/P – Geotectonics and Geomorphology
- GEO-A-CC-1-02-TH/P – Cartographic Techniques
- GEO-A-CC-2-03-TH/P – Human Geography
- GEO-A-CC-2-04-TH/P – Cartograms, Thematic Mapping and Surveying
- GEO-A-CC-3-05-TH/P – Climatology
- GEO-A-CC-3-06-TH/P – Hydrology and Oceanography
- GEO-A-CC-3-07-TH/P – Statistical Methods in Geography
- GEO-A-CC-4-08-TH/P – Economic Geography
- GEO-A-CC-4-09-TH/P – Regional Planning and Development
- GEO-A-CC-4-10-TH/P – Soil and Biogeography
- GEO-A-CC-5-11-TH/P – Research Methodology and Fieldwork
- GEO-A-CC-5-12-TH/P – Remote Sensing, GIS and GNSS
- GEO-A-CC-6-13-TH/P – Evolution of Geographical Thought
- GEO-A-CC-6-14-TH/P – Disaster Management

1.5 Honours Course: Choices for Four Discipline Specific Electives ¹

- GEO-A-DSE-A-5-01-TH/P – Fluvial Geomorphology
- GEO-A-DSE-A-5-02-TH/P – Climate Change: Vulnerability and Adaptations
- GEO-A-DSE-B-5-05-TH/P – Cultural and Settlement Geography
- GEO-A-DSE-B-5-06-TH/P – Social Geography
- GEO-A-DSE-A-6-03-TH/P – Environmental Issues in Geography
- GEO-A-DSE-A-6-04-TH/P – Resource Geography
- GEO-A-DSE-B-6-07-TH/P – Urban Geography
- GEO-B-DSE-B-6-08-TH/P – Geography of India

1.6 Honours Course: Choices for Two Skill Enhancement Courses

- GEO-A-SEC-A-3-01-TH – Coastal Management
- GEO-A-SEC-A-3-02-TH – Tourism Management
- GEO-A-SEC-B-4-03-TH – Rural Development
- GEO-A-SEC-B-4-04-TH – Sustainable Development

1.7 General Course: Core Subjects

- GEO-G-CC-1-01-TH/P – Physical Geography
- GEO-G-CC-2-02-TH/P – Environmental Geography
- GEO-G-CC-3-03-TH/P – Human Geography
- GEO-G-CC-4-04-TH/P – Cartography

¹ Any two electives, one each from DSE-A and DSE-B, are to be chosen in each of Semesters-V and VI

CURRICULUM SCHEME

Semester	Course Type	Paper ID and Name	Credits	Marks Distribution *						Marks per Qn Type	
				FULL MARKS	ATTENDANCE	INTERNAL ASSESSMENT	THEORETICAL EXAM	PRACTICAL EXAM		MCQ	LONG-ANSWER TYPE
								WRITTEN	PROJECT/VIVA		
IV Marks: 500 Credits: 26	Core Course - VIII	GEO-A-CC-4-08-TH – Economic Geography	4	70	10	10	50	—	—	20	30
		GEO-A-CC-4-08-P – Economic Geography Lab	2	30	—	—	—	25	5	—	25
	Core Course - IX	GEO-A-CC-4-09-TH – Regional Planning and Development	4	70	10	10	50	—	—	20	30
		GEO-A-CC-4-09-P – Regional Planning and Development Lab	2	30	—	—	—	25	5	—	25
	Core Course - X	GEO-A-CC-4-10-TH – Soil and Biogeography	4	70	10	10	50	—	—	20	30
		GEO-A-CC-4-10-P – Soil and Biogeography Lab	2	30	—	—	—	25	5	—	25
	Skill Enhancement Course - II	GEO-A-SEC-B-4-03-TH – Rural Development / GEO-A-SEC-B-4-04-TH – Sustainable Development	2	100	10	10	80	—	—		
	Generic Elective - IV	TBD-TH	4/5	70/85							
		TBD-P/TU	2/1	30/15							
V Marks: 400 Credits: 24	Core Course - XI	GEO-A-CC-5-11-TH – Research Methodology and Fieldwork	4	70	10	10	50	—	—	20	30
		GEO-A-CC-5-11-P – Research Methodology and Fieldwork Lab	2	30	—	—	—	—	20+10	—	—
	Core Course - XII	GEO-A-CC-5-12-TH – Remote Sensing, GIS and GNSS	4	70	10	10	50	—	—	20	30
		GEO-A-CC-5-12-P – Remote Sensing, GIS and GNSS Lab	2	30	—	—	—	25	5	—	25
	Discipline Specific Elective - I	GEO-A-DSE-A-5-01/02-TH	4	70	10	10	50	—	—	20	30
		GEO-A-DSE-A-5-01/02-P	2	30	—	—	—	25	5	—	25
	Discipline Specific Elective - II	GEO-A-DSE-B-5-05/06-TH	4	70	10	10	50	—	—	20	30
		GEO-A-DSE-B-5-05/06-P	2	30	—	—	—	25	5	—	25
VI Marks: 400 Credits: 24	Core Course - XIII	GEO-A-CC-6-13-TH – Evolution of Geographical Thought	4	70	10	10	50	—	—	20	30
		GEO-A-CC-6-13-P – Evolution of Geographical Thought Lab	2	30	—	—	—	—	20+10	—	15
	Core Course - XIV	GEO-A-CC-6-14-TH – Disaster Management	4	70	10	10	50	—	—	20	30
		GEO-A-CC-6-14-P – Disaster Management Lab	2	30	—	—	—	—	20+10	—	—
	Discipline Specific Elective - III	GEO-A-DSE-A-6-03/04-TH	4	70	10	10	50	—	—	20	30
		GEO-A-DSE-A-6-03/04-P	2	30	—	—	—	25	5	—	25
	Discipline Specific Elective - IV	GEO-A-DSE-B-6-07/08-TH	4	70	10	10	50	—	—	20	30
		GEO-A-DSE-B-6-07/08-P	2	30	—	—	—	25	5	—	25

*Tutorials of 1 Credit will be conducted in case there is no practical component

2.22 GEO-A-CC-5-11-P – Research Methodology and Fieldwork Lab ✦ 30 Marks / 2 Credits

Every student needs to participate in fieldwork and prepare a field report according to the following guideline, failing which he/she will not be evaluated for GEO-A-CC-5-11-P.

1. Each student will prepare a report based on primary data collected from field survey and secondary data collected from different sources.
2. Students will select either one rural area (*mouza*) or an urban area (municipal ward) for the study, with the primary objective of evaluating the relation between physical and cultural landscape.
3. A specific problem or a special feature should be identified based on which, the study area will be selected.
4. The report should be handwritten in English on A4 size paper in candidate's own words within 5,000 words (Introductory Chapter: 1000 words; Physical Aspects: 1500 words; Socio-economic Aspects: 1500 words; Concluding Chapter: 500 words, approximately) excluding tables, photographs, maps, diagrams, references and appendices.
5. Photographs, maps and diagrams should not exceed 15 pages.
6. A copy of the bound report, duly signed by the concerned teacher, will be submitted during examination.
7. The field work and post-field work will include:
 - a. Collection of primary data on physical aspects (relief and soil) of the study area. Students should use survey instruments like prismatic compass, dumpy level, Abney level or clinometer wherever necessary.
 - b. Collection of soil samples from different land cover land use regions of the study area for determining pH and NPK values with help of a soil kit.
 - c. Collection of socio economic data, at the household level (with the help of a questionnaire) in the selected study area.
 - d. Plot to plot land use survey for preparation of a land use map, covering whole or part of the selected area.
 - e. Visit to different organisations and departments for collection of secondary data.
 - f. Any other survey relevant to the objective of the study.
8. The Field Report should contain the following sections (a–e).
 - a. Introduction: Study area extent and space relations, reasons for selection of the study area on the basis of a specific problem or special feature, objectives, methods of data collection, analyses and presentation, sources of information, etc.
 - b. Physical aspects: Lithology and geological structure, relief, slope, drainage, climate, soil, vegetation, environmental issues, proneness to natural hazards, etc.
 - c. Socio-economic aspects:
 - i. Population attributes: Number, sex ratio, literacy, occupational structure, ethnic and religious composition, language, per capita income, etc.
 - ii. Settlement characteristics: Number of houses, building materials, number and size of rooms, amenities, etc.
 - iii. Agriculture: General land use, crop-combination, use of fertiliser and irrigational facilities, production and marketing etc.
 - iv. Other economic activities: Fishing, horticulture, brick-making, household and other industries, etc.

- d. Conclusions: Relation between physical and cultural landscape. Evaluation of problems and prospects. General recommendations.
 - e. Bibliography.
9. The students will prepare (i) a chorochromatic land use land cover map on the basis of plot to plot survey; (ii) a profile of suitable length, surveyed and plotted, with different land use land cover superimposed on it.
10. All sections of the report should contain relevant maps, diagrams and photographs using primary and secondary data, clearly citing sources.
11. All surveys should pertain to the objective of the study. Surveys not relevant for establishing the relation between physical and cultural landscape should be avoided.
12. Marks division: 20 on report + 10 on viva-voce = 30

2.26 GEO-A-CC-6-13-P – Evolution of Geographical Thought Lab ◇ 30 Marks / 2 Credits

A laboratory notebook, comprising class assignments of topics 1 and 2, is to be prepared and submitted. The exercises are to be drawn in pencil with photocopied representation of source materials where necessary. All texts are to be handwritten.

1. Changing perception of maps of the world (Ptolemy, Ibn Batuta, Mercator)
2. Mapping voyages; Columbus, Vasco da Gama, Magellan, Thomas Cook
3. Group Presentation of five to ten students on any selected school of geographical thought (20 marks)
4. Viva-voce based on laboratory notebook on topics 1 and 2 (10 Marks)

References

- Black, J. 2003. *Visions of the World: A History of Maps*, Mitchell Beazley.
- Couper, P. 2015. *A Student's Introduction to Geographical Thought: Theories, Philosophies, Methodologies*, Sage.
- Holt-Jensen, A. 2011. *Geography: History and Concepts: A Student's Guide*, Sage.
- Whitfield, P. 2017. *Charting the Oceans*, British Library.

2.28 GEO-A-CC-6-14-P – Hazard Management Lab ✦ 30 Marks / 2 Credits

A Group Project Report is to be prepared and submitted based on any one case study among the following hazards from West Bengal, incorporating a preparedness plan, preferably in the vicinity of the candidates' institution / district:

- 1. Earthquake**
- 2. Landslide**
- 3. Land subsidence**
- 4. Thunderstorm**
- 5. Flood**
- 6. Riverbank / Coastal erosion**
- 7. Fire**
- 8. Industrial accident**
- 9. Road / Railway accident**
- 10. Structural collapse**
- 11. Environmental pollution**
- 12. Biohazard**

One case study will be done by a group of five to ten students. Different groups may choose different case studies from any one or different types of disasters. The report should be prepared on secondary data and handwritten on A4 page in candidates' own words not exceeding 2,000 words excluding references. The report should contain a proper title. The report should incorporate relevant tables, maps, diagrams, and references, not exceeding ten pages. Photographs are optional and should not exceed three. A copy of the stapled / spiral-bound report in a transparent cover, duly signed by the concerned teacher, is to be submitted during examination. Without the report the candidates will not be evaluated for GEO-A-CC-6-14-P.

Marks division: 20 on report + 10 on viva-voce = 30

BUDGE BUDGE COLLEGE
Academic Session: 2022-2023
Department of Geography

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

List of students undertaking field / project work follows:

I. B.A. / B.Sc. Geography Honours Semester-V
Research Methodology and Fieldwork (GEO-A-CC-5-11-P)

Serial No.	Registration Number	Roll Number	Name	Project Title	Supervisors
1	561-1211-0164-20	202561-11-0085	Anindita Das	Project Report on 'Development & Access to Infrastructural Facilities in Village Chorinda: Focus on Hydrology and Access to Water'	Dr. Swati Sachdev & Mr. Sajid Qamar & Ms. Sumana Das
2	561-1211-0165-20	202561-11-0086	Anwesha Mondal		
3	561-1211-0167-20	202561-11-0087	Arpita Kajali		
4	561-1211-0170-20	202561-11-0088	Gargi Dutta		
5	561-1211-0173-20	202561-11-0089	Nashima Khatun		
6	561-1211-0174-20	202561-11-0090	Nishat Saba		
7	561-1211-0177-20	202561-11-0092	Poly Malick		
8	561-1211-0178-20	202561-11-0093	Rachana Bairagi		
9	561-1211-0179-20	202561-11-0094	Rimi Jetty		
10	561-1211-0180-20	202561-11-0095	Rimpa Khan		
11	561-1211-0185-20	202561-11-0096	Smritilekha Das		
12	561-1211-0190-20	202561-11-0097	Zasmin Parvin		
13	561-1211-0345-20	202561-11-0179	Mousumi Bag		
14	561-1212-0168-20	202561-11-0224	Barsha Naskar		
15	561-1212-0172-20	202561-11-0225	Keya Sardar		
16	561-1212-0175-20	202561-11-0226	Parna Mondal		
17	561-1212-0186-20	202561-11-0229	Sneha Mondal		
18	561-1212-0187-20	202561-11-0230	Sudipta Dhara		
19	561-1212-0189-20	202561-11-0231	Triasha Dalui		
20	561-1215-0182-20	202561-11-0286	Rubina Khatun		
21	561-1215-1286-20	202561-11-0311	Sohena Parvin		
22	561-1112-0169-20	202561-21-0039	Debraj Mondal		
23	561-1112-0188-20	202561-21-0040	Sujan Sardar		
24	561-1114-1252-20	202561-21-0054	Sandeep Parui		
25	561-1211-0379-20	203561-11-0015	Agamoni Manna		
26	561-1211-0382-20	203561-11-0016	Deboleena Malik		
27	561-1211-0383-20	203561-11-0017	Debopriya Chakraborty		
28	561-1211-0384-20	203561-11-0018	Diya Dey		
29	561-1211-0385-20	203561-11-0019	Isika Das		
30	561-1211-0387-20	203561-11-0020	Koyel Bhowmick		
31	561-1211-0388-20	203561-11-0021	Oindrila Das		
32	561-1211-0390-20	203561-11-0022	Priya Bag		
33	561-1211-0393-20	203561-11-0023	Riya Ghosh Roy		
34	561-1211-0394-20	203561-11-0024	Sangita Mallick		
35	561-1211-0395-20	203561-11-0025	Shraboni Majhi		
36	561-1212-0391-20	203561-11-0047	Priyanka Mondal		
37	561-1214-0389-20	203561-11-0052	Priti Sardar		
38	561-1214-0397-20	203561-11-0053	Susmita Das		
39	561-1111-0380-20	203561-21-0003	Ajay Ray		
40	561-1112-0381-20	203561-21-0011	Amar Biswas		
41	561-1112-0386-20	203561-21-0012	Jagannath Naskar		
42	561-1112-0392-20	203561-21-0013	Ritam Hazra		
43	561-1112-0396-20	203561-21-0014	Sudipto Naskar		

II. B.A. / B.Sc. Geography Honours Semester-VI
Evolution of Geographical Thought (GEO-A-CC-6-13-P)

Serial No.	Registration Number	Roll Number	Name	Project Title	Supervisor
1	561-1211-0164-20	202561-11-0085	Anindita Das	Positivism and Positivist Geography	Dr. Swati Sachdev
2	561-1211-0165-20	202561-11-0086	Anwesha Mondal		
3	561-1211-0167-20	202561-11-0087	Arpita Kajali		
4	561-1211-0170-20	202561-11-0088	Gargi Dutta		
5	561-1211-0173-20	202561-11-0089	Nashima Khatun		
6	561-1211-0174-20	202561-11-0090	Nishat Saba		
7	561-1211-0177-20	202561-11-0092	Poly Malick		
8	561-1211-0178-20	202561-11-0093	Rachana Bairagi		
9	561-1211-0179-20	202561-11-0094	Rimi Jetty		
10	561-1211-0180-20	202561-11-0095	Rimpa Khan	Deterministic School of Geographical Thought	Ms. Sumana Das
11	561-1211-0185-20	202561-11-0096	Smritilekha Das		
12	561-1211-0190-20	202561-11-0097	Zasmin Parvin		
13	561-1211-0345-20	202561-11-0179	Mousumi Bag		
14	561-1212-0168-20	202561-11-0224	Barsha Naskar		
15	561-1212-0172-20	202561-11-0225	Keya Sardar		
16	561-1212-0175-20	202561-11-0226	Parna Mondal		
17	561-1212-0186-20	202561-11-0229	Sneha Mondal		
18	561-1212-0187-20	202561-11-0230	Sudipta Dhara		
19	561-1212-0189-20	202561-11-0231	Triasha Dalui	Humanistic School of Geographical Thought	Mr. Sajid Qamar
20	561-1215-0182-20	202561-11-0286	Rubina Khatun		
21	561-1215-1286-20	202561-11-0311	Sohena Parvin		
22	561-1112-0169-20	202561-21-0039	Debraj Mondal		
23	561-1112-0188-20	202561-21-0040	Sujan Sardar		
24	561-1114-1252-20	202561-21-0054	Sandeep Parui		
25	561-1211-0379-20	203561-11-0015	Agamoni Manna		
26	561-1211-0382-20	203561-11-0016	Deboleena Malik		
27	561-1211-0383-20	203561-11-0017	Debopriya Chakraborty		
28	561-1211-0384-20	203561-11-0018	Diya Dey	Behavioural Geography	Dr. Swati Sachdev
29	561-1211-0385-20	203561-11-0019	Isika Das		
30	561-1211-0387-20	203561-11-0020	Koyel Bhowmick		
31	561-1211-0388-20	203561-11-0021	Oindrila Das		
32	561-1211-0390-20	203561-11-0022	Priya Bag		
33	561-1211-0393-20	203561-11-0023	Riya Ghosh Roy		
34	561-1211-0394-20	203561-11-0024	Sangita Mallick		
35	561-1211-0395-20	203561-11-0025	Shraboni Majhi		
36	561-1212-0391-20	203561-11-0047	Priyanka Mondal	Possibilistic School of Geographical Thought	Mr. Sajid Qamar
37	561-1214-0389-20	203561-11-0052	Priti Sardar		
38	561-1214-0397-20	203561-11-0053	Susmita Das		
39	561-1111-0380-20	203561-21-0003	Ajay Ray		
40	561-1112-0381-20	203561-21-0011	Amar Biswas		
41	561-1112-0386-20	203561-21-0012	Jagannath Naskar		
42	561-1112-0392-20	203561-21-0013	Ritam Hazra		
43	561-1112-0396-20	203561-21-0014	Sudipto Naskar		

III. B.A. / B.Sc. Geography Honours Semester-VI
Hazard Management (GEO-A-CC-6-14-P)

Serial No.	Registration Number	Roll Number	Name	Project Title	Supervisor
1	561-1211-0164-20	202561-11-0085	Anindita Das	Air Pollution: A Case Study of Durgapur	Dr. Swati Sachdev
2	561-1211-0165-20	202561-11-0086	Anwesha Mondal		
3	561-1211-0167-20	202561-11-0087	Arpita Kajali		
4	561-1211-0170-20	202561-11-0088	Gargi Dutta		
5	561-1211-0173-20	202561-11-0089	Nashima Khatun		
6	561-1211-0174-20	202561-11-0090	Nishat Saba		
7	561-1211-0177-20	202561-11-0092	Poly Malick		
8	561-1211-0178-20	202561-11-0093	Rachana Bairagi		
9	561-1211-0179-20	202561-11-0094	Rimi Jetty		
10	561-1211-0180-20	202561-11-0095	Rimpa Khan	The Impact of Landslide and Management of Landslide in Kurseong, Darjeeling: A Case Study of Limbugaon Landslide	Mr. Sajid Qamar
11	561-1211-0185-20	202561-11-0096	Smritilekha Das		
12	561-1211-0190-20	202561-11-0097	Zasmin Parvin		
13	561-1211-0345-20	202561-11-0179	Mousumi Bag		
14	561-1212-0168-20	202561-11-0224	Barsha Naskar		
15	561-1212-0172-20	202561-11-0225	Keya Sardar		
16	561-1212-0175-20	202561-11-0226	Parna Mondal		
17	561-1212-0186-20	202561-11-0229	Sneha Mondal		
18	561-1212-0187-20	202561-11-0230	Sudipta Dhara		
19	561-1212-0189-20	202561-11-0231	Triasha Dalui	Socio-economic Impact of Arsenic Contamination in Different Blocks of Maldah, West Bengal	Ms. Sumana Das
20	561-1215-0182-20	202561-11-0286	Rubina Khatun		
21	561-1215-1286-20	202561-11-0311	Sohena Parvin		
22	561-1112-0169-20	202561-21-0039	Debraj Mondal		
23	561-1112-0188-20	202561-21-0040	Sujan Sardar		
24	561-1114-1252-20	202561-21-0054	Sandeep Parui		
25	561-1211-0379-20	203561-11-0015	Agamoni Manna		
26	561-1211-0382-20	203561-11-0016	Deboleena Malik		
27	561-1211-0383-20	203561-11-0017	Debopriya Chakraborty		
28	561-1211-0384-20	203561-11-0018	Diya Dey	An Analysis of Road Accident, A Case Study of Midnapore Kharagpur Development Authority Planning Area	Mr. Sajid Qamar
29	561-1211-0385-20	203561-11-0019	Isika Das		
30	561-1211-0387-20	203561-11-0020	Koyel Bhowmick		
31	561-1211-0388-20	203561-11-0021	Oindrila Das		
32	561-1211-0390-20	203561-11-0022	Priya Bag		
33	561-1211-0393-20	203561-11-0023	Riya Ghosh Roy		
34	561-1211-0394-20	203561-11-0024	Sangita Mallick		
35	561-1211-0395-20	203561-11-0025	Shraboni Majhi		
36	561-1212-0391-20	203561-11-0047	Priyanka Mondal		
37	561-1214-0389-20	203561-11-0052	Priti Sardar	The Impact of Cyclone <i>Aila</i> on Indian Sundarban	Ms. Sumana Das
38	561-1214-0397-20	203561-11-0053	Susmita Das		
39	561-1111-0380-20	203561-21-0003	Ajay Ray		
40	561-1112-0381-20	203561-21-0011	Amar Biswas		
41	561-1112-0386-20	203561-21-0012	Jagannath Naskar		
42	561-1112-0392-20	203561-21-0013	Ritam Hazra		
43	561-1112-0396-20	203561-21-0014	Sudipto Naskar		

To
The Principal
Budge Budge College
Kolkata - 700137

Q
16/6/2022

Subject: Field Trip for Geography Honours Students

Respected Madam,

This is to inform you that in accordance with the curriculum/ syllabus of B.A./ B.Sc. Geography (Honours), Calcutta University, a field report has to be prepared by the students on a village/ town. Accordingly, a field trip has been planned and is being arranged to Ghatsila-Tatanagar, Jharkhand and surrounding areas by the Department of Geography through 'Dear Travels' in the first week of August 2022 (tentatively) for 4th Semester B.A. / B.Sc. Geography (Honours) students. The approximate cost per person as per the details provided by the travel agent is Rs. 4900/- (Rupees Four Thousand Nine Hundred Only).

We shall be grateful if permission is granted for the above field trip and we can begin the process of undertaking the ticketing and making other final arrangements for the above field trip.

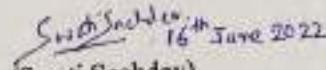
Three teachers from the Department of Geography Ms. Swati Sachdev, Mr. Sajid Qamar and Ms. Sumana Das, will accompany the students and conduct the field study. In addition, Shri Subrata Karmakar, attendant of the Department will be accompanying the students. I request you to please provide permission and 'on duty' for the teachers and staff concerned for the above duration.

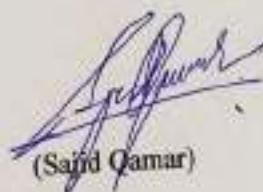
I also request for the sanction of a grant of Rs. 23000/- (Rupees Twenty Three Thousand Only) to the Department to meet the expenses of the three teachers, staff and for other necessary related miscellaneous expenses.

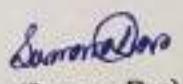
I shall be obliged if you kindly sanction the above.

Thanking you,

regards,


Swati Sachdev
16th June 2022


(Sajid Qamar)


(Sumana Das)



Budge Budge College

Estd. 1971

NAAC Accredited B+ & UGC 12B, 2(f)

Affiliated to the University of Calcutta

Ref. No.....

Date 16/08/2022

To

The Inspector in Charge
Budge Budge Police Station
24 Parganas (South)

Subject: Field trip for B.A. / B.Sc. Geography (Honours) students, Budge Budge College,
24 Parganas (South), Kolkata, West Bengal, 2022

Respected Sir/ Madam,

This is to inform you that in accordance with the curriculum/ syllabus of B.A./ B.Sc. Geography (Honours), Calcutta University, a field report has to be prepared by the students on a village/ town. Accordingly, a field trip has been arranged to Ghatsila, Jharkhand and surrounding areas by Budge Budge College for B.A. / B.Sc. Geography (Honours) Semester V students from 24th August 2022 to 28th August 2022. The contact number and details of traveling students, staff and teachers is being enclosed for ready reference.

I shall be grateful if you can provide appropriate and adequate security, cooperation and assistance in case the circumstances so demand or any problematic situation arises and forward necessary details to concerned officials in Ghatsila, Jharkhand to extend their kind cooperation, assistance and adequate security.

With regards,

Yours faithfully
Debjani Datta
(Dr. Debjani Datta)
Principal

DR. DEBJANI DATTA
Principal
Budge Budge College

Received, Content.
Not Verified

P
Pat

Dt : 20/08/22
Budge Budge P.S
D.D.H Police Dist .



Budge Budge College

Estd. 1971

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Affiliated to the University of Calcutta

Ref. No.....

Date 16/08/2022

TO WHOM IT MAY CONCERN

The following are the list and details of B.A./ B.Sc. Geography (Honours) Semester V students, staff and teachers of Budge Budge College going for the field trip to Ghatsila, Jharkhand and surrounding areas from 24th August 2022 to 28th August 2022. The total number of students, staff and teachers are 47.

Sl. No.	Name	Age	Sex	Father's/Guardian/Husband's Name	Permanent Address	Phone
I. LIST OF STUDENTS						
1.	Agamani Manna	19	Female	Ram Chandra Manna	Budge Budge, Shayampur, Chanditala, 24 Parganas (S) 700137, West Bengal	9836753077
2.	Anindita Das	20	Female	Mukul Das	Vill+P.O Mayapur, P.S Nodakhali, 24 Parganas (S) 743318, West Bengal	8240905617
3.	Anwesha Mondal	21	Female	Basudeb Mondal	Vill: Mayapur (Das & Chakraborty Para), P.O. Mayapor, P.S. Nedakhali, 24 Parganas (S) 743318, West Bengal	9874528479
4.	Arpita Kajali	19	Female	Shankar Kajali	Vill: Pujali, P. S.: Pujali, P. O.: Pujali, 24 Parganas (S) 700138, West Bengal	9903549937
5.	Barsha Naskar	20	Female	Prashanta Naskar	Rampur Shitalatala Main Road, 24 Parganas (S) 700141, West Bengal	8013954185
6.	Deboleena Malik	20	Female	Bidyut Kumar Malik	Parbhanga Near Nungi More (Beside Rajakshmi Apartment) Post Parbhanga Via Batanagar, 24 Parganas (S) 700140, West Bengal	9239321973
7.	Dehopriya Chakraborty	18	Female	Debanta Chakraborty	Vill P.O: Purba Nischintapur, P.S: Budge Budge, 24 Parganas (S) 700138, West Bengal	9748452055
8.	Diya Dey	19	Female	Pradip Dey	Pujali Rajib Ghat Road, Bana Para, Budge Budge, 24 Parganas (S) 700138, West Bengal	9933080525
9.	Gargi Dutta	19	Female	Santu Dutta	28/I A.M Ghosh Road, Budge Budge, 24 Parganas (S) 700137, West Bengal	9836999646
10.	Isika Das	19	Female	Gopal Das	Vill: Kalinagar, P.O.: Bawali, P.S.: Nodakhali, 24 Parganas (S) 700137, West Bengal	9674184833
11.	Keya Sardar	20	Female	Kalyan Sardar	Vill+P.O.: Buita, P.S.: Budge Budge, 24 Parganas (S) 700137, West Bengal	6291748851
12.	Koyal Bhownick	19	Female	Asit Bhownick	1 No Doulatpur, Mahatshay Tala, 24 Parganas (S) 700139, West Bengal	9836949270
13.	Mousumi Bag	18	Female	Ranajit Bag	Vill - Jagabullabpur, P.O: Mayapur, P.S: Budge Budge, 24 Parganas (S) 743318, West Bengal	9674608957
14.	Nashima Khutun	19	Female	Sk. Korban Ali	34 K.P. Mondal Road, Budge Budge, 24 Parganas (S) 700117, West Bengal	7890044187
15.	Nishat Saba	21	Female	Sk. Ahmmad Ali	32/IA R. L. Ghosh Road Budge Budge, 24 Parganas (S) 700137, West Bengal	9674609864
16.	Oindrila Das	20	Female	Dipankur Das	Vill: Bowali Boropole, Bawali, P.S.: Nodakhali, P. O: Bawali, 24 Parganas (S) 700137, West Bengal	9836233050
17.	Purna Mondal	19	Female	Suvra Mondal	Vill: Balrampur, P. O.: Maheshtala, P.S: Budge Budge, 24 Parganas (S) 700141, West Bengal	9903386299
18.	Poly Malick	19	Female	Krishna Malick	Vill: Sonapuri, P.O +P.S.: Nodakhali, 24 Parganas (S) 743318, West Bengal	9007917091

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Affiliated to the University of Calcutta

Ref. No.....

Date/6.08.2022.....

SL No.	Name	Age	Sex	Father's/Guardian/ Husband's Name	Permanent Address	Phone
40	Ritum Hazra	20	Male	Sukumar Hazra	Poali Patrapura, Poali Hazrapara, 24 Parganas (S) 743318, West Bengal.	9143874841
41	Sandeep Parui	19	Male	Sukhen Parui	Vill-P.O. Dhamisa P.S.: Panchla, Howrah 711322, West Bengal.	7044819174
42	Sudipto Naskar	19	Male	Alonk Naskar	Neogipara, Shibtala, Maheshtala(M), 24 Parganas (S) 700141, West Bengal.	9674949276
43	Sujan Sardar	19	Male	Gobinda Sardar	Vill: Dhancheheria, P.S.: Nodakhali, P.O.: Dongaria, 24 Parganas (S) 743318, West Bengal.	9051929594

II. LIST OF TEACHERS AND STAFF

Sl. No.	Name	Age	Sex	Father's/Guardian/ Husband's Name	Permanent Address	Phone
1	Swati Sachdev	41	F	Savita Sachdev	4RB, 43 Purbachal Phase 2, Sector 3, Block G.A. Salt Lake, Kolkata - 700097, West Bengal.	9831043744
2	Sajid Qamar	31	M	Rahina Khatoon	43/1 K.B.M Road Chapdani Po, Baidyabati, Pt. Bhadreswar, District Hoogly, Pin-712222, West Bengal.	8240009726
3	Sumana Das	29	F	Dulal Chandra Das	Hatpukur, Ramrajatala, P.O.: G.I.P. Colony, P.S.: Jagacha, Howrah, 711112, West Bengal.	9038787034
4	Sobrata Karmakar	49	M	Prithima Chakraborty	65 Dharmatala Road, Budge Budge, 24 Parganas (S), Pin-7000137, West Bengal.	9331971584

With regards,

(Dr. Debjani Datta)

Principal

DR. DEBJANI DATTA

Principal

Budge Budge College

BUDGE BUDGE COLLEGE
Department of Geography

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

B.A. / B.Sc. Geography Honours Semester-V: Research Methodology and Fieldwork (GEO-A-CC-5-11-P)

Topic of Fieldwork / Field Report (Academic Session: 2022-2023): ‘Development & Access to Infrastructural Facilities in Village Chorinda: Focus on Hydrology and Access to Water’ (24th August 2022 to 28th August 2022)

Objectives and Outcome

Objective

A socio-economic household survey was conducted by the semester 5 Geography honours students at village Chorinda, in Ghatshila to ascertain the developmental levels. Ghatshila is a developmental block in East Singhbhum district of Jharkhand. It comprises a population of 129905 and nearly 69 percent of its population is rural. It is located at an average elevation of 103 meters and on the outskirts of Chhota Nagpur plateau. This influences the climate, soil, density of forests, access to water resources, livelihood and developmental level of the people of the region. The main objectives of this fieldwork were:

- to study the relationship between physical and cultural factors and their impact on development levels in the region
- to examine the socio-economic characteristics and developmental levels of villagers at village Chorinda
- identify the problems related to infrastructural facilities mainly water related problems faced by the inhabitants of the village and ascertain its relationship to physical environment.

The research problem thus was to examine the above issues of development and accessibility and indicate suitable measures for enhancing access to infrastructural amenities and facilities in the region that might promote sustainable development of inhabitants of the region.

Outcome

A number of surveys were conducted by the students to analyze the developmental level and infrastructural aspects. Besides socio-economic rural household survey, a land use survey of the village coupled with analysis of the soil quality was undertaken to assess nature of agrarian economy and pattern of land use and standard of living. In addition, market survey, market morphology and nature of problems faced by inhabitants and perception regarding living conditions was also assessed.

Analysis revealed that there is a good correlation between the physical and cultural landscape in the region. The region being a plain region has an agrarian economy as the soil is conducive for agriculture. However, cultivation is restricted to rice and monocrop as there is scarcity of water. The village has both social and economic disparity as on one hand women workforce participation rates are much lower than men and on the other hand, still a significant share don't have access to basic safe drinking water and sanitation within their premises and also own a BPL card. Social infrastructure like health and education are only available at a basic level and people also report transport to be a serious problem as the main market is far and there is dearth of public transport services and they primarily rely on cycles. Besides the problem of access to water for irrigation, there is a problem of access to safe drinking water and physical and social infrastructure. Thus, while on one hand climate and soil i.e. the environment has resulted in moderate standard of living in the region with disparities being present; on the other hand, rampant deforestation for expansion of agricultural tracts and over utilization of groundwater and soil is also endangering the environment. Thus, the need of the hour is to focus on having a more balanced development by focusing on agricultural support services as well as other avenues of employment and at the same time conserve the environment to ensure sustainable development.

I. Department of Geography: Fieldwork

'Development & Access to Infrastructural Facilities in Village Chorinda: Focus on Hydrology and Access to Water' (Ghatsila, Jharkhand - 24th August 2022 to 28th August 2022)



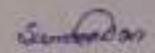


This is to certify that Roll No. 203561-11-0025 , an examinee of the B.A. / B.Sc. Semester V Honours Examination (CBCS), 2022 of the University of Calcutta has visited the field area of study **VILLAGE CHORINDA, GHATSHILA BLOCK** and its **Surrounding Areas** in the month of **AUGUST 2022**. She/ He has completed the field report within the assigned time, under the guidance of Dr. Swati Sachdev, Mr. Sajid Qamar and Ms. Sumana Das, who accompanied the Semester V Geography Honours students of Budge Budge College.

The field report partly completes Paper GEO-A-CC-5-11-P of the Three-Year-Six-Semester Geography Honours Course.


(Swati Sachdev)


(Sajid Qamar)

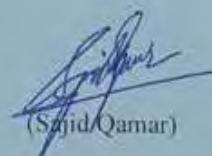

(Sumana Das)



This is to certify that Roll No. **202561 - 11-0086**, an examinee of the B.A. / B.Sc. Semester V Honours Examination (CBCS), 2022 of the University of Calcutta has visited the field area of study **VILLAGE CHORINDA, GHATSHILA BLOCK** and its **Surrounding Areas** in the month of **AUGUST 2022**. She/ He has completed the field report within the assigned time, under the guidance of Dr. Swati Sachdev, Mr. Sajid Qamar and Ms. Sumana Das, who accompanied the Semester V Geography Honours students of Budge Budge College.

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(Swati Sachdev)


(Sajid Qamar)


(Sumana Das)

UNIVERSITY OF CALCUTTA

B.Sc SEMESTER V GEOGRAPHY HONOURS PRACTICAL
EXAMINATION 2022

GEOGRAPHY PRACTICAL NOTEBOOK

STREAM: HONOURS

PAPER: GEO-A-CC-5-11-P - RESEARCH METHODOLOGY
AND FIELD WORK LAB

UNIVERSITY REG No: 5G1-1211-0335-20

UNIVERSITY ROLL NO: 2035G1-11-0025



This is to certify that Roll No. 203561-11-0025 , an examinee of the B.A. / B.Sc. Semester V Honours Examination (CBCS), 2022 of the University of Calcutta has visited the field area of study **VILLAGE CHORINDA, GHATSHILA BLOCK** and its **Surrounding Areas** in the month of **AUGUST 2022**. She/ He has completed the field report within the assigned time, under the guidance of Dr. Swati Sachdev, Mr. Sajid Qamar and Ms. Sumana Das, who accompanied the Semester V Geography Honours students of Budge Budge College.

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(Swati Sachdev)



(Sajid Qamar)



(Sumana Das)





**DEVELOPMENT & ACCESS TO INFRASTRUCTURAL
FACILITIES IN VILLAGE CHORINDA**
FOCUS ON HYDROLOGY AND ACCESS TO WATER



ACKNOWLEDGEMENT

I am grateful to the principal of our college DR. Debjani Datta for providing me the opportunity and support to undertake the field study and prepare the field report. I am also thankful to the college authorities for assisting in preparing the field report. I am thankful to Budge Budge College Geography Department H.O.D Swati Sachdev along with Sajid Qamah, Sumana Das, and staff member Subrata Karimakar for their guidance.

We are thankful for the cooperation of different offices and officials in Kolkata and Ghatshila and village Chorinda who helped us and provided us with relevant data and information e.g. main block office Ghatshila, Panchayat office Chorinda, Ayanman Bhawan health centre chorinda etc.

I am grateful to my fellow classmates for their help and assistance in field report preparation.

Date
31/1/23

Shraboni Majhi

PREFACE

Village Choninda is located in Ghatshila Block in East Singhbhum District in Jharkhand. It is located on the bank of the Subarnarekha River, and it is situated in a forested area and the average height of the region is 103 metres. The nearest railway station is at Ghatshila, at a distance of approximately 10 Kilometres. The panoramic location among rivers, forest, hilly rugged tracts and valley influences both the demographic profile and livelihood of the people of the region.

A field Survey was conducted by Geography Honours Students of Semester 5 in Village Choninda and adjacent areas to study the nature of relationship between physical and cultural factors and their influence on the developmental levels in the region. In addition focus was there on exploring the access to infrastructural facilities especially water. A number of surveys were conducted by the students to analyse the developmental level in general and the access to infrastructural facilities like water of the people in that region and assess the problems faced by them. The objective was to indicate suitable measures for enhancing access to infrastructural amenities and facilities in the region that might promote sustainable development of inhabitants of the region.

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Questionnaires

Title

Q1	Household Survey
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LOCATION OF STUDY AREA CHORINDA AND SURROUNDING PART

Date: 25/8/2022
Time: 5:00 - 5:00PM

Surveyed By: Sonerjan G Geography
Himanshu Bhattacharya

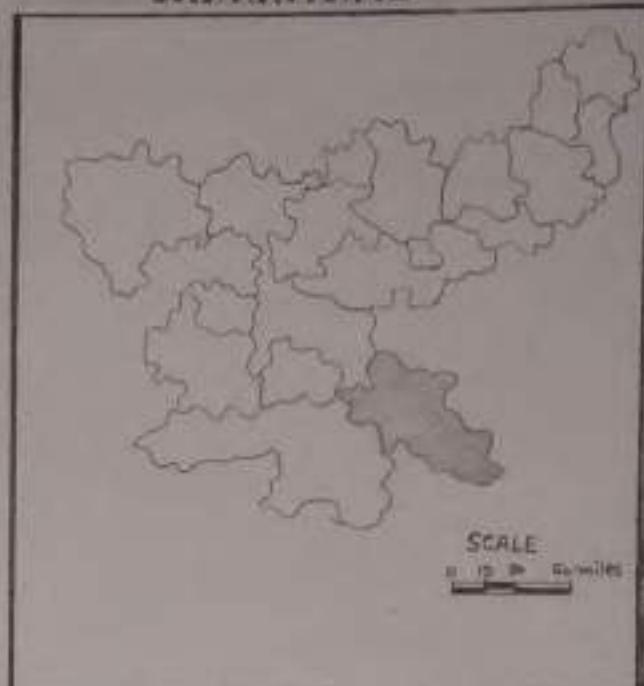
Place: Chotila

JHARKHAND

INDIA



SOURCE: NATMO



SOURCE: NATMO

PURBI SINGHBHUM



SCALE
Km 0 10 20

GHATSHILA C.D. BLOCK



SOURCE: Directorate of Census operations,
Census of India, 2011

Handwritten Signature
Biju Bhattacharya

INTRODUCTION

Ghatshila is a developmental block in East Singhbhum district of Jharkhand. It is located on the bank of the Subarnarekha River, and it is situated in a forested area and the average height of the region is 103 meters. The panoramic location among river, forest, rugged upland tract and valley influences both and developmental level of the people of the region and their access to infrastructural facilities.

Ghatshila Comprises of a population of 129905 and nearly 69 per cent of its population is rural. Hence, the study area village Chaninda was Selected in East Singhbhum District in Jharkhand at a distance of 10 km from the block headquarters at ghatshila. It is located at an average elevation of 103 metres and on the outskirts of Chhotanagpur plateau. This influences the climate, Soil density of forests, access to water resources, livelihood and developmental level of the people of the region.

As mentioned 69 percent of the population of the block is rural. Hence a village was Selected for the purpose of Conducting a Socio economic Survey. Accordingly, a rural Socio economic household Survey was Conducted by the Semester 5 Geography Honours Students at village Chaninda to ascertain the development levels and the problems in access to infrastructural facilities mainly water faced by the inhabitants of the village and ascertain its relationship to physical environment.

S. P. K. S.
S. P. K. S.

OBJECTIVE AND RESEARCH PROBLEM

The objective was to study the nature of relationship between physical and cultural factors and their influence on the development levels in the region. In addition, focus was then on exploring the access to infrastructural facilities especially water.

The research problem thus was to examine the above issues of development and accessibility and indicate suitable measures for enhancing access to infrastructural amenities and facilities in the region that might promote sustainable development of inhabitants of the region. A number of surveys were conducted by the students to analyse the developmental level in general and the access to infrastructural facilities like water of the people in the region and access the problems faced by them.

A landuse Survey of the village was also undertaken to access the assemblage of landuse. In addition, to get an approximate idea of the relative slope into the village a long profile was done along the Cart-track approaching of soil characteristics and availability of macro nutrients (NPK) was attempted for which soil sample was collected from areas of different land use in the region.

These were combined with a market Survey from where the population of the village fulfilled their needs. The Survey sought to examine the various goods sold at the market and their problems. A landuse Survey of the market (market morphology) was also undertaken to determine the diversity of goods sold and the grouping of shops.

Thus, fieldwork was conducted in the Choninda village on the above-mentioned aspects bearing in mind the agrarian economy of the region. An attempt was made to examine the linkages of the physiography and ecology with Socio-economic life and its impact of livelihood developmental levels and accessibility to infrastructure.

✓
Sohail
Sohail

LITERATURE REVIEW

East Singhbhum district is situated at the extreme Southeast of Jharkhand. It has an area of 3533 Sq. km and a population of 2293919 persons (Census of India) 2011). The district Comprises two Subdivisions (Dhalbhum and Ghatshila) and nine development blocks. The study area is located in the Ghatshila block of the district with an area of 349.12 Sq. km and population of 129905 persons.

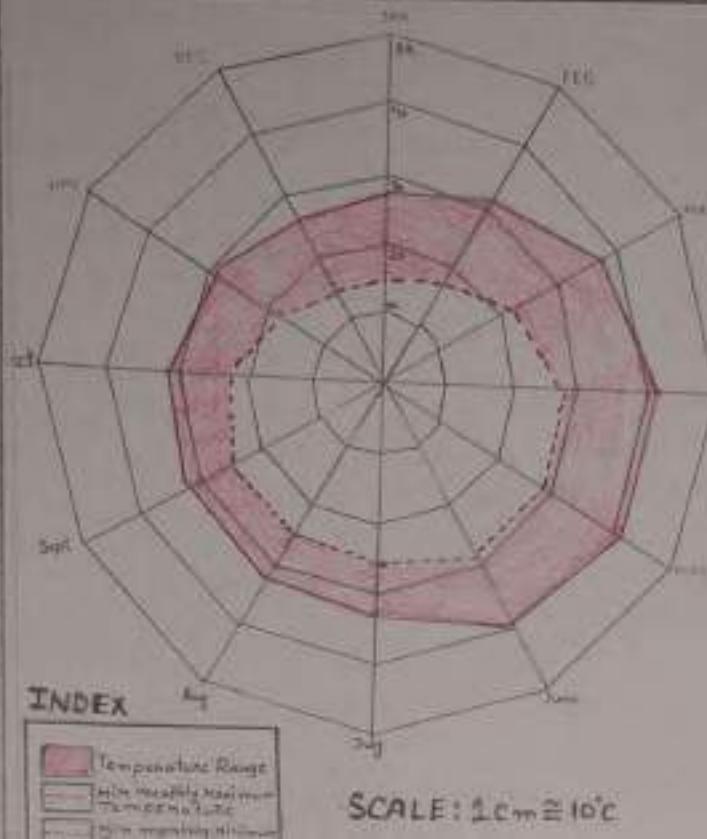
It is surrounded by forested hills, undulating ranges and valleys dotted with villages. It has great importance from industrial and mining standpoint. The rich Cultural heritage of the block steeped in history has also resulted in high potential for tourism. The physical and Cultural landscape and its location at the banks of Subarnarekha River influences the climate and mode of living of people of the area.

Geology

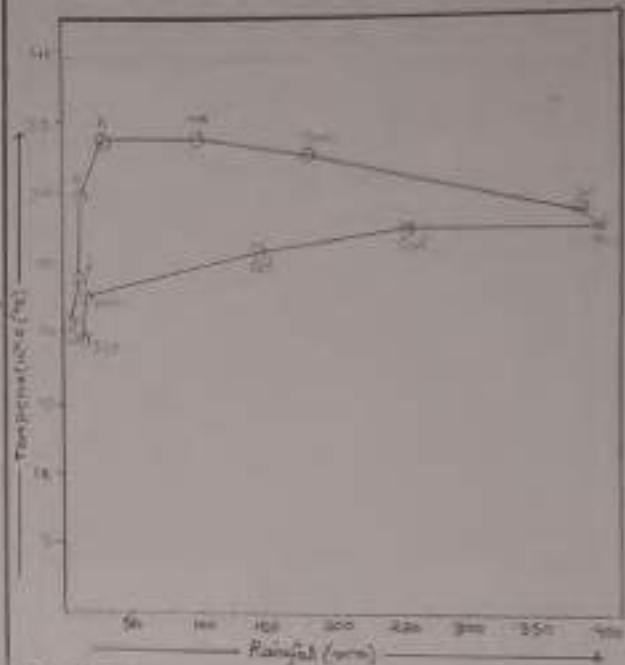
The district has large variation in slope and has remarkably unique geological history. From Behanagora in the South East up to East of Jamshedpur a major thrust zone is present which further extends into Saharikela & Khatwan district. This Shear Zone Spans two pre-Cambrian provinces of the Indian shield; an older province in the south which stabilized after the Iron Age orogenic cycle closed about 2000 million years ago and a younger province in the north that underwent the Singhbhum orogenic cycle closing at about 850 million years ago (Government of India 2013). The area is Comprised of granites, gneiss and Schist formations of igneous, Sedimentary, and metamorphic rocks of the Dharwarian period are found in places.

CLIMATIC SCENARIO AROUND GHATSILA 2021

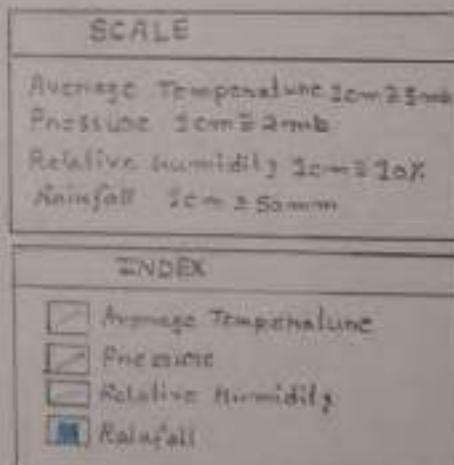
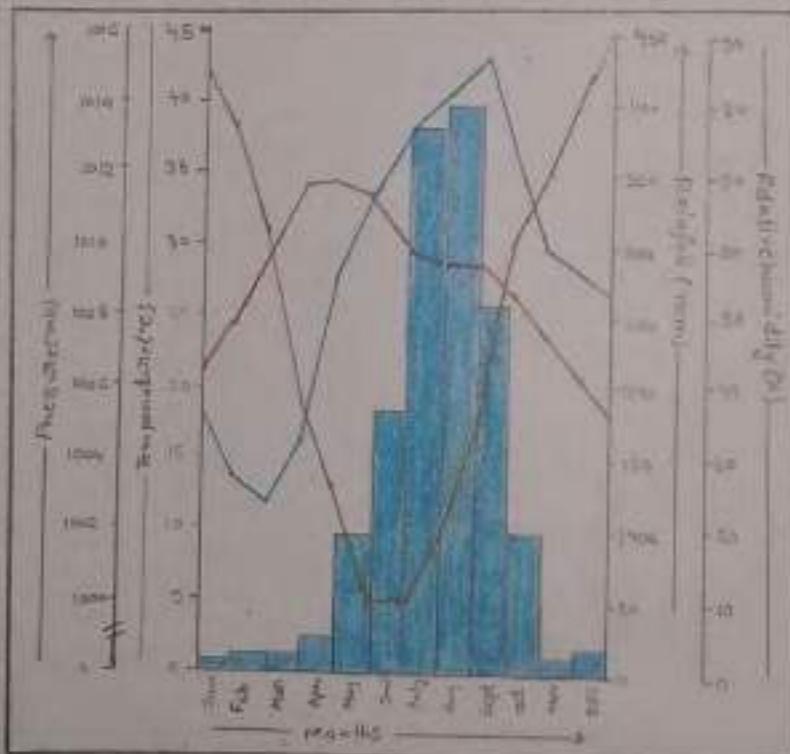
MAXIMUM MINIMUM TEMPERATURE



HYTHERGRAPH



CLIMATIC CHART SHOWING RELATIONSHIP BETWEEN WEATHER ELEMENTS



SOURCE: <https://www.worldweatheronline.com/ghatsila/weather/?w=1&h=1.aspx>

✓
5/5/2020
24/7/2020

Physiography



The district has varied landforms like high hill ranges, eroded valleys, and undulating land. The Dalma and Dhalbhum are the main hill ranges and are covered by dense forests. The lower area that lies between hill ranges is known as the Dhalbhum plain and is mainly created by river Subarnarekha

and its tributaries. About 53 per cent of the total area of the district is covered by residual mountains and hills. The belief is high in the Southern and north-western portions of the district. Generally, the height of the district is 213 m to 945 m above Sea level. East Singhbhum district has large variation in slope. The study area Ghatshila has a slope range of 80 to 150 m/km (Government of India 2013)

Climate

Ghatshila has three distinct seasons - Summer, monsoons and winter. Summers are topical and hot. Monsoons are very moderate and generally start from June and continue till September. The average annual rainfall of the area about 839 mm. winters are quite chilly with temperature 10 to 15 degrees Celsius during this period.

An analysis of the climate of the region through a Thermograph (for 2021) reveals that at Ghatshila the maximum temperature ranges from 30°C in May to 17°C in December. Minimum temperature ranges from 28°C in May to 13°C in December. The average annual temperatures in a year indicate that the summer months range from March-May. There is a sharp dip in temperatures indicating the onset of winter season post September. The air pressure is very high in December-January.

Rainfall however is variable and occurs from June to

HYDROGEOLOGICAL FEATURES

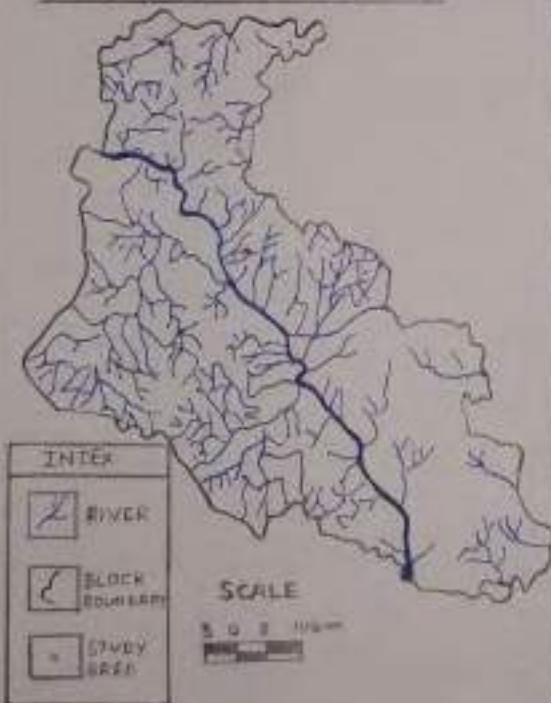
TOPOGRAPHICAL MAP



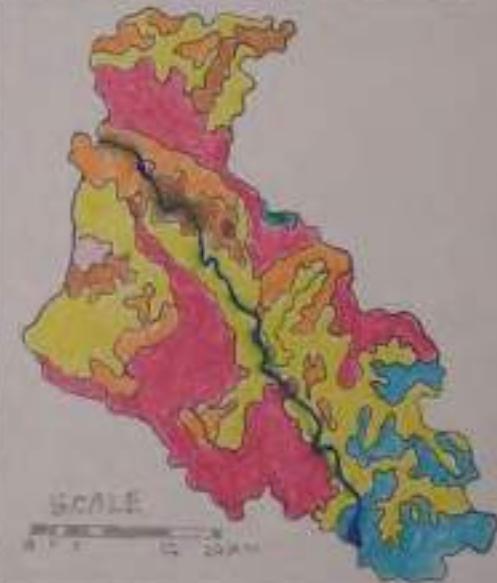
HYDROLOGICAL MAP



DRAINAGE MAP



GROUND WATER PROSPECT MAP



SOURCE:
GROUND
WATER
BOOKLET

September with a peak in August in 2021. Thus the monsoon season begins in June and extends well into September. The temperature rainfall graph reveals that the relative humidity also very high in these months. The region has very low relative humidity only in February and March else humidity is conspicuous.

Histogram reveals the moderately high temperatures and thus evaporation and high rainfall prevails. The Study region thus basically falls under hot humid climate with varying monthly rainfall.

Drainage



The major rivers in the district are Subarnarekha and Khankai. The Subarnarekha River flows from west to Southeast direction. All the tributaries of this area meet with the river. The drainage pattern is dendritic in nature. Drainage of plateau blocks do not meet in Subarnarekha.

River Khankai River meets the river at Sonani near Jamsedpur. Major tributaries which meet the river from west to east are Sapnaranadi, Gannanadi, Dukhnadi, Chaldekanadi (Government of India 2013).

Hydrogeology

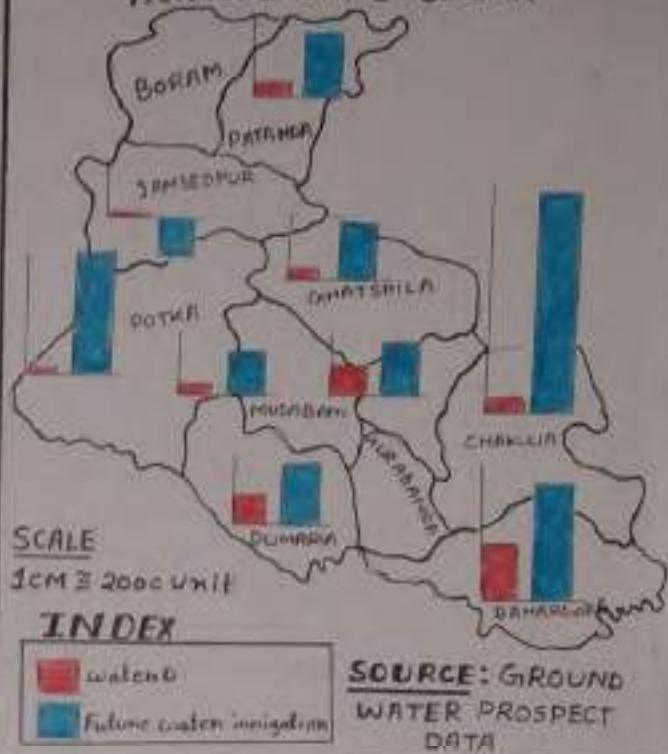
The groundwater occurrence and movement are controlled by the prevailing morphology and intensity of structural discontinuities over the area. Rainfall is the main source of ground water moves slowly and finds its way through the fractures and open joints. The area is underlain by unconsolidated to semi-consolidated sediments of the Tertiary age which are made up of coarse sand, gravel, fine to medium sand, and clay. In hard rock areas, groundwater occurs within the weathered mantle portion.

GROUND WATER QUALITY

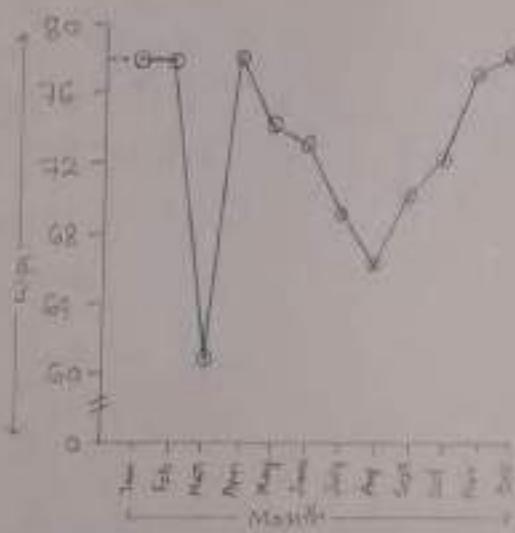
STAGES OF GROUND WATER DEVELOPMENT



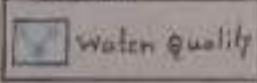
STAGES OF GROUND WATER AGRICULTURAL SECTOR



MONTHLY VARIATION OF WATER QUALITY



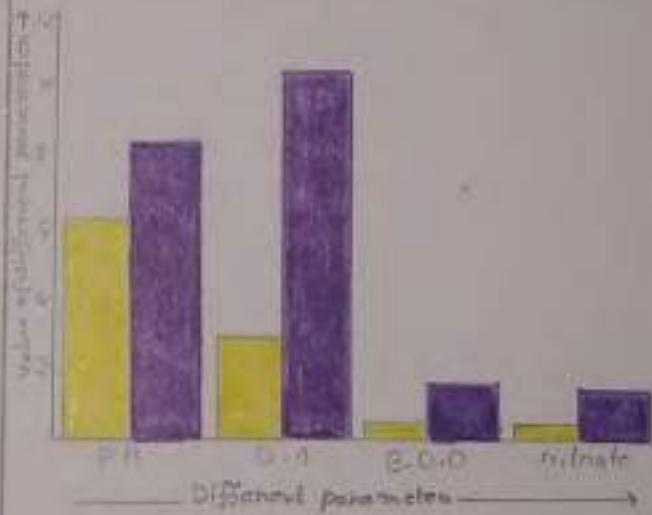
INDEX



SOURCE: MINISTRY OF WATER RESOURCE

Scale: 1 cm ≈ 50 km

WATER QUALITY PARAMETER



INDEX



SOURCE: CENTRAL POPULATION CONTROL BOARD

Scale: 1 cm ≈ 2 unit

weathered zone (1025 m thickness) and in the underlying fractures/joints. The groundwater occurs both under unconfined conditions and semi-confined to confined conditions. The unconfined condition exists in the weathered mantle portion of the rocks. The depth of weathered mantle varies from 1534 m in general (Government of India 2013).

The hydrological map represents the groundwater condition and depth of an aquifer in Ghatshila and its surrounding parts. The area is divided into six categories based on the nature of aquifer. Most of the part of this district lies in a less thick aquifer zone, Chonimda is also situated in this zone. The Southern and Southwestern parts of this district have moderately thick aquifers with high to medium porosity.

Ground Water

Central Groundwater Board has a network of observation wells and ground water management study and field data collected have examined the behaviour, quantity and quality of ground water level in the district periodically.

Groundwater Development and prospect:

Dug wells and shallow to medium depth (upto 50m) bore wells are the main groundwater extraction structures in the area to meet the increasing demand for domestic water supply. The overall groundwater development stage of the district is 20.74 per cent only. Thus, there is scope for further development of groundwater. The groundwater development varies in different places depending on the availability of favourable location (local and regional hydrological condition). Assessment of block wise groundwater resource indicated the following:

Gross groundwater draft (all uses)	5033 ha.m
Net annual groundwater availability (all uses)	27155 ha.m
Net annual groundwater availability (irrigation development)	13843.95 ha.m

Ghatshila the study area has 'Safe' level of groundwater exploitation and the stage of groundwater exploitation and the stage of ground water development in the block varies from 6.84 per cent to 131.39 per cent (1997). The block still has immense potential for developing and tapping groundwater for utilisation.

Many wells have been dug in East Singhbhum district under Rajiv Gandhi National Drinking water mission project. The depth range of the well varies from 10 to 80 meters. In most parts of this district, the depth of the well is 30 to 60 meters. The flow rates of water in different categories of well are 50 to 200 l/min. In Chorinda depth of groundwater is less than 30 meters with a flow rate of 10 to 50 l/min.

Water Quality parameters: water quality depends on different parameters i.e dissolved oxygen, pH, Biological Oxygen Demand (BOD) and nitrate. pH range of ground water in the region is 6 to 8, which represents natural water. The range of BOD and Nitrate is between 1 to 2. Range of Dissolved Oxygen is 3 to 10. Monthly variation of water quality Index or WQI of the region depicts the aggregate water quality scenario and reveals that the water quality is bad in the Month of March and is good for most of the rest of the months throughout the year.

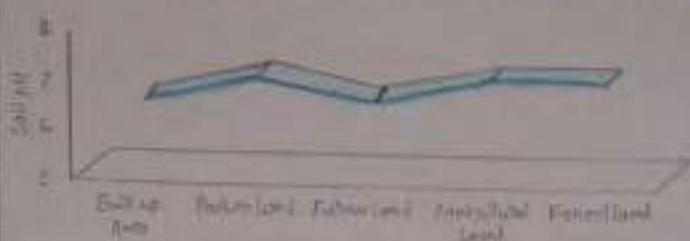
Ground Water Management Strategy: Thrust on development of ground water resources to meet increasing demand, implies focusing on water conservation and artificial recharge to augment the depleting ground water resources and to improve ground water quality by dilution. As nearly 58.33 per cent of Cent of the wells show declining trend for pre monsoon and the same share for post monsoon period and about 41.67 percent wells show declining trend for entire period, hence all the blocks required for artificial recharge through check dam, percolation tank, Nala bandhara, contour

SOIL CHARACTERISTICS AND ITS VARIATION ACROSS LANDUSE IN VILLAGE CHORINDA

Surveyed on: 26/2/22

Surveyed by: Sarmad & Chanchal Singh Haryana Student

VARIATION IN SOIL PH ACROSS DIFFERENT LANDUSE



Built up Area

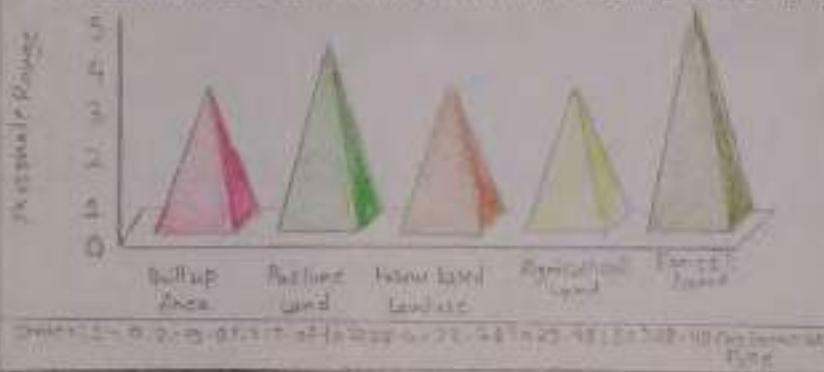


Fallow Land

VARIATION IN NUTRATE NITROGEN AND AMMONICAL NITROGEN ACROSS DIFFERENT LANDUSE



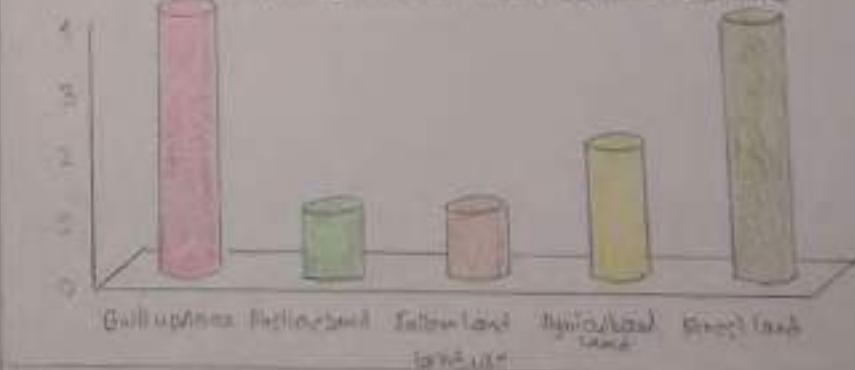
VARIATION IN SOIL PHOSPHATE AND ACROSS DIFFERENT LANDUSE



Agricultural land



Variation in Soil Potassium across different Landuse



Source Note: Based on Sample Collected in the village on 26/2/22 and tested in Laboratory Soil Test under following soil pH, 6.5, 6.8, 7.0 and 7.5.

✓ Verified
Sarmad

bunding and trembling.

Ground Water Related problems: The Study area experiences varied levels of ground water development. In the north eastern part of the area the ground water resources are over utilized whereas in western and Southern parts of Central region ground water resource is underutilized. Ground water related issues and problems have not been the focus of scientific research to the same extent as Surface water in the region. However, they need urgent attention e.g. Compulsory rainwater harvesting laws, Separate pricing policy for bulk consumers of ground water to mention a few so that the rural agricultural population may also have access to their share of groundwater for agricultural and domestic use.

Soil

The major Soil of the district are Alfisols (71 percent) which comprise of both mixed red and black Soil and red gravelly and Sandy Soils. These Soils have light to medium texture and are moderately acidic. Besides these the district also has Entisols and Inceptisols. There in all five Soil types in the district: red gravelly, red Sandy, red loamy, red and yellow and lateritic Soils (Government of Jharkhand undated).

In order to examine the Soil characteristics and its variation across landuse types in the study area of village Choninda, Soil Samples were collected from the five major landuse of the region - Cultivated area, fallow land, forested land, pasture land and built up area. The Soil Samples were dried in hot air oven and processed and analysed. Analysis reveals that the Soil in the region is slightly acidic and there is no variation in the pH of Soil in the region. The slight acidic nature of Soil is conducive to growth of several crops.

However, an examination was also made into the availability of micro nutrients for plant and agriculture growth namely NPK (Soil Testing kit 2018). The availability of nitrogen varies from high in built up area with 80 kg / acre of ammoniacal nitrogen to very low in other areas. However, nitrate nitrogen

is high in built up area, pasture land and forest area at 20 kg/acre. The share of ammoniacal and nitrate nitrogen in built up area may be due to presence of poultry and livestock. The high share of nitrogen in the pasture land may be attributed to similar causes. The high share of nitrate nitrogen in the forest area however may be due to the accumulate of humus. The other important nutrient phosphorous is also high in pasture and forest land with more than 22.68 kg/acre of phosphate in soluble form. This may be on account of presence of livestock excreta and humans. The other regions also have moderate amount of phosphorous. As regards potassium, it is very high in forest area probably due to the same reasons as phosphate. However, its high share in built-up area may be due to presence of poultry and its waste.

The agricultural land has low ammoniacal and nitrate nitrogen but low phosphorous and moderate potassium. The low nitrogen in the soil is probably due to overuse and in its current stage is not conducive for growth of cereal crops but requires application of nitrogen fertilizer/manure on crop rotation before continuing growth of cereal crops. The low soluble phosphate implies that cereal crops cannot be grown well. Excessive growing of crops in fields result in depletion of phosphorous which needs regular replenishment. The growth of rice crops over years have probably resulted in the low share of phosphate and there is a need to add phosphate fertilizer/manure regularly to improve productivity of cereal crops. The moderate potassium amount in the cultivated area is conducive to the growth of crops especially in these slightly acidic soils. In order to cultivate terms of agriculture, the soil in the region has adequate potassium, but it needs replenishment of nitrogen and phosphorous as it probably has been depleted through overuse. Crop rotation is also probably required in the region and growth of leguminous plants must be encouraged as well.

Flora



Due to varied landscapes, the forest cover is found in different proportions in different areas. plains associated with the Submontane Kharai basin record considerable deforestation but Dalmia and Okanjan highland areas are undeniably forest cover. Sal trees are dominant in this area. Other trees are Mango, Jamun, Jackfruit, Kanauj, Palas etc.

The region has witnessed deforestation due to need to expand agricultural land and most forests like in study area are hence open Mixed forests.

Population and Economy

East Singhbhum district Comprises of 2 sub-divisions Dhalbhum and Ghatshila. Ghatshila has 8 development blocks out of which in Ghatshila CD Block. The Total population of East Singhbhum district was 2293919 with a population density of 651 persons per Sq km and a rural population of 44 percent in 2011. Ghatshila block had a population density of 129305 and density of population of 372 persons per Sq km. and rural population of 69 percent (Government of Jharkhand updated). Hence a village Choninda adjacent to Ghatshila was undertaken for field work. The Total population of Village Choninda was 1035 over an area of 242 hectares. The forested area in the village is facing deforestation due to extension of agriculture and pasture land to accommodate the expanding population.

The level of literacy in the district was 60 per cent and in the block 62 per cent and in the village 75 per cent. As expected the male female discrepancy is significant at district, block and village level, though it is more conspicuous at village level.

The percent of workers in Ghatshila was 61 per cent and in Village choninda only 40 per cent. However, male and female discrepancies prevail, while male workforce participation rate is around 60 per cent ; for females

it is barely 20 percent in the village, the distribution across industry categories reveals that higher percent are employed in non-agricultural activities in the district and at cultivating in the village. This indicates the reliance of the villages on agriculture for their sustenance.

The infrastructure facilities of the region are not upto the mark. The physical infrastructure, namely transport and well development and there are two approach roads into the village from the main metalled road. The rest of the village has only cart tracks or pack tracks. Economic infrastructure facilities like bank are absent from the village and nearest bank is at a distance of approximately 5-10 kms from the village. Social infrastructure is only marginally better and the village has a primary and middle school; though the nearest Secondary and Senior Secondary School is only at Chakdih and Ghatshila respectively. Health infrastructure too is dismal and the village don't have any PHC or Sub Centre as per Census 2011.

Despite of relying on agriculture, the village has only well, hand pumps, tube wells and one lone tap to supply water. There are no canals for irrigation though local tanks or ponds are present and there are the limited sources of irrigation.

Thus, the above discussion and review of literature provides an insight into the Ghatshila region of Panch Singhbhum district, the focus of field work. Based on this a Snowball Sample Survey was undertaken of households in village Chakdih to assess the developmental level and access to infrastructural facilities mainly under resources as agriculture is the mainstay of their livelihood even in contemporary times.

July 2013

METHODOLOGY

The Students of Semester 5 Geography Honours of the College Conducted their field work in Ghatshila block in East Singhbhum district Jharkhand. The Survey analysed the developmental and Socio-economic levels of living of people of the area and focused on examining the hydrology and access to water of people in the Study area. The entire field work can be Categorised into - pre-field work, work during Field Trip and post field work.

Pre - field Work

After deciding to go to Ghatshila, the initial task was to Collect information pertaining to various geographical aspects of the area, for which purpose, a number of books, government documents and website were consulted on the history, geology, hydrology, population, economy, etc of the region. In addition, Census data pertaining of various villages in ghatshila block were examined to Select the village for the purpose of Survey. Finally, after deciding on the village Choninda, the location map was prepared using the Census District Primary Census Abstract and Village and Town Directory and Census Atlas 2011. Several online articles and websites were referred to analyse the physiography, drainage, geohydrology and climate of the region with data obtained from the RMC Alipore, kolkata. In addition, more detailed data regarding the population, occupational Structure and village profile was Collected on the Selected block and village.

During Field Work

In Course of the field work, Stress was laid on collecting primary data by conducting a number of Surveys. A household Survey was Conducted in the village Choninda to obtain a picture of the Socio-economic developmental Scenario (demographic, literacy, occupation

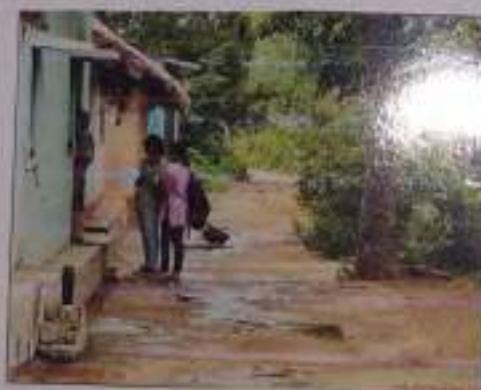
Standard of living) and access to amenities like water of population in the region.

A Land use Survey was also conducted in the region to ascertain the amalgam of landuse. Examination of Soil of the Study area was also conducted in the village as it is the main source of livelihood. A detailed assessment of hydrology of the region, the various water sources, quality, access and problems of water resources in the region were examined.

A longitudinal profile Survey Coupled with changing landuse along the approach road to the village which connects it to Ghatshila was undertaken to ascertain the variations in micro-relief.

A market Survey was also conducted to determine the type of goods sold, characteristics of shops and shopkeepers and problems. A landuse Survey of the market morphology was also undertaken to find out the prominence of various types of shops.

In addition a hotel Survey was also conducted around Ghatshila to examine the nexus of tourist economy of the region with the agrarian economy.



Besides, Secondary data and maps were obtained from the Land records office, block office and PHC, regarding the various programs undertaken for the development of the region.

Post Field Work

After returning from the field based on the primary and secondary data and maps, the field report was prepared. In order to obtain a proper visualization of the data obtained from field work, several maps, Cartograms, graphs etc were prepared. The various techniques used for this purpose and to analyse the field data are discussed as follows.

The map depicting the location was prepared using Census Administrative Atlas. Articles and research papers were used for studying the Geography of the region.

The climatic data was prepared by plotting histograms for rainfall and line graphs for temperature, pressure and relative humidity. Similarly the variation of maximum and minimum temperature was depicted using Star/sector diagrams. The overall climate of the region was examined using hythengraph.

Soil testing kit was used to analyse the soil. Samples collected from the field. The objective was to assess the varying nature of soil physical and chemical characteristics under different land use types and to assess the suitability of crops of different soil in the region.

The landuse map was prepared after conducting a primary survey and with the help of locals. The data provided by the land and land reforms office assisted the process. A long profile was prepared from the data collected by observing heights through dumpy level and bearings through prismatic compass in the field.

Using the primary data that was collected through household Survey in village Chorinda, an analysis of the demographic and developmental scenario and access to infrastructural amenities and facilities was undertaken and represented

through age Sex pyramids and different chart and graphs like bar graphs, pie graphs and star diagrams.

In addition, both Secondary and primary data sources and research articles were referred to in order to analyse the nature of hydrogeology, drainage and water quality of the region. The problem of access to water was also examined using primary data. Maps and graphs have been prepared from selected data regarding these dimensions.

Data obtained through market Survey was used to represent type of goods sold, nature and characteristics of shops and shop keepers and their problems through bar graph, pie graphs, etc. Using pacing method landuse of market areas was assessed and represented through a landuse map/market morphology map.

Thus, various Statistical and Cartographic methods were used to diagrammatically represent the primary and secondary data obtained through the field work surveyed aspect of the region, which have enhanced the visualisation and assisted in drawing conclusions regarding the correlation between physical and cultural attributes of the region and the development scenario in general and access to water resources in particular.

J. S. M.
S. P. M.

RESULTS AND DISCUSSIONS

The main purpose of the field trip was to examine the development level of the people of the Study area and to assess their access to infrastructure mainly water resources. In order to understand these and the correlation between physical and cultural factors, a number of primary surveys were conducted. In addition, analysis was undertaken from data obtained from various Secondary Sources. On the basis of the analysis of primary and Secondary data, the following result emerged.

Landuse

The landuse of any region is dependent both on the physical and cultural attributes of a place. The region is part of the Southern fringe of the Chhotanagpur plateau and is a rugged upland tract near river Subarnarekha. The landuse needs to be carefully managed in such area to maintain the quality of environment.

Village Chorinda which was the focus of the fieldwork is essentially an agrarian economy nestled in the midst of forested upland tract. This village was selected for Survey purposes as the objective was to examine the access to infrastructure especially water in an agrarian economy and examine their developmental level.

The village has an area of 242 hectares. Out of this 36 percent is net sown area. The land use map reveals that there is limited diversity of land use in the region. The prominent land use in the village is agricultural land use, fallow land and forested area. Mainly paddy cultivation is carried out, especially towards the Southern, central and north eastern part of the region from south to north. The paddy fields are interspersed by settlements especially along roads or water bodies on edges of fields. Open mixed forests also are present adjoining the road in the west and in the north and South west extremities as well as in the patches within the village. Cattle pasture land is evident in patches scattered

LANDUSE MAP OF CHORINDA VILLAGE



near the fallow land in the South east, South west and a small tract in the centre of the village.

The village is bounded on the east by a 'Nala' of Subarnarekha River and in the west by a metalled road. Three prominent unmetalled roads (Cart tracks) branch off into the village and another pack track is visible towards the centre traversing from north west to south east of the village. There are some small water bodies scattered throughout the village. Yet because of the absence of canals the irrigated area is minimal only 1.21 hectares. There is an almost continuous belt of uncultivable wasteland bordering the 'Nala' in the west as it is not clean water and is sandy.

There is a presence of a temple at the entrance to the village towards the left of the approach road. The primary school is also present near the main approach road to the village, slightly offshoot to the east sheltered by open mixed forests.

Thus, the region depicts a typically dispersed settlement pattern on account of the forested upland terrain wherein the forests have been cut down and transformed into cultivated tracts. Thus it is clear from the Mauza and landuse map that most of the region is under agricultural land use - cultivation of rice being the mainstay of most people. In addition, the settlement of the region is influenced by the physical feature of the region as there is prominence of fallow land and forests.

Thus, developmental planning must take into account (i) the high share of agriculture in the village and provide for more irrigation facilities and building of more canals, etc. (ii) managing the common property resources like the waste and fallow land wherein there is livestock grazing.

Land use monitoring and management is needed to enable best utilisation of available land and reduce harmful environmental effects and increase access to irrigation facilities in the village.

✓
S. S. Patel

FILED BOOK: DUNPY LEVEL SURVEY - LONG PROFILE



FIELD BOOK: DUMPY LEVEL SURVEY - LONG PROFILE

Technical Note

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LONGITUDINAL PROFILE ALONG Approach Road to village

A long profile Survey and prismatic Survey was undertaken along the Card track/unmetalled road approaching the village in order to assess the nature of profile and curvature of the path and examine the changing land use along the path.

The ground slope decreases from the main road as one moves inwards towards the village. This clearly indicates that most of the cultivated and residential area have developed in the relatively lower and less steep the existence of undulating upland terrain very distinctly. The average elevation of the region is 100-30 metres.

There is changing pattern of landuse along the approach road to the village. There is a presence of a temple at the entrance to the village towards the left of the approach road. Either side of the approach road is bordered mainly by fallow land and forested tract. The gentle slope into the village encourages growth of pasture land over the common property resources and upspring of settlements.

Thus, the longitudinal profile reveals that the approach road into the village is downward sloping and that lower relatively level land promotes livelihood options and growth of settlements.

HOUSEHOLD SURVEY

DEMOGRAPHIC AND SOCIAL CHARACTERISTICS

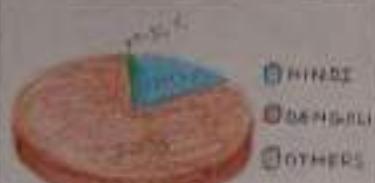
Place: Chawinda

Time : 10:00 AM - 12:00 PM

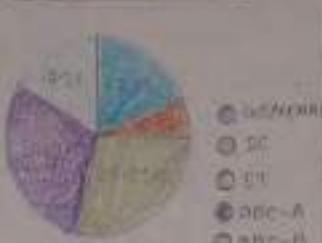
Submitted on: 25/8/2022

Surveyed by: Semester 5 Geography
Honours Student

LINGUISTIC COMPOSITION



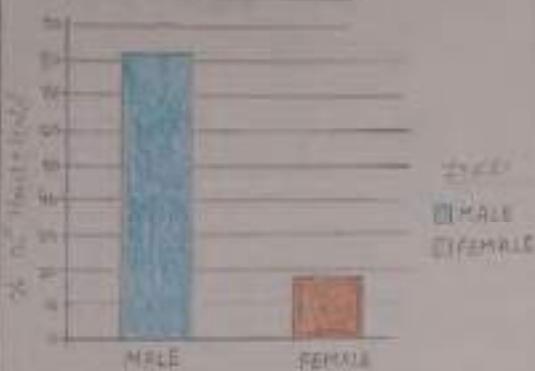
SOCIAL GROUP



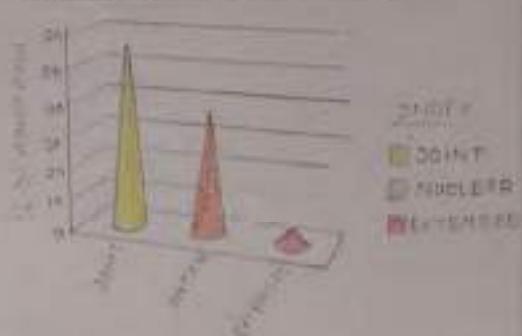
RELIGIOUS COMPOSITION



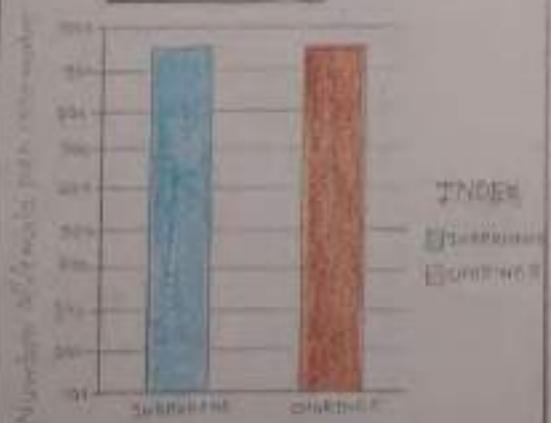
HEAD OF FAMILY



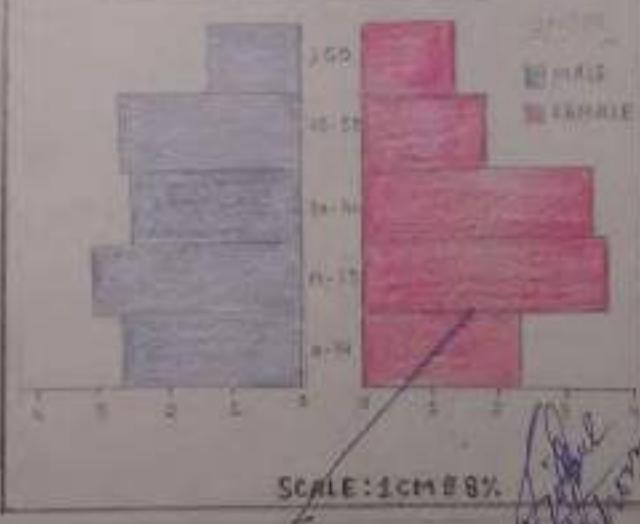
NATURE OF FAMILY



SEX RATIO



AGE SEX PYRAMID



SOURCE: Primary Survey

HOUSEHOLD SURVEY OF CHORINDA VILLAGE IN GHATSHILA: DEMOGRAPHIC AND Socio-ECONOMIC SURVEY

Introduction

A field Survey - household - demographic and Socio- economic Survey was conducted by the 5th Semester Geography (Hons) Students of the College at chorinda village in Ghatshila Subdivision of purbi Singhbhum district in Jharkhand, in Aug 2022, to analyze the level of development of people.

Demographic and Social Composition of population

Religion, Social Group and Language: A Social Composition of the population .

147 household Surveyed reveal that Hindu (90.55%) comprise of the majority of the population , other share is 3.4%.

However, the Share of SC,ST,OBC and General population depict predominance of OBC-A 30.61%, ST (21.89 %) and OBC-B 10.32%. This is because Jharkhand is home to a large number of tribal population . General population also comprises of a large share of the population i.e 18.30% indicating diversity in the Social profile of the population . Most the people have Bengali as their mother tongue. thus the Social Composition of the region is on one hand diverse Comprising of people of various Social groups but with a predominance on reflection of Bengali ancestry of people of the region. Thus in terms of Social Composition there is heterogeneity within homogeneity

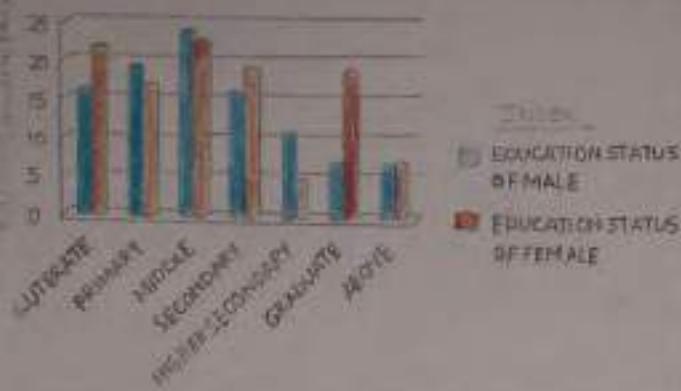
In spite of the high Share of STs in the population only 17.62% of households are female headed households, which Shows predominance of patriarchal Society prevalent in the Study area . There is a tendency towards Joint family nearly 50.40% of the households are Joint Household . A large Share of households are of Nuclear family (32.09%), whereas extended Family constitute 5.44%.

HOUSEHOLD SURVEY EDUCATION AND ECONOMIC CHARACTERISTICS

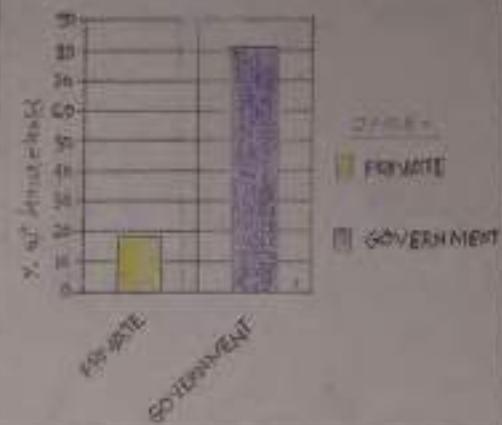
Place: Chorinda
Time: 10: A.M - 12:00 P.M

Surveyed on: 25/8/2022
Surveyed by: Semester 5 Geography
MEMORANDUM Student

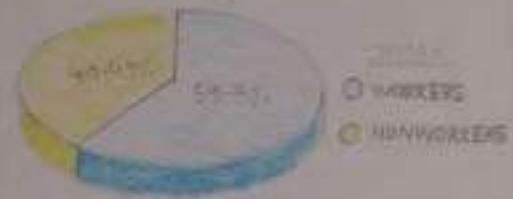
EDUCATIONAL STATUS OF POPULATION



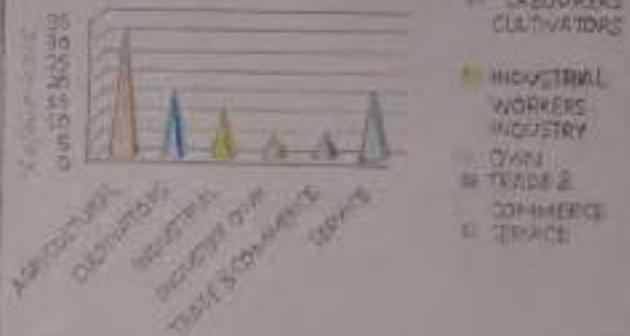
CHILDREN GOING TO SCHOOL



EMPLOYMENT STATUS MALE



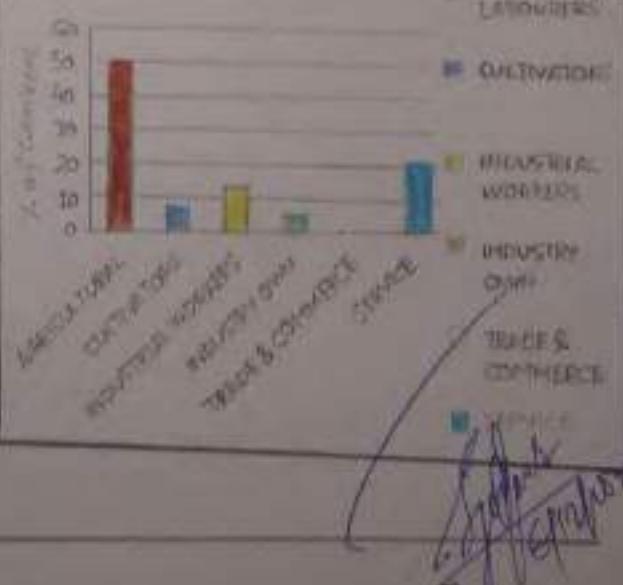
OCCUPATIONAL STRUCTURE MALE



EMPLOYMENT STATUS FEMALE



OCCUPATIONAL STRUCTURE FEMALE



Demography

The demographic profile of the people is examined through the Age Sex pyramid household type. The age-sex pyramid reveals a tapering apex and a broaden middle section and a moderate yet narrow base; hinting toward a gradually controlled population structure as the children have a slightly lower share as compared to Middle Section. However the very low share of old age persons both among men and women are probably indicative of low life expectancy and poor access to health infrastructure or higher morbidity.

The Sex Ratio of Chhinda is 953 female per 1000 males which is more than the Sex Ratio of Jharkhand i.e. 948. It is more than an indicator of gender equality though this may indicate male out migration for employment purpose as employment prospects in the region are limited.

Education

About 80% children go to Government Schools. Due to low level of earnings majority of household are unable to send their child to a private educational institution. More than 75% of male and females are literate in the study area. The level of literacy is nearly same for both men and women, indicating that there is general equality in Society. Thus the educational attainment levels in the region are moderate with share of female population having graduation degree is greater than their male counterpart, indicating lack of gender discrimination and higher status of women in the Society. In the Higher education education Male population is left behind their female counterpart due to which the job opportunities are limited.

Economy

Workers and occupation among men and women are strikingly different there is a marked discrepancy in the

Share of workers between men and women while 59.5% of men are workers, only about 19.84% of women are workers thus women rarely go out to work as they are expected to do household chores.

The Occupational pattern reveals that the share of men and women both are highest in Agriculture Sector followed by Service and allied activities for both men and women although the concentration of women in Service Sector is marginally higher than men, in trade the women participation is negligible. This indicates the reliance of the region on agriculture. Industry is not an important source of employment only 14.53% of male and 13.88% women are employed as industrial laborers.

This reflects the gender bias that does prevail even in this society as women are confined more to agriculture. There is higher share of men in trade and as industrial laborers. Thus the occupational structure indicates the dominance of Agriculture and Service Sector.

House Type

The Standard of living of most of the people is up to the mark. Thus majority of households (99.3%) own their houses, which reflect the relatively better scenario of the household in spite of a substantial segment owning a BPL card.

In addition majority of household have floors made of cemented sand (37.41%), Earth (34.08%) and Rammed earth (14.29%). Majority of Roofs are made of tiles (49.05%) yet substantial portion of households have roof of asbestos (12.73%), concrete (15.04%) or tin (7.43%). Most of the household have wall made of mud and poles (39.03%), Burnt established brick (25.17%) and cement blocks (20.4%).

The village mostly depends on wood as major source

ECONOMY AND INFRASTRUCTURE



OTHER OCCUPATION



LIVESTOCK FARMING



AGRICULTURE



SCHOOL

HEALTH CENTRE

PACK TRACK

HOUSEHOLD SURVEY

HOUSING AND FACILITIES

Place: Chaitinda

Time: 10:00 AM - 12:00 PM

Surveyed Date: 20/1/2014
Surveyed By: Surveyor & Data Entry
Reviewed By: Reviewer & Data Entry

NATURE OF FLOOR OF HOUSE



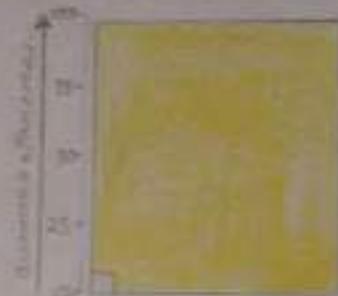
MATERIAL USED IN CONSTRUCTION ROOF



MATERIAL USED FOR CONSTRUCTION OF WALL

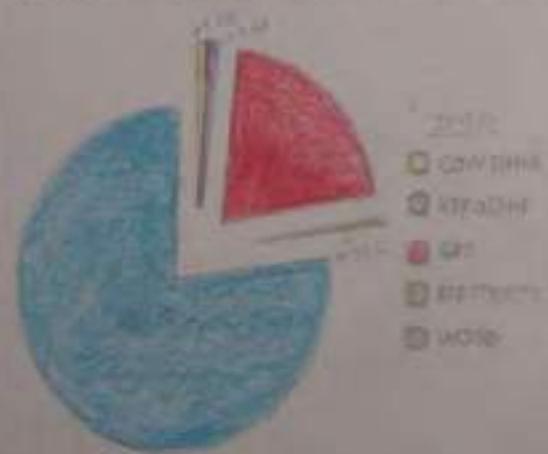


OWNERSHIP OF HOUSES

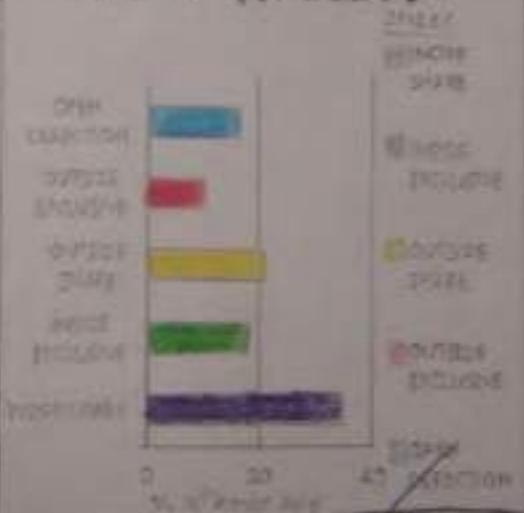


Total 30 Hous

TYPES OF FUEL USED BY HOUSEHOLD



TOILET FACILITY



SOURCE: Primary Survey

*Surveyed
Reviewed
Approved*

of fuel for cooking, nearly 76.87% of the household was using wood as means of cooking and around 21.08% uses Gas as a source of fuel, which can create serious health issues among women and pollute the environment.

Facilities

The access to facilities is well up to the mark as regards to public facilities like electricity and drinking water.

All the residents have electricity and majority of household use tap as the source of drinking or drinking water.

In terms of toilet 84% of households have access to toilet and only 16% of house practice open defecation. 18% have their inside exclusive toilets within their premises which they do not need to share with other household but a considerable share still do not have their own toilets. 35% have inside share, 21% have outside share while outside exclusive constitute only 10%.

Amenities

Access and ownership of amenities is an indication of the standard of living, the survey reveals that majority of households have at least electricity and one set of basic furniture like bed, chair and tables even with respect to electronic gadgets like TV or mobile. Only 40.13% have TV and 79.91% of household have access to mobiles but only 15.64% have fridge and only 5.44% household possess a computer. It is interesting to note the penetration of mobiles into the lives of these household today. Around 70% of household have cycle as the means of commutation otherwise, access to two wheeler is around 42.18%. Electricity is the main source of lighting in the majority of households, while a minute proportion of household uses Biogas, kerosene and solar energy.

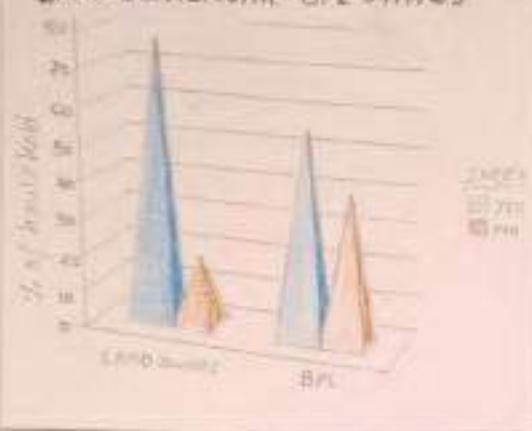
HOUSEHOLD SURVEY AMINITIES AND PERCEPTION

Place: Chawinda
Time: 10:00 AM - 12:00 NOON

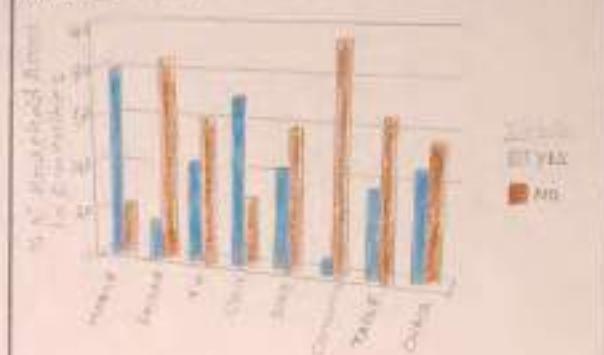
Surveyed on: 25/01/2022
Surveyed by: Somdev & Geography
Human Subject

ACCESS TO AMINITIES

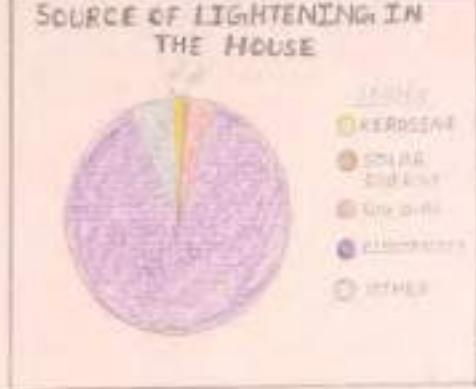
LAND OWNERSHIP & PL STATUS



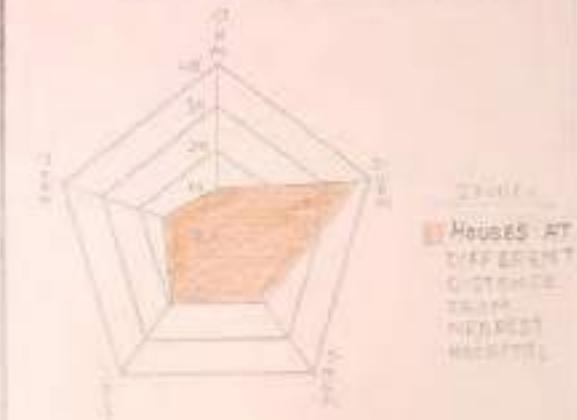
ACCESS TO AMINITIES TO HOUSEHOLD



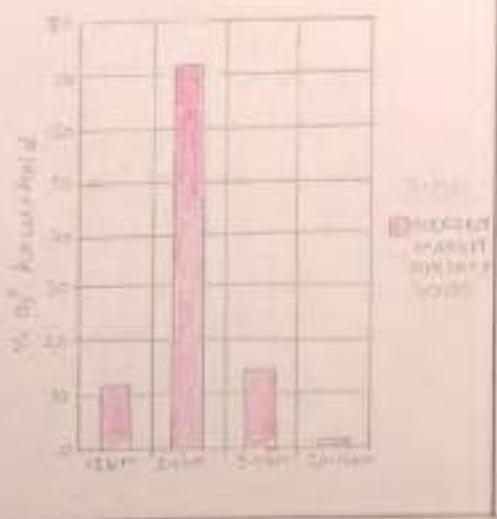
SOURCE OF LIGHTENING IN THE HOUSE



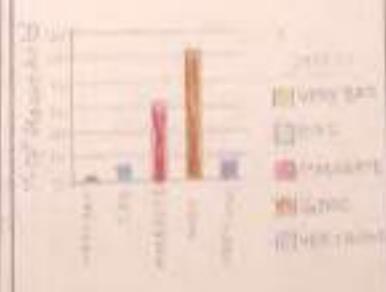
HOUSES AT DIFFERENT DISTANCE FROM NEAREST HOSPITAL



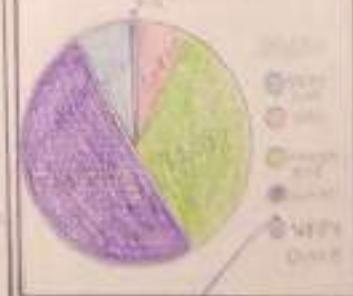
NEAREST MARKET FOR DAILY GOODS



PERCEPTION ABOUT LIVELIHOOD CONDITION



PERCEPTION ABOUT TRANSPORT INFRASTRUCTURE



SOURCE: primary Survey

*Suraj
Somdev
Sharma*

Majority of the household have basic amenities like bed chair and own house and access to electricity and even advance electronic gadgets however a significant population lack access to own vehicles although the house structure of half of the houses are stable yet some of them have mud floors and has need to be the focus of developmental programmes such as PM Awas Yojana (Gramin), in terms of access to facilities although access to safe drinking water is not so much a concern but there is a dearth of adequate sanitation facility.

It is evident that the standard of living of majority of households is far from satisfactory level as nearly 58.5% of the household have BPL Card, the share of such people is being so high it indicates lack of percolation of the benefits of economic development to the people of surrounding areas however the redeeming factor is that more than 79.55% of household have their own land and hence have a better livelihood prospects as a large segment of population not directly linked with industries and depends upon agriculture.

Around 36% of households have a hospital within a distance of 1-4 kilometers, while majority of household have to cover more than 5 kilometers to reach the nearest hospital. In times of emergency health situation it might become a matter of great concern.

Market

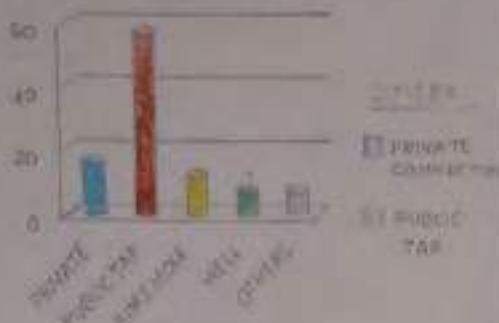
- Majority of household have access to nearest market within a distance of 4 kilometers. Local markets enable small farmers and their families to increase their income by enabling them to sell their produce more effectively, thereby reducing their dependence

HOUSEHOLD SURVEY PROBLEM RELATED TO WATER

Place: Chhindwara.
Time: 10:00 AM - 12:00 PM

Surveyed On: 25/2/2022
Surveyed by: Semester 5 Geography
Honours Student!

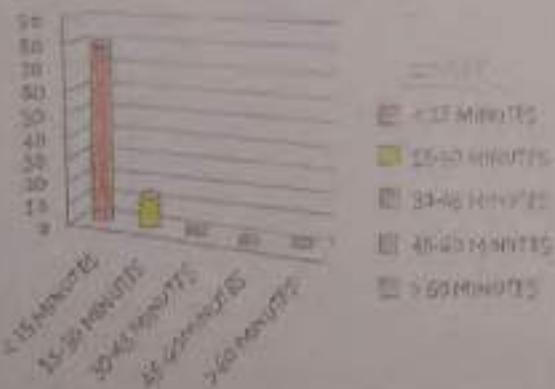
DRINKING WATER



TIME TAKEN TO REACH THE WATER SOURCES

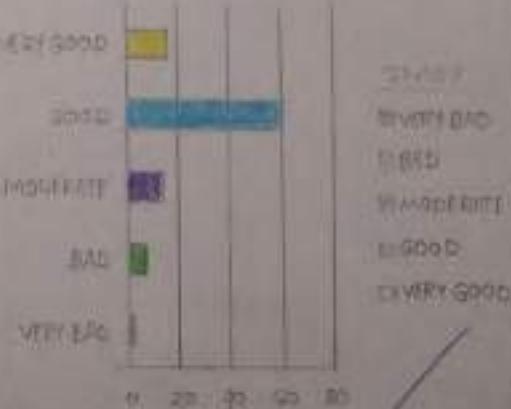


TIME TAKEN IN QUEUE TO FETCH WATER



SOURCE: Primary Survey

PERCEPTION ABOUT QUALITY OF DRINKING WATER



*Chhindwara
District
Bihar
India*

on Social Transfers and Subsidies. Local markets generate local markets generate local jobs and the potential for new employment opportunities. Market Mobilises professionally local residents encouraging them to opportunities. Market Mobilises professionally local residents, encouraging them to undertake innovative economic and Social initiatives locally in the field of production, processing and distribution of locally produced food.

Perception: The living Condition of the Study area is quite Satisfactory more than 80% of the population rated the living Condition between moderate to good. perception about the transport infrastructure is quite Satisfactory, majority of population are happy with the available transport facilities.

Problem related to water

Only 16.32% of the household in the region have private Connection of drinking water while 57.82% households are dependent upon public tap. The other Source of drinking water includes bore hole (12.24%) well (c.8%) and others (c.8%).

Majority of Household don't have access to personal Connection of drinking water due to which they are forced to Stand in queue for at least 15-20 minutes. As most of the public drinking water sources are situated at some distance from their home, So it takes them around 15 minutes to bring it to their home. On a day to day basis it is a very tedious Job to do so it become one of the primary matter of concern which needs to be addressed on an urgent basis.

Majority of household have perception about quality of drinking water ranging between moderate to good.

ACCESS TO WATER



Planning the Future

The basic needs of the household needs to be tackled at first, there is a need to create awareness about Various government Schemes for the rural areas like Pradhan Mantri Gramin Awaz Yojana, Pradhan Mantri Gramin Sadak Yojana

There is need to work more for improving Sanitation in the locality : health and education must be given adequate focus. Dooh Step water Connection is one of the most important concern. The developmental works must happen without hampering the environment.

MARKET SURVEY

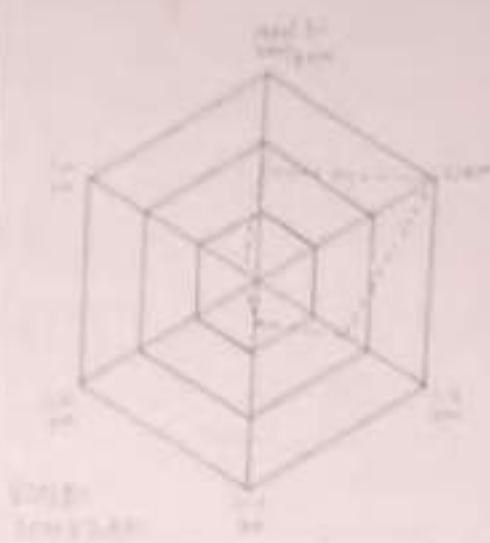
Place : Chauraha
Time : 10 AM - 12 PM

Conducted on : 26/01/2018
Surveyed by : SPG Team - OGDCA Survey.

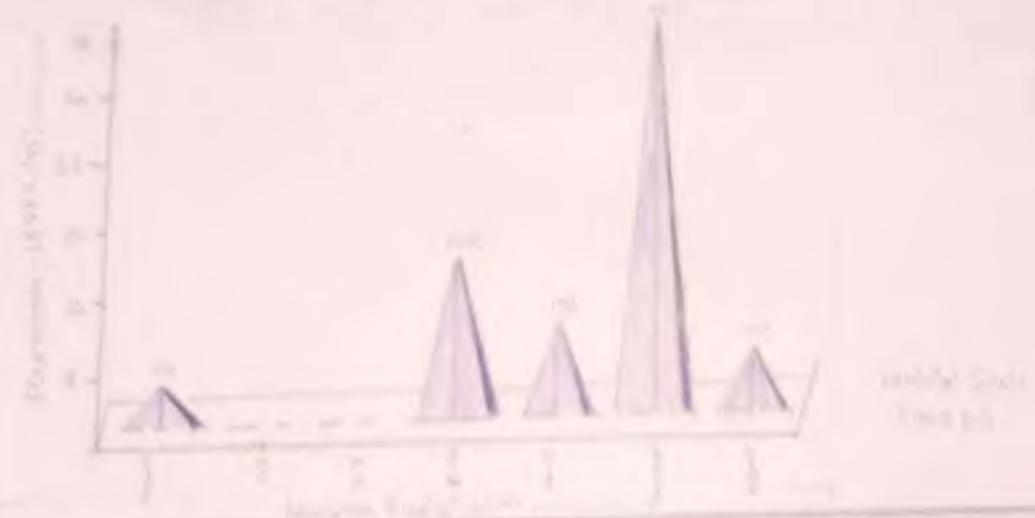
DENSITY OF SHOP



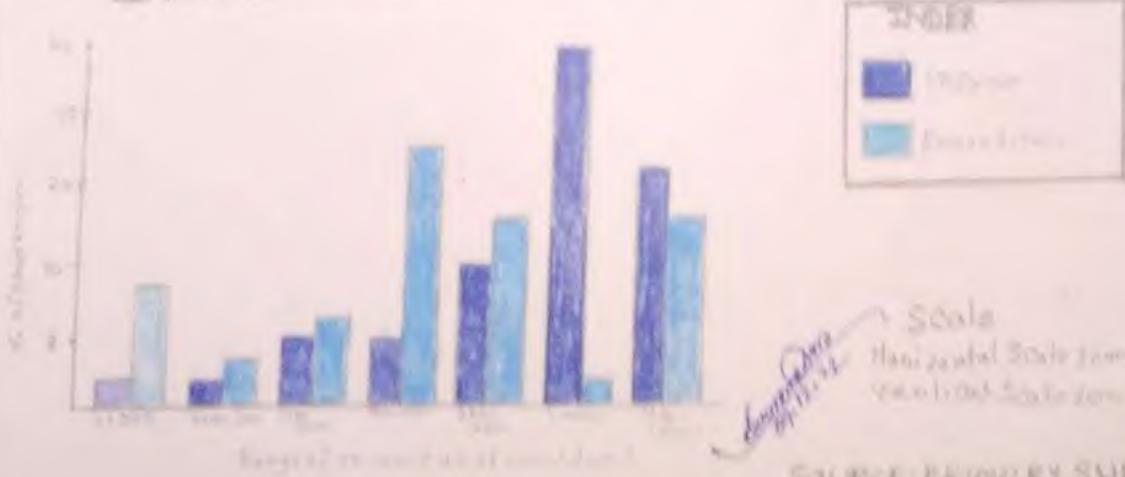
DISTANCE OF SHOP FROM HOME



EDUCATION LEVEL OF SHOPKEEPER



INCOME AND EXPENDITURE OF SHOPKEEPER



SOURCE: PRIMARY SURVEY

Market Survey

A Survey was conducted at Ghatshila market, which is the prime source area for articles of daily use for the villagers in Surrounding villages. The objectives of this Survey were to analyze the various types of goods Sold, Source area of different goods, education level, income and expenditure level of Shopkeepers, and their problems. Most of the Outcomes of this market.

Profile of Shops-

In this market, there is a diversity of product Sold. Among the various types of goods, Some categories were vegetables, fruits, grocery, garments, watch, shoes, medicine, ladies Cosmetics, mobile and electronic gadget, etc. Among the Shop, about 25 to 30% are Clothes Shops, and another 2 to 3% each are grocery, medicine, tiles and marbles, electronics and cosmetics. About 10 to 15% are food shops, including fruit and vegetable shops.

The Second diagram Shows the distance between the shop and the house of the Shopkeepers. Around 20% of the Shops are adjacent to the house (within 1 km). Almost 10 to 12% of shops are located near the door of Shopkeepers. Less than 2% of shops are located between 3-4km distance from the house of Shopkeepers.

Profile of Shopkeepers-

Almost 90 percent of Shopkeepers are male whereas only 5-10 Percent are female.

There is a variation among the Shopkeepers based on their educational qualifications. Around 40 percent of Shopkeepers are graduates, nearly 5 percent are higher educated, and very few are illiterate (less than 5%). Thus the educational level of Shopkeepers is diverse, which means people from all kind of backgrounds Come here to Sell their goods.

An analysis of the income level of Shopkeepers indicates the variation in the income of Shopkeepers. Around 30 to 40% of

Shopkeepers have an income between 10 to 20,000 rupees per month. Another 30 percent of shopkeepers have an income of more than 20,000 rupees per month. Most of the shopkeepers' income ranges are between 7 and 10,000 per month. There is also variation in the case of expenditure of shopkeepers have expenditures of nearly 10,000 per month. Shopkeepers with low income face loss as their expenditures are higher than income.



Different Problems-

Most of the shopkeepers have reported the main problems are waterlogging in the locality, power cut problems, and poor infrastructure.



*Sumantra
14-11-2014*

MARKET MORPHOLOGY GHATSHILA STATION ROAD

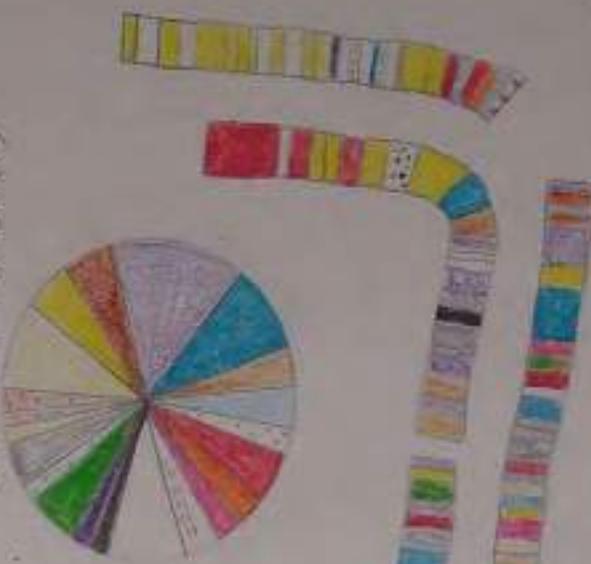
Place : Ghatsila

Time : 11:00 - 12:00 AM



Surveyed on : 26/07/20
Surveyed by : Srinivas Geography Research Student

PIE DIAGRAM
DIVERSITY OF SHOP TYPE (%)



Scale : 1 cm = 5 metres

North

South

Land Use Along Market (Market Morphology) - Ghatshila Station Road

A land use Survey was undertaken of the main market in front of the Station, where residents of all neighbouring village come for marketing and where the local village Commuters shop as they go to and from work. The Survey was undertaken on both sides of the road by pacing method to assess the pattern of distribution of various shop within a market and the diversity of goods available in the market.

Land use of this market reveals that there is a clustering of similar goods being sold in adjacent to each other e.g grocery shops, eataries, medical Shop, clothes Shop. In addition, the segment of road nearest to the Station are primarily Eataries of different kinds from biscuit Shop, Snake Shop to tea Shop and restaurants.

This is because these spots are most lucrative as Commuter need these feel that Scale is very poor in the innermost Sections as most customers don't reach so far because of other shops near the entrance selling the same produce.

Among the shops the most prominent are those pertaining to clothes/garments, eataries and groceries fruits and vegetables and mobile and recharge shop - i.e. goods of daily necessities. In addition, there are several shop pertaining to shoes, bags, medical and diagnostic Centres. There is a great diversity of shops in the market as the commuters from neighbouring towns and villages often purchase the goods for their various needs to and from their workplace to residence. This indicates that the changing lifestyle reflected in the diversity of shops in the Market.

There is an aggregation of the same type of shop adjacent to each other, probably in order to attract maximum customers and to cater to different portions of the market. The Land use reflects that there is clustering of same type of shops and there is diversity of shops selling different goods.

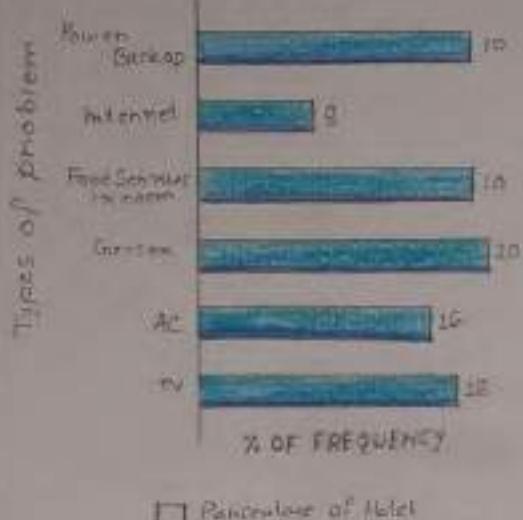
HOTEL SURVEY

DATE : 25.08.2022

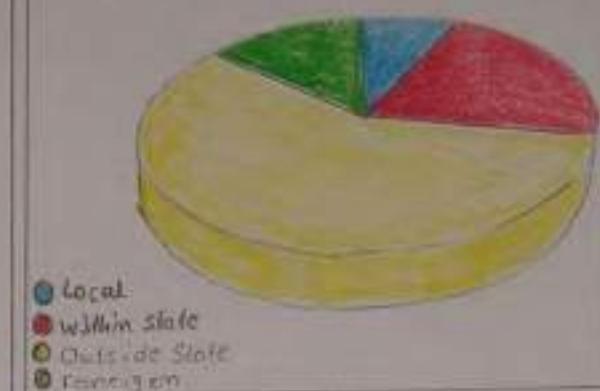
TIME : 5:00 - 5:00PM

SURVEYED BY - Semester 5
Geography Hons
Students
PLACE - GHATSHILA

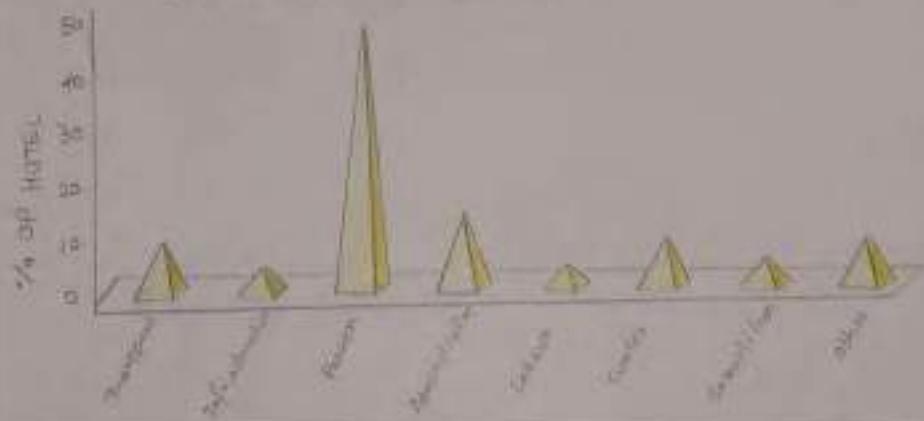
FACILITIES AVAILABLE



DETAILS OF TOURIST



PROBLEMS OF HOTEL



LEVEL OF INCOME



Source: Primary Survey

[Signature]
1/8/22

Hotel Survey

Ghatshila is a well known tourist spot in Jharkhand. Surrounded by the lush greenery of thick forests, Ghatshila is one of Jharkhand's most beautiful places. This site is relatively popular among tourists from eastern India people from West Bengal, Bihar and Jharkhand adore the spot and often visit Ghatshila during the weekends. The town's climate and scenic views attract many people.

One of the most famous Bengali authors Bibhutibhushan Bandopadhyay was from Ghatshila. He was the author of the coveted novel "Pather panchali". Bengali's often visit Ghatshila to see the author's residence. This city is located in the East Singhbhum district of the state and is situated by the gorgeous Suwanekha River bank. Throughout the town you will see many waterfalls and creeks. As hills surround the city, the scenic view is quite breathtakingly beautiful.

The prominent destination for tourists is Phuldungri Hill, Bankini Kali temple, Burudih dam, Dhanagiri Waterfalls, and Ralmohana.

Various resorts and hotels are present all around the region. A survey was conducted of the hotels to assess their characteristics and the linkage of the tourism economy with the surrounding villages.

The survey indicates that most of the hotel owners are well educated and reside adjacent to their hotel.

Most of the tourists (near about 60%) are from outside of the state, mainly they come from West Bengal, Orissa and Bihar. Around 20% of tourist come from within the state and only 10% come from outside of the country.

These tourists have access to a different facility. These hotels have adequate facilities of AC, geyser, room service for food, TV and generator. Among different hotels, only less than 30 percent hotels provide internet facilities, where most of the hotels have power backup facilities, food service in the room, geysers, and TV most of the hotels are small having up to 10 rooms nearly 70 percent of the hotels have double bed-rooms, only 30 percent of hotels having a single room.

There is a large variation among the hotel owners based on income level. Most of the hotels have a medium range of income of 50,000 to 75,000 rupees per month.

Most of the hotel owners reported that they have faced many problems i.e. transport problems, lack of infrastructure power cut problems, competition, and administrative problems

About 50 percent of hotels reported that they suffered due to power cut problems and 30 percent of hotel owners said that due to lack of infrastructure they faced many problems.

✓
Date: 23/11/17



CONCLUSION

The village has majority of Hindus. Main Social group of the area consist of OBC and ST. Most of the people live in Joint household. Majority of population are literate, in higher education the share of women is greater than men, indicating lack of gender discrimination and higher status of women in the Society. majority of the population is engaged in agriculture. Male workers are more in share than female workers and occupational structure among men and women are strikingly different there is a marked discrepancy in the share of workers between men and women, women are mostly engaged in agricultural Sector. women rarely go out work as they are expected to do household chores.

Majority of household possess own house and land at the same time large number of household possesses a BPL card which means the living condition is not so satisfactory. Majority of house have roof made of Tiles, wall made of Mud and poles and Burnt established Brick and floors made of Cemented Sand. Majority of household have cycle as the means of communication whereas, Access to two wheeler is also available to a substantial share of population. Electricity is the main source of lightening in the majority of household while a minute proportion of the household uses Biogas, kerosene and Solar energy.

Access to basic facilities furniture and modern means of communication like mobiles is present

with most of the household yet some household still
resort to wood for cooking and use tap water
as the source of drinking water. The share of house
with toilet facility and use tap water as the source
of drinking water and health infrastructure is a
serious concern for considerable segment of
household of the village as they have to commute
to access these facilities. This needs to be solved
in order to raise the standard of living of the
people and reduce inequality, although the Gram
Panchayat has taken steps to meet these problems
yet a lot needs to be done to address their problems
and improve their living condition.

APPENDIX

CLIMATIC SCENARIO AROUND GHATSILA, 2021

Month	Mean Monthly Temperature (°C)		Average Temperature	Rainfall (mm)	Pressure (mb)	Humidity (%)
	Maximum	Minimum				
January	27	15	21	5.6	1015.4	37
February	31	18	24.5	12.4	1013.5	29
March	37	23	30	11.6	1010.3	24
April	41	27	34	25.7	1006.0	32
May	41	28	34.5	33.5	1003.3	55
June	35	28	33.5	178.2	1000.4	67
July	33	26	29.5	378.4	1000.4	76
August	32	25	28.5	354.2	1002.1	81
September	32	25	28.5	256	1005.3	86
October	31	22	26.5	144.6	1010.1	78
November	29	18	23.5	12.5	1013.5	55
December	26	15	20.5	14.3	1016.1	56

Source: <https://www.worldweatheronline.com/ghatsila-weather/monsoon-and-seasons.aspx>

*✓ 2021
MAY 2021*

Table No: Variation in Soil pH in Village Chorinda across different landuse

Sample No	Latitude	Longitude	Landuse	Date	Time	pH
Sample No 1	22.07357°N	86.49302°E	Built up Area	25/08/2022	10:00 am	6.5
Sample No 2	22.07357°N	86.49302°E	Rainfed Land	25/08/2022	10:10 am	7.0
Sample No 3	22.07357°N	86.49302°E	Fallow Land	25/08/2022	10:20 am	6.5
Sample No 4	22.07357°N	86.49302°E	Agricultural Land	25/08/2022	10:30 am	7.0
Sample No 5	22.07357°N	86.49302°E	Forest Land	25/08/2022	10:50 am	7.0

Table No: Variation in Soil phosphate and Potassium in village chorinda across different landuse

Sample No	Latitude	Longitude	Landuse	Date	Time	Phosphate ppm	Potassium ppm	Soil texture	Water
Sample No 1	22.07357°N	86.49302°E	Built up Area	25/08/2022	10:00 am	20-50 Medium	3.07 to 2.08	Very High	Very High
Sample No 2	22.07357°N	86.49302°E	Rainfed Land	25/08/2022	10:10 am	50-100 High	2.88 to 2.40	Medium	Low
Sample No 3	22.07357°N	86.49302°E	Fallow Land	25/08/2022	10:20 am	20-50 Medium	9.07 to 2.02	Below 100 Moderate (soil) & 45-50 Moderate (water)	Low
Sample No 4	22.07357°N	86.49302°E	Agricultural Land	25/08/2022	10:30 am	20-50 Medium	9.07 to 2.02	150 to 250 Moderate (soil) & 45-50 Moderate (water)	Medium
Sample No 5	22.07357°N	86.49302°E	Forest Land	25/08/2022	10:50 am	>100 Very High	Above 20-40	Above 350000000 (soil) & 158000000 (water)	Very High

Table No: Variation in Nitrate, Ammonium and Nitrogen in village chorinda across different landuse

Sample No	Latitude	Longitude	Landuse	Date	Time	Nitrate ppm	Ammonium ppm	Nitrogen ppm	Kjeldahl N ppm
Sample No 1	22.07357°N	86.49302°E	Built up Area	25/08/2022	10:00 am	45 High	20.4	180	71.4
Sample No 2	22.07357°N	86.49302°E	Rainfed Land	25/08/2022	10:10 am	45 High	20.41	13	5.0
Sample No 3	22.07357°N	86.49302°E	Fallow Land	25/08/2022	10:20 am	10 Medium	3.16	13	5.0
Sample No 4	22.07357°N	86.49302°E	Agricultural Land	25/08/2022	10:30 am	10 Medium	3.10	13	5.15
Sample No 5	22.07357°N	86.49302°E	Forest Land	25/08/2022	10:50 am	45 High	20.41	13	5.30

Source Note: Based on Sample Collected in the village on 25/08/22 and Tested in Laboratory setting in
Ridge Ridge Colaka on 26th and 22nd December, 2022.

✓ ✓ ✓ ✓ ✓

FIELD BOOK: DUMPY LEVEL SURVEY - LONG PROFILE

Instrument Number:

Dumpy level: DL₉

Prismatic compass: PC₁

Surveyed by 5th Semester GEOA Students

Place: Approach Road to Chawandia village
 Date: 25/8/22
 Start time: 12:05 PM
 End time: 12:55 PM

Line	Magnetic Bearing	Stations	Distance	Reduced Distance	Staff Reading (m)	Collimation Level (m)	Reduced Level (m)	Remarks
		G ₁	0	0		101.455	100.30	Get 81.00 100.30 (L)
		G ₁ ₁	3	1		1.290	100.250	
		G ₁ ₂	6	2		1.410	100.425	
		G ₁ ₃	9	3		1.455	100.440	
		G ₁ ₄	12	4		1.545	100.350	
		G ₁ ₅	15	5		1.580	100.315	
G ₁ - G ₁ ₆	157°	G ₁ ₆	18	6		1.620	100.875	
		G ₁ ₇	21	7		1.705	100.750	
		G ₁ ₈	24	8		1.780	99.710	
		G ₁ ₉	27	9		1.855	99.540	
		G ₁ ₁₀	30	10	1.735	1.980	99.515	Check point
		G ₁ ₁₁	33	11	1.860	101.310	99.420	
		G ₁ ₁₂	36	12	1.950		99.340	
G ₁ ₁₀ - G ₁ ₁₅	147° 30'	G ₁ ₁₃	39	13	2.010		99.300	
		G ₁ ₁₄	42	14	2.070		99.240	
		G ₁ ₁₅	45	15	2.120		99.150	
		G ₁ ₁₆	48	16	2.160		99.150	
		G ₁ ₁₇	51	17	2.155		99.115	
		G ₁ ₁₈	54	18	2.035		99.075	
		G ₁ ₁₉	57	19	2.070		99.040	
G ₁ ₁₅ - C	142°	C	60	20	2.310		99.000	

Arithmetical Checking : BS - FS = RL of last point - RL of first point

$$(1.155 + 1.735) - (1.980 + 2.310) = (99.000 - 100.300)$$

$$2.990 - 4.290 = -1.3000$$

$$-1.3000 = -1.3000 \text{ (Proved)}$$

Household Survey Demographic and Social Characteristics

Linguistic Composition (%)			Social Group (%)			Religious Composition			Household Size			Age Sex Pyramid (%)		
Hindi	Bengali	Others	OBC	SC	ST	Muslim	Others	Christian	Total	Male	Female	Total	Male	Female
15.14	82.55	1.31	18.36	2.8	21.85	15.32	36.53	35.14	82.91	17.08	5.6	3.8	5.7	2.6

Household Survey Educational and Economic Characteristics

Educational Status of population (%)			Children going to School (%)			Employment Status (%)			Occupational Structure (%)			Employment Status (%)		
Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
M	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35	45.35
F	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93	34.93

Household Survey Housing and Facilities

Nature of roof of house (%)			Material used in construction of roof (%)			Characteristics of roof (%)			Domestic water supply (%)			Types of fuel used by household (%)			Toilet facility (%)		
Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Totals	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28
14.28	34.49	0.41	2.64	2.47	2.77	3.12	3.04	3.24	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12

[Signature]

Household Survey Activities and perception

Household Survey Activity	Access to Formal Utilities to Households (%)			Source of Lighting In The House (%)			Living Condition (%)			Perception About Living Condition (y)			Perception About Type of Household			Non-formal market for Daily Goods (%)		
	No.	Yes	26.2%	26.2%	2	2	5	5	5	5	5	5	5	5	5	5	5	5
40.65	54.56	35.51	15.04	40.03	26.42	17.54	36.46	47.76	1.32	0.04	0.02	1.32	5.04	31.9	59.02	0.98	3.74	0.56

Houses at Different Distance from nearest Hospital (Y)

<1km	1-4km	5-9km	10-14km	≥15km
10.26	30.73	24.48	19.04	13.60

Household Survey Problem Related water

Drinking Water	Time Taken to Fetch The Water Sources			Time taken in fetch water			Response about drinking water			Response about drinking water			
	Private (%)	Public place (%)	Others (%)	<15 minutes (%)	15-30 minutes (%)	>30 minutes (%)	<15 minutes (%)	15-30 minutes (%)	>30 minutes (%)	<15 minutes (%)	15-30 minutes (%)	>30 minutes (%)	
10.32	57.82	12.24	0.94	74.4	12.32	5.44	1.32	80.2	14.96	0.84	6.08	1.32	0.32

Signature

Market Survey

Table - Density of Shop

Types of Shop	Grocery	Clothes	Mosaic and Tiles	Cosmetics	Food	Mobile	Watch	Shoes	Medicine	Gift
Percentage	6	20	7	7	15	7	8	9	10	11

Source - Primary Survey

Table - Distance of shop from House

Distance	Next to Door	<1km	1to2km	2to3km	3to4km	>4km
% of Shops	28	30	17	9	8	8

Source - Primary Survey

Table - Educational level of Shop keepers

Educational Level	Illiterate	Primary	Upper primary	Secondary	Higher Secondary	Graduate	Higher Level
% of Shop keepers	8			27	12	45	8

Source - Primary Survey

Table - Income Level of Shopkeepers

Income Level	<2000	2000-2500	2500-5000	5000-7000	7000-10,000	10-20,000	>20,000
% of Shops	5	5	10	10	16	30	24

Source: Primary Survey

Table - Expenditure Level of Shopkeepers

Expenditure Level	<2000	2000-2500	2500-5000	5000-7000	7000-10,000	10-20,000	>20,000
% of Shops	15	5	10	32	24	6	8

Date: 01/01/2023

Table: Market Morphology Analysis along the Ghatshila Station Road (Right Pavement), On 26th August 2022 (11.00 a.m to 12.00 Noon)

Start pace	End pace	End pace according to Scale	Shop type
0	16	0.25	
16	29	0.45	Grocery closed shop
29	45	0.70	Grocery
45	53	0.83	Jewellery
53	59	0.92	closed shop
59	88	1.32	Residence
88	102	1.50	Automobile Accessories
102	121	1.89	closed shop
121	133	2.08	Closed Shop
133	146	2.29	Garments
146	164	2.57	Grocery
164	177	2.77	Textiles
177	194	3.04	Unmetalled Road
194	210	3.23	Beauty parlor
210	229	3.55	Electronic Goods
229	240	3.76	Garment
240	247	3.87	Restaurant
247	261	4.03	Medical
261	271	4.24	Graphic Designing
271	282	4.42	Cyber Cafe
282	293	4.53	Cyber Cafe
293	301	4.71	Vegetables
301	312	4.85	paint
312	319	5.06	Mobile Recharge
319	330	5.17	Stationary
330	347	5.43	ATM
347	360	5.64	Doctor's chamber
360	365	5.72	Shoes
365	380	5.85	Fruits
380	403	6.31	Vegetables
403	415	6.50	Shoes
415	429	6.72	Fruits
429	448	7.02	Closed Shop
448	465	7.28	Metalled Road
465	470	7.36	Bank

Start page	End page	End page According to Scale	Shop Type
470	480	7.52	Shoes
480	497	7.63	Fruits
497	511	8.00	Vegetables
511	525	8.22	Shoes
525	535	8.38	Fruits
535	554	8.68	Closed Shop
554	585	9.22	Metallic Road
585	638	9.95	Bank
638	651	10.20	Cement
651	665	10.41	Construction Related
665	675	10.57	Residence
675	704	11.03	Tiles
704	733	11.48	Sarees
733	742	11.71	Residence
742	773	12.11	Closed Shop
773	787	12.33	Garments
787	797	12.48	Garments
797	810	12.65	Closed Shop
810	827	12.95	Newspaper
827	844	13.22	Graphic Designing
844	863	13.52	Medical
863	893	13.80	Medical
893	896	14.03	Jewellery
896	915	14.33	Hardware
915	936	14.57	Hardware
936	940	14.72	Residence
940	963	15.8	Hotel
963	975	15.27	Books
975	988	15.47	Plastic Goods
988	998	15.63	Stationary
998	1003	15.71	Dashakarma
1003	1017	15.93	Building Material
1017	1043	16.34	Building Material
1043	1055	16.52	Electronic Goods
1055	1069	16.73	Closed Shop
1069	1081	16.93	Dashakarma
1081	1097	17.12	Vegetables
1097	1114	17.45	Residence

Start pace	End pace	End pace According to Scale	Shop type
1114	1126	17.04	Mobile Recharge
1126	1142	17.89	Sweets Eatery
1142	1180	18.48	Garnments
1180	1197	18.75	Jewellery
1197	1234	19.32	Sarees
1234	1244	19.48	Bag
1244	1252	19.61	Sarees
0 - 47		0.74	Distance between Two sides of Road
0	11	0.17	Stationary
11	20	0.31	Jewellery
20	35	0.55	Bag
35	53	0.83	Garnments
53	70	1.18	Shoes
70	95	1.49	Hotel
95	106	1.66	Grocery
106	111	1.74	Cobbler
111	121	1.89	Closed shop
121	131	2.05	Clock and watch
131	142	2.22	Mobile
142	152	2.38	Closed shop
152	166	2.51	Clock and watch
166	172	2.69	unmetalled Road
172	186	2.81	Closed shop
186	196	3.07	Saloon
196	217	3.40	Grocery
217	236	3.60	Grocery
236	246	3.76	Empty Space
246	256	3.91	Pan
256	259	4.06	Empty Space
259	267	4.18	Biscuits
267	286	4.38	Eatery
286	309	4.92	Tea Shop
309	330	5.17	Tea Shop
330	339	5.31	Pan shop

Start page	End page	End page According to Scale	Shop Type
335	358	5.61	Tea shop
358	370	5.75	Empty Space
370	380	6.04	Tea Shop
380	397	6.22	Empty Space
397	406	6.36	Pan

Source: Primary Survey By Semester 5 Geography Honours Students, 2022

Table: Market Morphology Analysis along the Ghadskipa Station Road (Left Pavement), on 26th August 2022 (11:00 am to 12:00 Noon)

Slant pace	End pace	End Pace according to Scale	Shop type
0	4	0.00	Fruits
4	11	0.21	Empty Space
17	35	0.41	Bag
35	110	1.22	Closed Shop
110	146	2.15	Clothes
146	153	2.40	Mobile Recharge
153	162	2.54	Mobile
162	181	2.83	photo copy
181	193	3.02	Clothes
193	204	3.15	Bag
204	214	3.35	Clothes
214	223	3.45	Fruit
223	235	3.68	Fruit
235	246	3.85	Juice
246	257	4.62	handloom
257	264	4.15	Empty Space
264	284	4.45	Handloom
284	306	4.75	Clothes
306	318	4.58	Hardware
318	329	5.15	Plywood
329	341	5.34	Clothes
341	362	5.67	Clothes
362	388	6.08	Closed Shop
388	394	6.17	Clothes
394	416	6.51	Clothes
416	438	6.83	Empty Space
438	448	7.02	Clothes
448	459	7.15	Utensils
459	460	7.07	Mobile
460	592	8.33	Grocery
532	552	8.64	Cycle
552	571	8.34	Grocery
571	586	9.18	Medi. Col
586	595	9.32	Sweet Eatery
595	605	9.48	SAvoury Eatery
605	624	9.77	Shoes
624	631	9.88	Closed Shop
631	700	10.00	diagnostic

Source: primary Survey by Semester 5 Geography honours students, 2022

HOTEL SURVEY

Table - Facilities Available

Facilities	Power Backup	Internet	Food Service in room	Geyser	A.C	T.V
% of Hotels	10	8	10	20	16	18

Source - Primary Survey

Table - Details of Tourist

Tourist Type	Local	Within State	Outside State	Foreign
Percentage	8	21	58	13

Source - Primary Survey

Table - Problems of Hotels

Different Transport Infrastructure problems	Power	Administrative	Labour	Water	Competition	Others
% of Hotels	10	5	50	15	5	10

Source - Primary Survey

Table - Level of Income

Level of Income	15-30,000	30-50,000	50-70,000	70,000-1,00,000	Above 1,00,000
% of Hotel	10	18	12	38	22

Source - Primary Survey

2013
JULY

Household Survey

1. Date:

2. Household Id:

3. Sex of the Respondent: Male () Female ()

4. Sex of head of Household: Male () Female ()

5. Religion: Hindu () Muslim () Christian () Buddhist () Others(Specify) _____

6. Social Group: General () OBC A () OBC B () SC () ST ()

7. Language: Hindi () Bengali () English () Tribal Languages () Others(Specify) _____

8. How many members are there in the house: Male _____ Female _____

9. Age Sex Structure

Age Group	0-14	15-29	30-44	45-59	>=60
Female					
Male					

10. Marital Status

Gender	Married	Unmarried	Widow
Female			
Male			

11. Family Type: Joint () Nuclear () Extended ()

12. Does your House has BPL Card: Yes () No ()

13. Educational Status of Family Member

Gender	Illiterate	Primary	Middle	Secondary	Higher Secondary	Graduation	Above
Male							
Female							

14. Number of Children going to School Primary () Govt ()

15. Number of Drop Out Candidates

Gender	Primary	Middle	Secondary	H. Secondary
Female				
Male				

16. Cause of School Dropout

Financial Problem	Marriage	Health issues	Others(Specify)

17. Distance of the local educational facility

Primary	Middle	Secondary	H. Secondary	College

18. How many members in your household earn for living?

Adult. Men	Adult women	Boy Child	Girl Child

19. Occupational Structure:

Gender	Agricultural labourers	Cultivator	Industrial Worker	Industry Own.	Trade & Commerce	Service
Male						
Female						

20. Nature of Employees

Gender	Sel-employment	Regular Wage Employment	Causal Labour	No. of Months with Work
Male				
Female				

21. Monthly Income and Expenditure of Household

Income	<1000	1000-2000	2000-3000	3000-4000	4000-5000	6000-7000	7000-8000	10000-15000	>15000
Expenditure	<1000	1000-2000	2000-3000	3000-4000	4000-5000	6000-7000	7000-8000	10000-15000	>15000

22. Do you have your own land? Yes () No () Amount _____

23. What are the main crops grown?

24. Do you have your own house or it is Rented? Own () Rented () Rented (Mpees Rs) Amount _____

25. Nature of House

No. of floors	Katchi House	Semi-Pucca	Pucca House

26. What type of material is mainly used for construction of floor?

Bricks	Tiles	Asbestos	Concre	Tin	Tinich	Other(Specify)

27. What type of material is mainly used for construction of the roof?

Iron Sheets	Tiles	Asbestos	Concre	Tin	Tinich	Other(Specify)

28. What type of material is mainly used for construction of the wall?

Concrete/Silkes	Concre blocks	Glass reinforced blocks	Urban bricks	Wood	Mud and soil	Tin iron sheets	Other(Specify)

29. How many livestock does your family own?

None	Cattle for farming	Cow	Goat	Poultry	Buffalo	Others(Specify)

30. Do you have any of these Amenities?

Mobile	Fridge	TV	Cycle	Bike	Computer	Table	Chair	Others (Specify)

31. What is the main source of lighting in your house?

Kerosene	Firewood	Solar energy	Bio gas	Electricity	Others(Specify)

32. What type of fuel do you use for cooking?

Cow Dung	Kerosene	Gas	Electricity	Wood	Charcoal	Others (Specify)

33. Toilet Facility: Yes () No () (If Yes - select any one option from the following)

Inside shared	Inside exclusive	Outside shared	Outside exclusive	Open Defecation

34. What is the main source of water for drinking?

Private connection	Public Tap	Boor-hole	Well	River	Pond	Lake	Others(Specify)

35. How long do you have to stand in the queue to fetch water?

< 15 minutes	15-30 minutes	30-45 minutes	45-60 minutes	>60 minutes

35. Any govt. Programme/Scheme for Development purpose: Yes () No () (If Yes Mention:)

36. What was the impact of Covid-19 Pandemic on your Financial Status?

Very bad	Bad	Moderate	No effect at all
Did you receive any assistance during Pandemic? Yes () No () (If Yes Mention:)			

38. Do you have any health insurance facility/scheme? Yes () No () (If Yes Mention: Govt. / Private)

39. How far is the PHC and hospital?

Distance	<1 km	1-4 km	5-9 km	10-14 km	>=15 km
PHC					
Hospital					

40. How long does it take to reach main water source from your house?

Less than 15 minutes	15-30 minutes	30-45 minutes	45-60 minutes	>60 minutes

41. How far is the nearest market for daily goods?

Distance	<1 km	1-4 km	5-9 km	10-14 km	>=15 km
PHC					
Hospital					

42. How do you dispose your household garbage?

Bury in the yard	Burn	Collection point in village	Throw into the River	Others (Specify)

43. What is your Perception about Quality of Drinking Water?

Very Bad	Bad	Moderate	Good	Very Good

44. What is your Perception about Air Quality in your area?

Very Bad	Bad	Moderate	Good	Very Good

45. What is your Perception about Transport Infrastructure in your area?

Very Bad	Bad	Moderate	Good	Very Good

46. What is your Perception about the Living condition in your area?

Very Bad	Bad	Moderate	Good	Very Good

47. What kind of Problem do you face in your locality?

Power supply	Waste	Health	Transport	Banking Facility	Recreational Facilities	Education	Agriculture (Specify)	Other (Specify)

48. What are common diseases that affect People in the area? (Mention)

49. Do you have any Suggestions for improving your existing living condition.

Q3: Market Survey

1. Date: _____
2. ID No. _____
3. What is the name of the shop? _____
4. What is the gender of Shop Owner? Male Female
5. What is your educational level? Primary Secondary Tertiary Graduation Others
6. What is the distance of your home from the shop? Next Door 1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20 21-22 23-24 25-26 27-28 29-30 31-32 33-34 35-36 37-38 39-40 41-42 43-44 45-46 47-48 49-50 51-52 53-54 55-56 57-58 59-60 61-62 63-64 65-66 67-68 69-70 71-72 73-74 75-76 77-78 79-80 81-82 83-84 85-86 87-88 89-90 91-92 93-94 95-96 97-98 99-100
7. How many years? _____
8. Do you own the shop or is it rented? Own Rent
9. If it a temporary or permanent shop? Temporary Permanent
10. What is the nature of structure of the shop? Kiosk Semi-Kiosk Pure
11. What type of goods do you sell in your shop? _____
12. Where do you purchase your goods from? _____
13. What is the main mode of transportation of goods? Cycle Motor Scooter Van Tricyclic Bus Train Other Walk
14. What number of customers come to your shop daily? _____
15. What type of customers comes to your shop? Local Slumy Village Migrant Abroad Other
16. Do you hire any labour? Yes No
17. What are the number of hired labour? _____
18. What is your monthly income and expenditure and daily sale?
- | | | | | | | | | |
|-------------|-------|-------------|-------------|-------------|-------------|--------------|---------|--------------|
| Income | <1000 | 1000 - 2000 | 2000 - 3000 | 3000 - 5000 | 5000 - 7500 | 7500 - 10000 | > 10000 | 7500 - 10000 |
| Expenditure | <1000 | 1000 - 2000 | 2000 - 3000 | 3000 - 5000 | 5000 - 7500 | 7500 - 10000 | > 10000 | 7500 - 10000 |
| Daily Sale | <100 | 100-300 | 300-500 | 500-800 | 800-1000 | 1000-1500 | > 1500 | 1000-1500 |
19. Do you have any problems in your daily selling and trading? Yes No
20. What are the problems faced by you regularly? Crime Pollution Road Economic Cultural Religious Social
21. Do you have to pay for the market land or anything else? _____
22. Have you received any help from anyone? Yes No
23. If yes, what kind of help do you get? _____
24. Do you have any suggestions for improving your trade? _____

Q3: Tourism Survey – Hotel Survey

1. Date:

2. What is the name of the Hotel?

3. What is the sex of Hotel Owner? Male Female

4. What is your Household Size (M & F)?

5. Age Group of Hotel Owner

<0-14	15-29	30-44	45-59	>=60
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6. What is your educational level?

Gilliterate	Pre	I-5	5-8	9-10	11-12	Graduation	Above
-------------	-----	-----	-----	------	-------	------------	-------

7. What is the distance of your hotel from the town?

Next Dist.	<	1-2	2-3	3-4
4-5	5-10	10-15	15-20	20-25

8. When was your hotel established?

9. Please provide the details of type and number of rooms and their rent.

No. of Places	Type of Bed	No. of Rooms	Type of Room AC/non-AC	Daily Rent
	Special Rooms			
	Single Bed			
	Double Bed			
	Dormitories			

10. What are the facilities available in the rooms?

No. of Rooms with the Facility	TV	AC	Geyser in Bathroom	Food Served in Rooms	Internet	Power Backup

11. What are the services offered in the hotel?

Restaurant	Number of Hours of Water Supply	Meal Hours	No. of Hours of Power Supply	Internet	Car Parking	Recreational Services	Other Information

12. Please provide details of tourists.

Local	Tourists Primary Place		Family	Organised Tour Parties	Nature of Tourists	
	Within State	Outside State			Others	

13. In which time of year do tourists mainly come?

Month	Peak Season

Income	<1500	1500-3000	3000-3000	3000-7500	7500-100000	>100000
Expenditure	<1500	1500-3000	3000-3000	3000-7500	7500-100000	>100000
Profit	<1500	1500-3000	3000-3000	3000-7500	7500-100000	>100000

14. What is your monthly income and expenditure?

Rank in order of importance	Maintenance	Food	Power	Labour	Land-Rent	Administrative	Other

15. Are all family members engaged in the same occupation?

Yes No

16. Do you hire any labour in your hotel? If yes, number..

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> No. Females	<input type="checkbox"/> No. Males

17. Do you face any problem in the work?

Yes No

Financial	Transport	Infrastructure	Power	Administrative	Labour	Water	Competition	Customer Relation	Other

18. Do you have any suggestions for improving?

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2022-05-05

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14/5/2022



UNIVERSITY OF CALCUTTA
BA-HONOURS SEMESTER-II PRACTICAL EXAMINATION

2023

GEOGRAPHY LABORTARY NOTEBOOK

SUBJECT : GEOGRAPHY

STREAM : HONOURS

**PAPER : GEO-A-OC-6-14-P (HAZARD MANAGEMENT
LAB)**

HAZARD / DISASTER MANAGEMENT REPORT

UNIVERSITY REG. NO.: 561-1211-0167-20

UNIVERSITY ROLL NO. : 202561-11-0087

042 EXAMINED





DISASTER MANAGEMENT PROJECT
AIR POLLUTION: A CASE STUDY OF DURGAPUR



CONTENTS

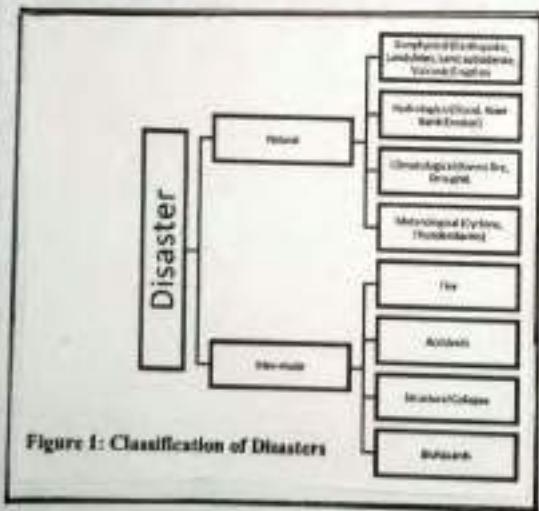
<u>SL. NO.</u>	<u>SUB-SECTION</u>
1.	INTRODUCTION
2.	AIR POLLUTION
3.	STUDY AREA
4.	OBJECTIVES
5.	METHODOLOGY
6.	CAUSES OF AIR POLLUTION IN DURGAPUR
7.	DISASTER CHARACTERISTICS, PATTERNS, AND IMPACTS
8.	DISASTER RESPONSE AND MANAGEMENT
9.	POST DISASTER MANAGEMENT, MITIGATION AND FUTURE PREPAREDNESS
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042 EXAMINED

DISASTER MANAGEMENT PROJECT

AIR POLLUTION: A CASE STUDY OF DURGAPUR

INTRODUCTION: Disaster as defined by the United Nations is "a serious disruption of the functioning of a community or society which have or involve widespread human, material, economic or environmental inputs that exceed the ability of the affected community or society to cope using its own resources." Disasters are seen as the effect of hazards on vulnerable population. Great damage, loss, destruction and devastation to life and property are the results of disasters. Disasters may be classified as provided below (Figure 1). Disaster may be due to natural or anthropogenic causes, but its intensity is accentuated due to human agency. Among man-made disasters, air pollution is one of the serious concerns of contemporary world. This disaster is the focus of this report.



AIR POLLUTION: Air Pollution is one of the most serious problems in the world. When dust, smoke, harmful gases introduced into the atmosphere and contaminate the environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere then air becomes

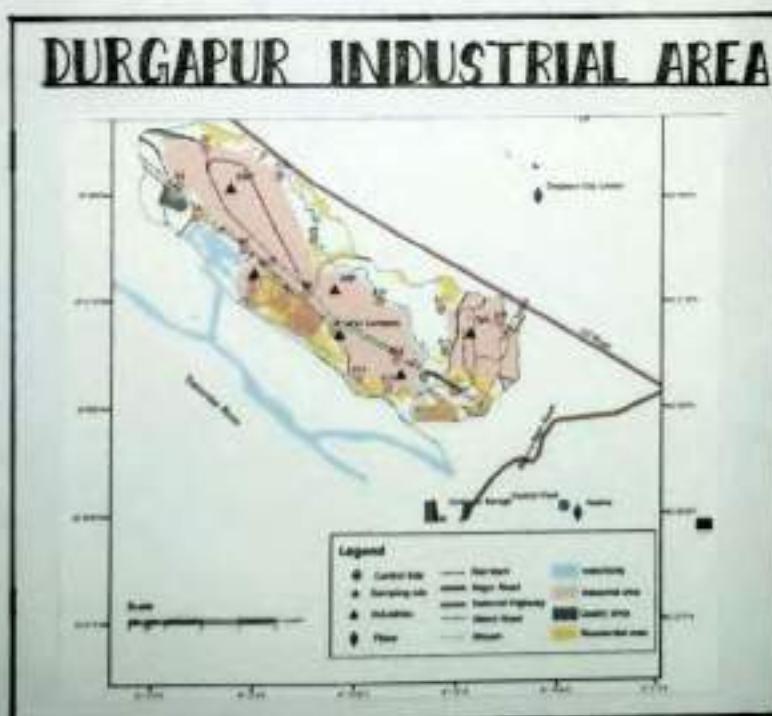
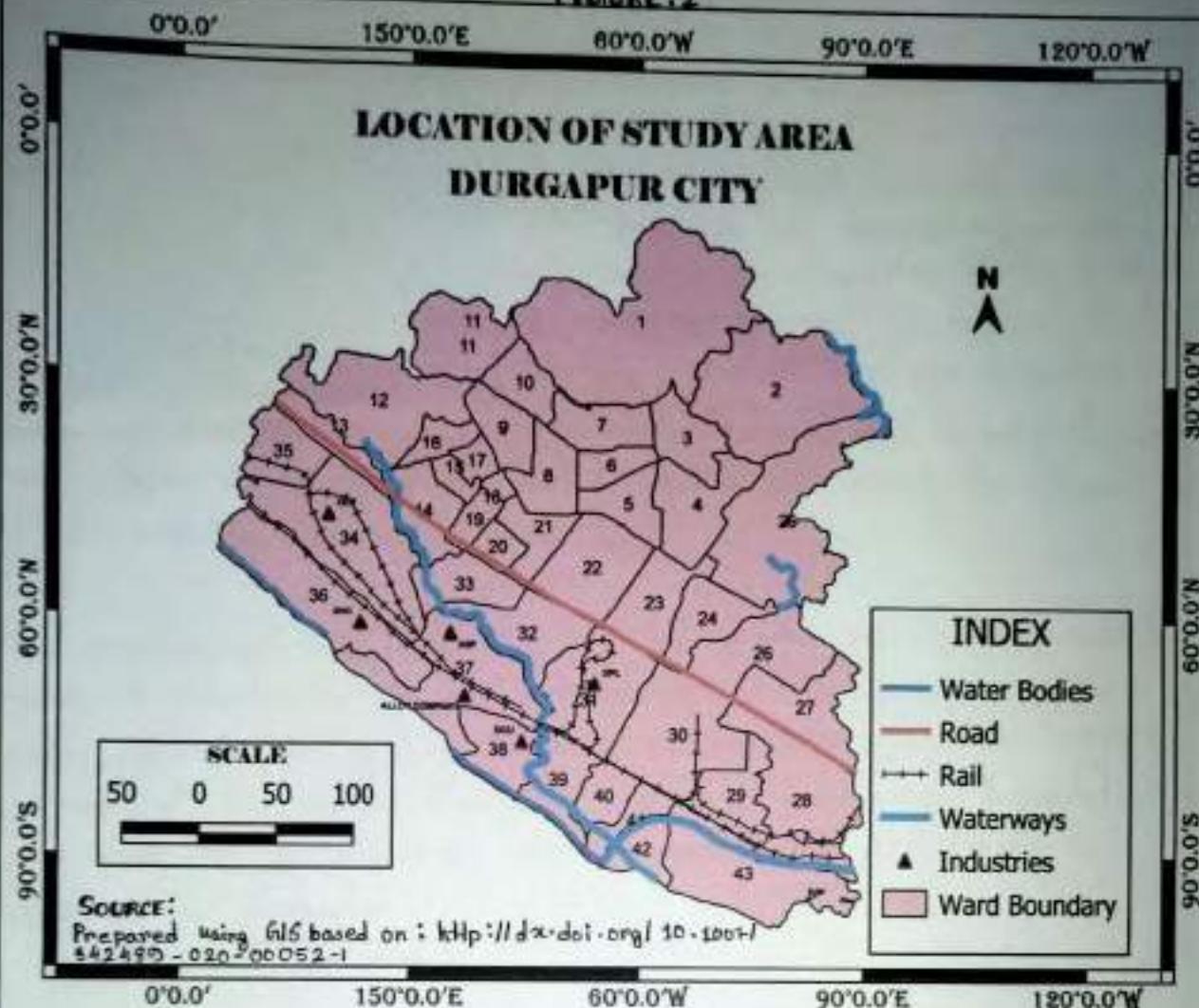
polluted for all living organisms. Air Pollution is a slow-paced disaster with effects that last longer. Household combustion devices, transport, industries, burning of fuel and forest fires are the main causes of air pollution. The six main pollutants are Carbon Monoxide (CO), Nitrogen (NO_2), Lead (Pb)

Ground level Ozone (O₃), particulate pollutant and Sulphur dioxide (SO₂). Long term health effects from air pollution include heart diseases, lung cancer, respiratory problems. Air pollution can also cause long term damage to people's nerves, brain, kidney, liver, other organs and increase morbidity and mortality.

STUDY AREA: Durgapur is located in India's eastern part at 23°32'0.3840"N latitude and 87°19'18.9480"E longitude. Durgapur, a major industrial city in Paschim Bardhaman (West Bengal), is a part of Chhotanagpur Plateau and is bounded by the Ajay River in the north and the Damodar River in the south, with an average elevation of 65 meters. Durgapur is a gently sloping alluvial terrain comprised of lava flows with interbedded carbonaceous, silicious shales and clays. It relies on the Damodar Valley Cooperation and barrage and is rich in mineral and coal deposits and hence is termed as the 'Ruhr of West Bengal'. The city is located in the enriched Bituminous coal belt of the Damodar Valley region; hence many industries are set up here (Figure Set 2). It is a municipal corporation in West Bengal with unprecedented urbanization, industrialization and transportation development. Hence it is one of the most polluted cities in West Bengal with high level of particulate matter in the atmosphere, creating a major health hazard. West Bengal, in 2019, accounted for the second-highest number of deaths linked to air pollution in the country, 20.8 per cent of overall deaths.

OBJECTIVES: Disaster management refers to the programs, administrative actions and operations undertaken to address a disaster, preparedness, mitigation, response and recovery. It refers to how one prepares for, responds to and learns from effects of disaster. Steps taken to address varies for each specific disaster.

FIGURE 2



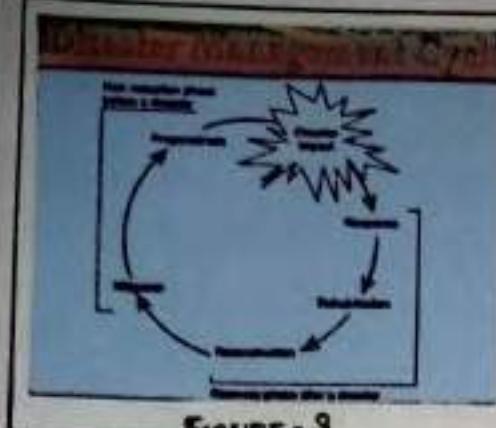


FIGURE - 9

The objective of this project is to examine the causes and nature of air pollution in Durgapur and impact of this disaster management measures and long-term response and rehabilitation planning undertaken for mitigation of the risk. It seeks to examine the nature of disaster preparedness plan to reduce the risk incurred due to air pollution and have a preparedness and mitigation plan ready for future if air pollution reaches serious levels.

The objective of this project is to examine the impact of unprecedented rates of industrialization and urbanisation in the Durgapur municipal area on air quality. It seeks to examine air pollution in Durgapur as one of the serious disasters impacting environment & population and prepare a disaster preparedness - mitigation plan for air pollution in Durgapur.

The objective thus are:

- To assess the status of urban environment in terms of air quality and examine its variation over a week in Durgapur,
- To analyse causes - sources - factors and level of air pollution.
- To examine the impact of chronic exposure to urban air pollution on health of the residents of Durgapur
- To suggest suitable measures to reduce the magnitude of air pollution and its adverse effects by providing a Disaster preparedness Plan.

METHODOLOGY : This hazard report took recourse to various reports of the West Bengal Pollution Control Board, various research articles and websites for obtaining data pertaining to air pollution in Durgapur. Resource was also undertaken at the website

accweather for obtaining real time data for the week 17th April 2023 to 2nd April 2023 at four time points. The data analysis was represented through graphs and cartograms for better visualisation to interpretation.

CAUSES OF AIR POLLUTION IN DURGAPUR:

Industries and heavy transport vehicles ownership continue to increase air pollution in Durgapur. Combustion of fuel in the domestic sector is also a significant contributor.

The steel plant, thermal power plant, mining areas, transport sector releases several pollutants such as particulate matter and fugitive dust. Significant sources of air pollution in Durgapur are industries (43%), thermal power plants (33%), waste burning (13%) and 9% from traffic (Chatterjee 2021).

Figure 4: Major Sources of Air Pollution

Source	Percentage
Industries	43%
Thermal Power	33%
Waste Burning	13%
Domestic	9%
Traffic	2%

Chatterjee, 2021.

- Vehicular Emissions:
 - Abundance of poorly maintained vehicles
 - Explosive increase in personal vehicles - cars and two-wheelers.
 - Use of petrol fuel and dieselization of personal vehicle segment.
- Thermal and Hydel power plants: which release nitrogen oxides and result in formation of smog
- Combustion of fuel in domestic sector:
 - Cooking in living rooms in slums using kerosene
 - Natural gas stoves in urban areas release carbon monoxide.
- Presence of versatile industries, e.g., steel plants, chemical industry, plastics, especially which use coal combustion
- Presence of small industries operating in the city contribute to the air pollution.
- Large-scale construction activities release fugitive dust and wind-blown dust due to removal of soil.

- Mining and transportation of coal and iron ore release dust and other pollutants.
 - High and ever-increasing population density.
 - Stubble burning results in deteriorating the air quality.
 - During Festivals like Durga Puja, Kali Puja, Diwali lot of fireworks and crackers are used and release pollutants like sulphur dioxide, carbon monoxide, suspended particles and iron dust.
 - Seasonal impacts and change of climate from hot humid and windy to colder weather with less wind results in higher concentration of air pollutants in Durgapur during wintertime.
 - Improper landuse planning in Durgapur city development. Initially the industries were set up south of National Highway and the residential areas to the north with a green buffer in midst. Later industries were set up south of the National Highway and railway line, near Damodar River in conjunction with township. In contemporary years the development has become more unplanned as industries have been set up in the buffer zones and in vacant spots close to residential areas.
- All these have increased the air pollution levels in Durgapur.

DISASTER CHARACTERISTICS AND IMPACTS

CHARACTERISTICS : The analysis of different sources of air pollution in Durgapur depicts that the major air pollutants are particulate Matter, especially PM 2.5 which is 3.9 times above the recommended limit given by the WHO 24 hrs air quality guidelines value. (<https://www.aqi.in/in/dashboard/India/west-bengal/Durgapur>) Particulate Matter 10, Carbon dioxide (CO₂), Carbon Monoxide (CO), and sulphur Dioxide (SO₂), Nitrogen dioxide (NO₂) are other significant contributions.

PARTICULATE MATTER (PM 10 AND 2.5): In Durgapur the concentration of SPM is much higher than the other pollutants. The main sources of these are incomplete combustion, automobile emissions, dust and cooking. SPM is too small to be filtered by the natural protective mechanisms of the human respiratory system. The effect of high SPM in the atmosphere are long term and short term. Short term effects result in nose and eye itching and irritation, headache, allergic reactions, nausea. Long-term and more serious impacts are lung cancer, heart disease, brain damage, kidney and liver damage. The annual average concentration of Suspended Particulate matter (SPM) and Respirable particulate matter (RPM) were $243.4 \mu\text{g}/\text{m}^3$ and $138.3 \mu\text{g}/\text{m}^3$, well above health permissible standards (Molla 2018).

NO₂: Annual concentration of NO₂ was $59.9 \mu\text{g}/\text{m}^3$, just about the maximum allowed concentration of 60 micrograms per cubic metre. NO₂ is created from automobile exhaust and industrial activity which causes allergic asthmatics by augmenting allergic responses. This also contributes to ozone pollution.

SO₂: SO₂ levels are under control largely because of change in energy mix and is low at $7.8 \mu\text{g}/\text{m}^3$.

CO: CO is produced in the incomplete combustion of carbon-containing fuels. The largest anthropogenic source of CO is vehicle emissions. Breathing the high concentrations of CO leads to reduced oxygen transport by haemoglobin and has health effects that include headaches, heart diseases and impaired reaction timing.

The **AIR QUALITY INDEX** measures the quality of air. It shows the amount and types of gases dissolved in the air. There are 6 categories in this air quality index: good, satisfactory, moderate, poor and severe. The World Health Organization guidelines 2021 states that,

- PM 2.5 should not exceed 15 ug/m^3 24-hour mean
- PM 10 should not exceed 45 ug/m^3 24-hour mean (India 60 ug/m^3)
- Nitrogen dioxide (NO_2) should not exceed 25 ug/m^3 for a 24-hours mean (India 40 ug/m^3)
- Sulphur dioxide (SO_2) concentrations should not exceed 40 ug/m^3 24-hours mean (India 50 ug/m^3)
- Carbon monoxide concentrations should not exceed 4 mg/m^3 24-hours mean
- AQI values at and below 100 are generally considered to be satisfactory

AIR POLLUTION PATTERNS IN DURGAPUR:

There are four manual air quality monitoring stations and one real-time station in Durgapur.

Table 1: Durgapur—Locations of the ambient air quality monitoring stations and the parameters monitored

Parameter monitored	
Automated monitoring stations	
Sethi Kanhu Indoor Stadium, Durgapur	PM10, PM2.5, SO ₂ , NO ₂ , ozone, ammonia, CO, lead, nickel, arsenic, benzene, AsF
Manual monitoring stations	
DMC Water Works, Angadpur	PM10, SO ₂ , NO ₂
Kwality Hotel, Bhurangi More, Berachitti	PM10, SO ₂ , NO ₂
Bidhannagar, PCBL Club, Mukhipara	PM10, PM2.5, SO ₂ , NO ₂ , ozone, ammonia, CO, lead, nickel, arsenic, benzene, AsF
Dew India Limited, PCBL More, Durgapur	PM10, SO ₂ , NO ₂

Source: As provided by the West Bengal Pollution Control Board and ITR website for automatic monitoring station

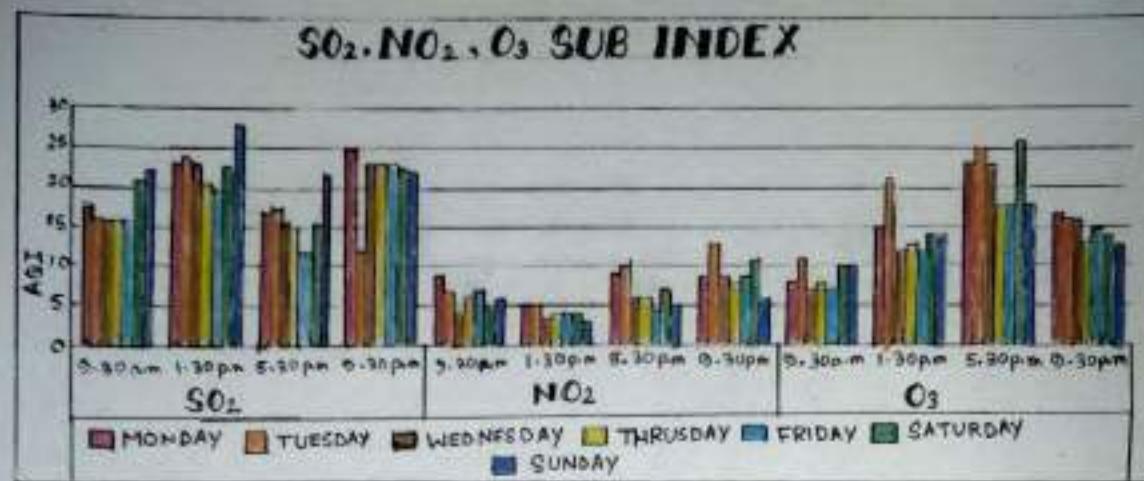
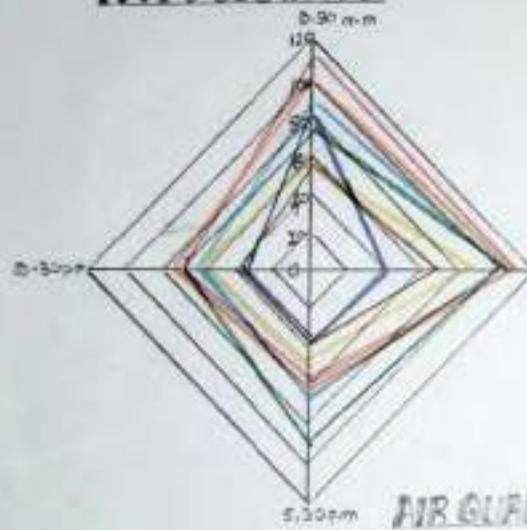
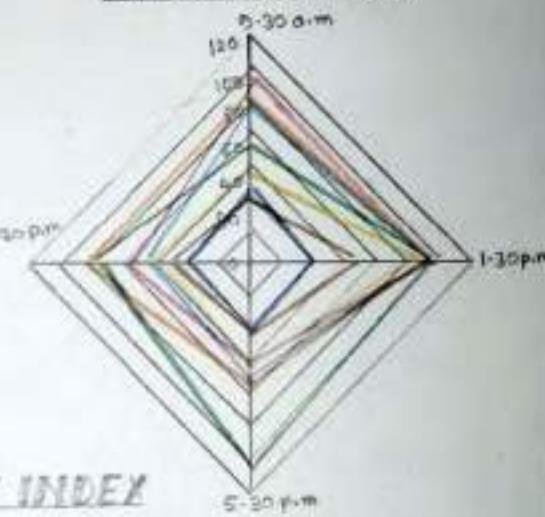
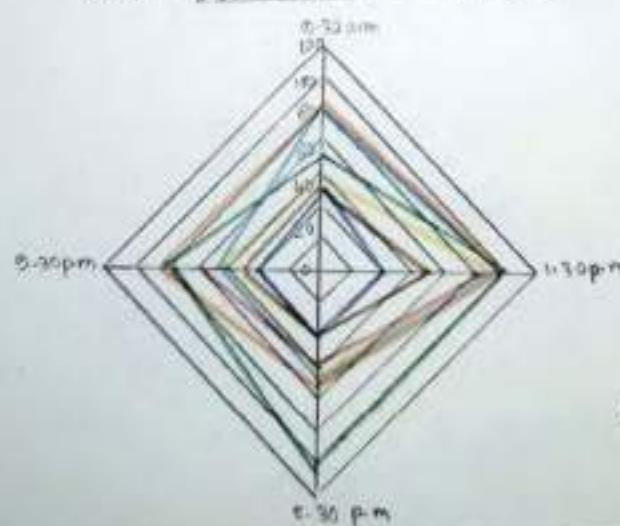
TABLE 2 : MANUAL MONITORING UNDER NATIONAL AMBIENT AIR QUALITY MONITORING PROGRAMME (IN ug/m^3) . 2020 (DURGAPUR)

LOCATION	MINIMUM (24 HOUR- LY AVER- AGE)	MAXIMUM (24 HOURLY AVERAGE)	ANNUAL AVERAGE	MINIMUM (24 HOURLY AVERAGE)	MAXIMUM (24 HOURLY AVERAGE)	ANNUAL AVERAGE	MINIMUM (24 HOUR- LY AVER- AGE)	MAXIMUM (24 HOURLY AVERAGE)	ANNUAL AVERAGE
DMC Water Works, Angadpur	4	15	13	16	48	32	63	182	111
Kwality Hotel, Bhurangi More, Berachitti	6	17	13	23	47	32	67	184	116
Bidhannagar, PCBL Club, Mukhipara	2	14	8	11	35	24	47(26)	146(92)	100(61)
Dew India Limited PCBL More, Durgapur	2	16	13	14	48	31	61	182	107

Source : http://airiit.iit.ac.in/nmap-data/

FIGURE 15

**DAILY VARIATION IN VARIOUS AIR POLLUTANT
IN DURGAPUR 17.04.2023 TO 23.04.2023**

**PM 2.5 SUB INDEX****PM 10 SUB INDEX****AIR QUALITY INDEX**

Suman S. J.
27/4/2023

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

TABLE 3 : POLLUTANTS IN DURGAPUR : 2005-2009

YEAR	DURGAPUR		
	SPM	SO _x	NO _x
2005	211.1	8.4	42.9
2009	344.8	8.4	58.9

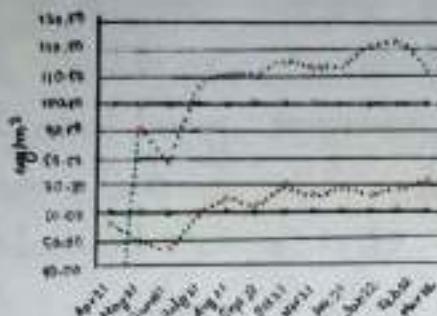
SOURCE: Shahin, F. SK. (2020)

Temporal study by a researcher has revealed that air pollution level have been rising between 2004-2005 to 2009 in Durgapur, especially SPM, which is at highly critical stage. Aggregate picture of Air Quality Index (AQI) reveals that air quality is poorer at morning peak and afternoon pre-lunch hours (Figure Set 5). This might be due to high vehicular traffic and higher intensity of work operations in mining, industrial and constructions sites in these areas. It is also interesting to note that pollution levels peak on Mondays and Tuesdays and Saturday evening probably when the commuters from neighbouring towns are going back home for the weekend or coming back to work for the week on Monday mornings. It is exceptionally low on Sundays on account of low level of traffic and absence of industrial and related economic activities.

SEASONAL VARIATION OF AIR POLLUTION: The chemical properties of the pollutants in the atmosphere depend upon temperature, wind direction, rainfall and relative humidity of a particular locations. Seasonal variation in the climate has a significant relation with the level of pollutants in the city. The increase in temperature results in an increase in the average mixing height thereby, increasing the volume of air circulation and reducing the concentration of pollutants. The increase in wind circulation, due to the proximity to rivers, reduces the concentration of the gaseous pollutants, with the aid of strong convection currents. An increase in the amount of precipitation results in the wash out of the pollutants in the form of wet deposition. Analysis of the cyclic pattern of the levels of the gaseous pollutants in Durgapur suggest that during winter the air mass is more stagnant compared to other

seasons as there is less atmospheric circulation and increase in atmospheric stability; this results in increased concentration of pollutants and poorer AQI.

TH10 AND PM2.5 PROFILE OF BIDHANNAGAR TUNNEL DURING 2021-2022



INDEX	
—	PM 2.5
—	PM 2.5 std
—	PM 10
—	PM10 std

FIGURE - 6

SOURCE : WBACB - 2022

Pollution levels rise very rapidly in winter due to low wind speed, low temperature, inversion trap and low mixing height of air. Application of National Air Quality Standards show that November onwards the air quality deteriorates, especially the extent of particulate matter (PM10 and PM 2.5) increases significantly in all three stations November onwards till February.

IMPACTS: The continuous air pollution has wide ranged immediate and long-term impacts on various aspects ranging from those on life, property, economic, social and environment.

TABLE 4 : CATEGORIES OF AIR POLLUTION LEVELS AND RELATED HEALTH IMPACTS

AQI Category Pollutants and Health Impacts		AQI Good (0-50)	Associated Health Impacts Minimal Impact
AQI Category Range	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17		
Good	0-50	0-50	May cause minor breathing discomfort to sensitive people.
Satisfactory	51-100	51-100	May cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults.
Moderately polluted	101-150	101-150	May cause breathing discomfort to people on prolonged inhaling, and problems to people with heart disease.
Poor	151-200	151-200	May cause respiratory illness to the people on prolonged inhaling. Effect may be more severe in people who are living with lung and heart diseases.
Very Poor	201-300	201-300	May cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart diseases. The health impacts may be experienced even during normal walk also.
Severe	301-400	301-400	

a) DEMOGRAPHIC IMPACTS ON HEALTH: Air pollution results in several respiratory and heart conditions like asthma, chronic bronchitis, emphysema, heart attack, stroke. In addition, long-term and critical illness like various kinds of cancer are caused. Several million are known to have died due to the direct or indirect effects of air pollution. Air pollution also impacts child and foetal health as exposure to high air pollution levels during pregnancy causes miscarriage, preterm birth, autism, asthma and spectrum disorder, damage early brain development in a child and cause pneumonia that kills almost a million children below 5 years. Durgapur has a significantly higher share of PM 2.5 which are so small that it can penetrate in to the gas exchange regions of the lung migrating into other organs, including the brain.

TABLE 5: DEATHS ATTRIBUTABLE TO AIR POLLUTION IN INDIA, 2019

STATES OF INDIA	INDIA	WEST BENGAL
Percentage of total deaths attributable to air pollution	17.8 (15.8 - 19.5)	20.8 (18.3 - 22.8)
Percentage of total deaths attributable to ambient particulate matter pollution	10.4 (8.4 - 12.3)	11.9 (9.1 - 14.4)

SOURCE: DANDONA, L. 2021.

Major diseases found by an author in a study of Durgapur city attributable to air pollution are given in the Table. Skin diseases, Bronchitis, Heart problem, Lung infection, Asthma, and Cancer, has increased at the rate of 26.06%, 43.40%, 32.07%, 40.75%, 55.92% and 57.14% from 2010 to 2017. Other common diseases like dust allergy and breathing issues, Fatigue, breathing problems, anxiety, depression, etc also were found but their magnitude couldn't be determined but the author (Chatterjee 2021).

TABLE 6: MAJOR DISEASES DUE TO AIR POLLUTION IN DURGAPUR (CHATTERJEE 2021)

MAJOR DISEASES	2005	2010	2017
Cardiovascular d.	172	704	1169
Lung infections	46	143	292
Asthma	57	342	776
Skin diseases	344	1688	2283
Bronchitis	78	442	781
Cancer	10	36	84
Pulmonary TB	7	16	23

b) **ECONOMIC:** Economic loss due to lost output from premature death and morbidity from air pollution was 1.4 per cent of the GDP in India in 2010. Economic loss due to air pollution as a percentage of the state GDP was higher in the Northern and Central Indian states. India should invest in state specific air pollution control strategies. Research suggests that air pollution reduces productivity in four critical ways.

- (i) Increased absenteeism due to pollution reduce working hours of adults
- (ii) Decreased individual employee productivity when workers are on the job
- (iii) Reduction in agricultural crop and commercial forest yields by billions of money each year.
- (iv) Loss of income due to increased visit to doctors and medical institutions, consequent financial and emotional loss due to premature deaths.

STATES OF INDIA	INDIA	WEST BENGAL
Economic Loss (US\$ millions) attributable to ambient Particulate Matter pollution	Air Pollution 36,803.8 (27,368.6- 47,710.3)	2125.3 (1,622.8- 2676.6)
Source: Dandona - L - 2021	Ambient Particulate Matter pollution 22,766.6 (15,935.6-30,719.4)	1104.0 (830.8-1,644.0)

TABLE 8: ECONOMIC LOSS AS A PERCENTAGE OF STATE GDP DUE TO VARIOUS SOURCES

STATES OF INDIA	INDIA	WEST BENGAL
Air Pollution	1.36	1.26
Ambient particulate matter Pollution	0.84	0.71

SOURCE : DANDONA, L. 2021

c) **SOCIAL**: It is important to remember that pollution is a social issue because it is caused by human behaviour and it increases violent behaviour. It not only has a negative effect on the human physical health but also on mental faculties on an individual. Research is ongoing of the effects of air pollutant exposure on social decision-making and social behavioural patterns.

d) **ENVIRONMENT**: (i) Air pollution results in release of green houses gases, resultant global warming and consequent increase in sea levels due to melting of ice from colder regions (ii) various types of industrial processes release harmful gases like nitrogen and sulphur oxides, which produce acid when they react with and fall back as acid rain causing damage to humans, animals, fisheries and crops. (iii) Ecosystem is also severely affected as heavy metal pollutants travel in the atmosphere and are deposited into various ecosystems resulting in disruption of ecosystem services and its self-regulating mechanism (iv) Air pollution has also resulted in displacement and loss of habitat of several species, especially pattern of migratory birds in the city.

e) **OTHERS**: Air pollution also affects visibility. When fine particles are dispersed in the air as emission from industrial facilities and power plants, they cause haze and reduce the transparency of the atmosphere.

DISASTER RESPONSE AND MANAGEMENT :

There is an emerging consciousness to reduce the risk of major air pollution event and reduce air pollution levels in general which is aggravating due to climate change. It is necessary to design a reliable emergency response system to tackle air pollution using new technology. An air pollution management system includes a knowledge database and inference mechanism and the interact with the user and another resource. Design of expert systems for air pollution emergency response includes identifying problem characteristics, decision structure regarding present knowledge, formulating and validating rules to organise knowledge for the future forecasting.

COMPREHENSIVE CLEAN AIR POLLUTION (CAP) has been initiated for six non-attainment cities in West Bengal including Durgapur which will submit these action plans to the Air Quality Monitoring committee for review and implementation. These are prepared within the broader framework of the National Clean Air Programme (NCAP) that has set a generic target of 20% - 30% reduction in particulate pollution by 2024.

Several policy measures have been introduced to curb air pollution. These range from industrial baseline measures, pollution control for critically polluted areas, stricter location policy for new industrial units, and restriction on setting up of red category industries in municipal area, ensure regulatory compliance for grossly polluting industries, mandatory use of clean fuels, incentivizing small and medium-scale units to improve and replace boilers and coal fired down draft kilns to incentivizing renewable energy practitioners with tax incentives to add to the long term cost effectiveness of solar energy (rooftop and community based solar devices).

POST DISASTER MANAGEMENT, MITIGATION AND FUTURE PREPAREDNESS

There are several steps that need to be taken to curb air pollution from all sources including industry, trash burning, construction dust, road dust among others to meet clean air target. But vehicles need special attention. Durgapur Municipality, West Bengal Pollution Control Board and other stakeholders have enacted several laws and taken several steps to control air pollution. Some of the steps that have been taken include:

(i) INDUSTRY

- Identification of cumulative impact of industrial emissions. e.g. total load from a specified area
- Regulatory compliance for grossly polluting industries and stringent pollution control action for each type of industry
- Regulating fuel quality by enhancing use of oil or gas in place of coal as mandatory i.e. Clean fuel policy and incentives for clean fuels like gas and electricity
- Regular testing and CEMS enabled monitoring for compliance to existing standards for PM; emission standard of 150 mg/Nm^3 for PM was enacted by the WBPCB for boilers and down-draft kilns.
- Minimizing fugitive emissions through the preparation of a check list for industrial zones and units, specific to each type of industry
- Stricter industrial siting policy: Enforce restrictions on operations of Brick kilns within urban airshed zones during high pollution periods, relocate hot mix plants to areas Durgapur boundaries, shut down small and mobile hot mix plants.

(ii) CONSTRUCTION

- Control measures for fugitive emissions from material handling.

conveying and screening operations through water sprinkling curtains barriers and dust suppression units

- No construction materials should be left uncovered at roadside
- Introduce steeper penalties for non-compliance

(iii) TRANSPORT

- Reduce vehicular emissions by expansion to gaseous fuel program for vehicles e.g. moving auto rickshaws and local taxis to LPG / CNG and buses can run on CNG
- Upgrade in-use emission testing for petrol and diesel vehicles by using additional methods of screening such as remote sensing.
- Electric Vehicles: There is a need to increase reliance on zero emissions electric mobility through use of E-Rickshaws and E-Carts as the mode of transport for last mile connectivity.
- Streamlining efficiency of Auto Emission Testing Centres.

(iv) TRANSPORT MANAGEMENT

- Traffic re-engineering e.g. signal replaced with circular roundabout for removal of congestion from densely polluted/most frequented road stretches.
- Introduction of synchronized traffic signals (green channels) to ensure less waiting time for vehicles and reduce gas emission from vehicles.

(v) URBAN GREEN

- Avenue planning along roads with more traffic
- Urban planning integrates urban green e.g. provide green roofs and vertical greens linked to infrastructure development
- Green walling with plantations around generators
- Dust barriers to be integrated with the urban forestry and forest policy
- Urban redevelopment projects set aside 15-20% area for urban green and tree cover.

iii) OTHERS

- Open Burning : Enforce a complete ban on garbage burning in the entire region and impose stringent action against such activities.
- Cooking Fuel : A targeted program to be implemented for 100% coverage of households by distribution of LPG/CNG in all non-compliant cities. Deter use of solid fuels for cooking especially the use of coal and firewood in roadside eateries and residential sector and issue trade license accordingly.
- Renewable Energy : West Bengal has a solar energy policy . It is mandatory for all housing societies having a total contract demand of 500 KW to install solar rooftop systems to meet at least 5% of their total electrical load.
- Need for Public awareness and cooperation : Organizing deeper public engagement to address the problem of sustainable industrial development and urban mobility . In addition , enhance place public education and awareness and awareness among public health providers regarding air pollution related illness , its treatment and prevention .

DISASTER PREPAREDNESS PLAN

The varied causes of air pollution in Durgapur necessitate recourse to myriad measures to combat the problem as well . Effective disaster preparedness plan seeks to both reduce physical and economic damages and prevent and minimize morbidity , mortality , increase access to relief measures . There are a number of measures which are undertaken for controlling air pollution from industry , domestic sector and transport sector .

(i) Industrial Sector

- Enhancing use of oil or gas in place of coal as mandatory . Coal use restricted in industries and coal - fired boilers and ceramic kilns converted to oil - fired ones .
- Relocating highly polluting industries outside of Durgapur city .

- Enforce Compulsory retirement of old machines.

(ii) Thermal Power Plants Control: The major contributor in medium and large-scale category is from thermal power plants. Thus, there is a need for installation of electrostatic precipitation in all boilers in power plants.

(iii) Transport Sector

- Phasing out vehicles: Currently, cities in West Bengal except Kolkata do not have age restriction on vehicles. After crossing 15 years registration time frame, these vehicles are re-registered for another five years. The non-attainment cities require a phase out plan through age restrictions supported by a scrappage policy.
- Emissions Standards: West Bengal has introduced Bharat Stage IV (BSIV) norms, where vehicles will be equipped with more advanced emissions control system, expected to reduce emissions from new vehicles by 80-90%.
- In-use Emission control: West Bengal has introduced In case of in use vehicles, CO and hydrocarbon concentrations, air to fuel ratio are measured in petrol and smoke density is measured in diesel vehicles while undertaking pollution testing and issuing PUC certificates. However, PUC centres are decentralized, need frequent inspections and robust audit programs linked with centralized data server.
- On road monitoring: Introduction of BSIV and BSVI vehicles with more advanced emissions control systems require advancement in emissions monitoring e.g. vehicles manufactured after 2013 equipped with on board Diagnostic system (OBD) should be checked for malfunctioning light on the dashboard of the vehicle when they come for PUC check; as OBD in vehicles has the capacity

to sense and record the emissions performance of the vehicles. In addition, on road smoky vehicles inspection is needed to identify visible pollution vehicles and ensure that vehicles do not emit more than they are designed to emit by introduction of on road remote sensing monitoring to check the emissions as the vehicles are passing.

- Regulating movement of heavy-duty vehicles: Several industries, mining result in heavy duty truck movement through city which contribute hugely to air pollution. Usually, truck movement is restricted during the day and allowed to pass through or do loading and unloading during night. However, explicit intervention is needed to design highway alignment in a way that they bypass the highly populated residential areas. Industrial areas will require focused freight movement plan and freight terminal and dust control measures to control re-suspension of dust. Long term solution will emerge in shift from road-based freight system to rail based freight movement and use of conveyor belt transport within industries or mining to industrial sites.
- (vi) Traffic Management: Introduction of integrated automated network system or traffic light system through Siemens controller via GPRS network system and use of Smart variable message signs (VMS).
- (v) Technology Upgradation: Introduction of Google Traffic Pilot Project to integrate real time traffic situation with Google Traffic virtual condition reducing the halting time of vehicles and minimizing the air pollution.
- (vi) Underpass and flyover construction at major crossings to reduce traffic congestion.

- (vii) Upgrading PCU emission testing centers to improve in-use emission control and on road monitoring.
- (viii) Enforcement of possession of valid PCU certificate in all vehicles and imposition of penalty for non-compliance.
- (ix) Comprehensive Clean Air Plan to be combined with GRAP. Objective of Graded Response Action Plan (GRAP) is to prevent pollution from getting worse when adverse weather conditions trap and spike pollution and are a series of temporary measures that needed to be initiated at state, district, municipal corporations, transport department, citizen level.

However, inspite of the preparedness plans, due to lack of awareness of citizens regarding these measures and increasing population the problem is getting aggravated.

CONCLUSION: The West Bengal Pollution Control Board is focused on improving the 4'E' for better traffic management i.e. Education, Enforcement, Engineering & Emergency Response, by harnessing the use of modern technology to minimizing the effects of air pollution. The problem of air pollution is a disaster that acquires high magnitude seasonally, is a slow-paced disaster and results in qualitative changes in the total ecology of Durgapur city. The preparedness and mitigation measures for such a disaster are interlinked and move in conjunction with each other and can provide direction for action and be used as guidelines for strategy formulation for future urban planning.

S. Saha
21-1-2023

**DIURNAL VARIATION IN VARIOUS AIR POLLUTANTS
IN DURGAPUR (17.04.2023-23.04.2023)**

9:30 A.M.

DAY	PM10	PM 2.5	SO ₂	NO ₂	O ₃	CO ₂	AQI
MONDAY	111 162 ug/m ³	110 60 ug/m ³	23 23 ug/m ³	5 11 ug/m ³	8 11 ug/m ³	3 548 ug/m ³	
TUESDAY	102. 14 ug/m ³	100 50 ug/m ³	24 23 ug/m ³	7 14 ug/m ³	11 25 ug/m ³	3 587 ug/m ³	102
WEDNESDAY	42. 42 ug/m ³	53 26 ug/m ³	23 37 ug/m ³	4 9 ug/m ³	7 19 ug/m ³	3 586 ug/m ³	53
THURSDAY	66 53 ug/m ³	56 28 ug/m ³	21 25 ug/m ³	6 11 ug/m ³	8 19 ug/m ³	2 419 ug/m ³	56
FRIDAY	56 71 ug/m ³	88 44 ug/m ³	20 21 ug/m ³	7 14 ug/m ³	7 18 ug/m ³	1 237 ug/m ³	
SATURDAY	71 63 ug/m ³	71 35 ug/m ³	23 31 ug/m ³	5 10 ug/m ³	16 24 ug/m ³	2 380 ug/m ³	71
SUNDAY	45 45 ug/m ³	49 24 ug/m ³	28 47 ug/m ³	6 12 ug/m ³	10 24 ug/m ³	2 389 ug/m ³	49

1:30 P.M.

DAY	PM10	PM 2.5	SO ₂	NO ₂	O ₃	CO ₂	AQI
MONDAY	114 102 ug/m ³	108 58 ug/m ³	18 18 ug/m ³	5 5 ug/m ³	15 39 ug/m ³	1 230 ug/m ³	114
TUESDAY	116 105 ug/m ³	108 58 ug/m ³	16 16 ug/m ³	5 10 ug/m ³	21 52 ug/m ³	1 211 ug/m ³	116
WEDNESDAY	69 62 ug/m ³	68 21 ug/m ³	16 16 ug/m ³	3 6 ug/m ³	12 30 ug/m ³	1 191 ug/m ³	69
THURSDAY	106 86 ug/m ³	96 42 ug/m ³	16 16 ug/m ³	4 7 ug/m ³	13 33 ug/m ³	1 179 ug/m ³	106
FRIDAY	112. 99 ug/m ³	102. 52 ug/m ³	16 16 ug/m ³	4 9 ug/m ³	12 30 ug/m ³	1 190 ug/m ³	112
SATURDAY	115 105 ug/m ³	103 53 ug/m ³	21 22 ug/m ³	4 7 ug/m ³	14 36 ug/m ³	1 201 ug/m ³	115
SUNDAY	42. 42 ug/m ³	40 20 ug/m ³	22. 25 ug/m ³	3 6 ug/m ³	14 35 ug/m ³	1 243 ug/m ³	42

5:30 P.M.

Days	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	O ₃	CO ₂	AQI
MONDAY	63	56	17	9	23	1	63
	58 ug/m ³	28 ug/m ³	17 ug/m ³	17 ug/m ³	56 ug/m ³	254 ug/m ³	
TUESDAY	74	61	18	10	25	1	74
	64 ug/m ³	31 ug/m ³	18 ug/m ³	20 ug/m ³	58 ug/m ³	284 ug/m ³	
WEDNESDAY	49	38	16	6	23	1	42
	42 ug/m ³	19 ug/m ³	16 ug/m ³	13 ug/m ³	55 ug/m ³	203 ug/m ³	
THURSDAY	66	45	15	6	18	1	66
	60 ug/m ³	25 ug/m ³	15 ug/m ³	13 ug/m ³	45 ug/m ³	198 ug/m ³	
FRIDAY	70	66	12	4	18	1	70
	63 ug/m ³	23 ug/m ³	12 ug/m ³	9 ug/m ³	45 ug/m ³	210 ug/m ³	
SATURDAY	126	91	16	7	26	1	126
	121 ug/m ³	45 ug/m ³	16 ug/m ³	14 ug/m ³	59 ug/m ³	196 ug/m ³	
SUNDAY	39	27	22	5	18	1	39
	39 ug/m ³	19 ug/m ³	27 ug/m ³	9 ug/m ³	45 ug/m ³	253 ug/m ³	

9:30 P.M.

Days	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	O ₃	CO ₂	AQI
MONDAY	79	71	25	9	17	3	79
	68 ug/m ³	35 ug/m ³	36 ug/m ³	12 ug/m ³	43 ug/m ³	621 ug/m ³	
TUESDAY	103	74	12	13	16	2	103
	84 ug/m ³	37 ug/m ³	12 ug/m ³	26 ug/m ³	30 ug/m ³	320 ug/m ³	
WEDNESDAY	48	39	23	9	16	3	48
	48 ug/m ³	20 ug/m ³	32 ug/m ³	17 ug/m ³	40 ug/m ³	521 ug/m ³	
THURSDAY	67	60	23	8	13	2	67
	60 ug/m ³	30 ug/m ³	31 ug/m ³	17 ug/m ³	23 ug/m ³	410 ug/m ³	
FRIDAY	66	64	23	9	15	2	66
	65 ug/m ³	32 ug/m ³	32 ug/m ³	15 ug/m ³	38 ug/m ³	2440 ug/m ³	
SATURDAY	98	71	22	11	14	1	98
	75 ug/m ³	36 ug/m ³	27 ug/m ³	13 ug/m ³	35 ug/m ³	2671 ug/m ³	
SUNDAY	40	36	22	6	13	2	40
	40 ug/m ³	18 ug/m ³	27 ug/m ³	13 ug/m ³	32 ug/m ³	313 ug/m ³	

SOURCE : www.accuweather.com/in/in/durgapur/191572/airquality-index/191572

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*Subdhan
25/6/2023*

*Examined By
F. M. S.
24/6/2023*

QH EXAMINED

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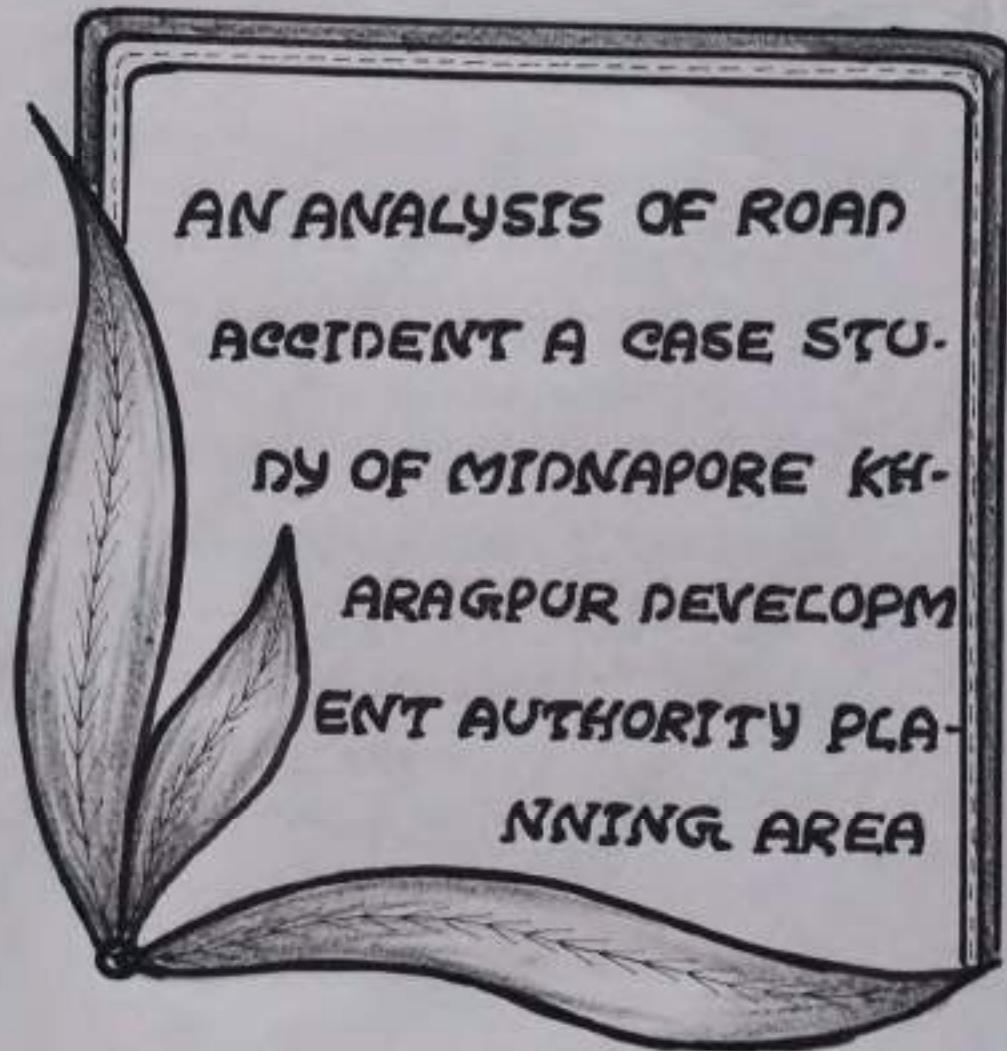
**B.SC - SEMESTER VI, GEOGRAPHY
HONOURS PRACTICAL
EXAMINATION 2023 CBCS
A GROUP PROJECT REPORT ON**

**AN ANALYSIS OF ROAD ACCIDENT. A CASE
STUDY OF MIDNAPORE KHARAGPUR
DEVELOPMENT AUTHORITY PLANING AREA**

PAPER: GEO- A-CC-6- 14-P

REG NO- 561-1211-0385-20

ROLL NO- : 203561-11-0019



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- CAUSES
- CONSEQUENCE & TRAUMA
- RESCUE AND RELIEF
- POST MANAGEMENT
- CONCLUSION
- REFERENCE

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F6	Black spot rate of the study roads.

INTRODUCTION

The road traffic system is considered as the most complex and dangerous system with which people have to deal everyday. Road accidents are increasing day by day mainly because the place of development of transportation infrastructure is somewhat less than that of other sectors such as meal estables and industries road traffic injuries is the eighth leading causes of death at the global level. According to the WHO Global level report on road safety 2018, India accounts for almost 11% of the accident related deaths in the world. According to the "Road Accident" in India 2015, the total number of road accident increased by 25% from 2014 to 2015. Road accident injuries have also increased by 14% from 2014 to 2015. According to "Road Accident" in India 2018, West Bengal ranked at 11th in the countries for total Road Accidents. Geographical Information System has made a noticeable impact is detecting road accident hot spots. Spatial attributes combines with statistical analysis presents a superior way to understands traffic accidents. In the results the reason of accident is vehicle over speed, faults of driven, climate condition, bad over talking and improper highway design. They define the black spot zone yearly, monthly, vehicle type and accident type wise. Thus study express the that proper traffic management is required for future.

STUDY AREA

Midnapore and Rhanagpur Development Authority has two major parts. One is Midnapore town and the other is Rhanagpur town. The congestion is a common problem in this place of daily life. The infrastructure such as proper signaling, maintenance and enlargement of the road is a matter of concern compared to the growing population of this place. Besides, illegal stalls are rapidly growing up beside the road, which has made the daily transportation very complicated. In the same way, the number of automobiles that are primarily responsible for congestion is overgrowing here. In the Midnapore Rhanagpur Development Authority planning area, there are many conjunction points of the different roads where the traffic signal is not available and sometimes it doesn't work correctly. On the other hand reckless driving and breaking traffic rules is a noticeable incident, which has made the accident prone road zone.



FIG.1: LOCATION MAP OF THE STUDY AREA

LITERATURE REVIEW

Yannis T.H (2014) was presented A Review of the Effect of traffic and weather characteristics on Road study. Despite the existence of generally mixed evidence on the effect of traffic parameters, a few patterns can be observed. For instance, traffic flow seems to have a non-linear relationship with accident rates, even though some studies suggested linear relationship with accident. Regarding weather effects, the effect of precipitation is quite consistent and leads generally to increased accident frequency but does not seem to have consistent effect on severity. The impact of other weather parameters on safety, such as visibility, the increasing use of real time data not only make easier to identify the safety impact of traffic and weather characteristics. The more systematic use of real time data may address several of the research gaps identified in the research.

K. Meshram and H.S. Goliya (2013) were presented an analysis of accidents on small portion NH3, Sandore to Bharuch. The data analysis is collected for the period of 2009 to September 2011. Only accident occurred in Manpura region by faulty road geometry. The trend of accidents occurring in urban portion is more than 35% to rate of total accident in each year. This may due to high speed and more vehicular traffic in the present study area. The frequency of total accident are 21 in a week and 6 for minor accident in a week. More number of accidents observe in 6pm to 8pm. At Rajendra Nagar from 2000 onwards the traffic is reduced due to the construction of by passes in that area.

R.R. Dince-A venmanagash (2011) was presented Random parameter models for accident prediction on two lane undivided highways in India. Based on three years of accident history, from nearly 200km highway segment is used to calibrate and validate the models, motorized two wheelers and trucks in traffic. They have concluded with a discussion on modeling result and the limitation of the present study.

Rakesh Uehara and Pradeep Kumar Agarwal (2013) were highlighted the deficiencies in the present state of the art and also presents some basic concepts so that systematic Approach for formulation of a road safety improvement program in India can be developed.

The study presents basic concepts to develop an accident model. It is expected that this study will provide a systematic approach for development of road safety improvement program in India and thus pave the way for improving safety on Indian roads.

Anab Al Qadis et al (2012) differential speed strategies increased the number and rate of car-truck overtakes over the range of volumes considered in this analysis. This suggests a negative effect on safety resulting from differential speed strategy applied to two lane rural highways. On a positive side DCL and MSL strategies have reduced the number of car overtakes of different volumes hence increasing safety. No significant effect was observed concerning differential speed control strategies and both average TTC and P900. The effect on rate was due to volume, highest TTC for cars and car-trucks interactions of very low volumes, decreasing to a minimum in the range between 500 up to 800 VPH low volumes and increasing slightly thereafter. This indicates suggests the highest road crash risk is experienced in the mid volume region. The average speed of traffic decreases in a monotonous fashion with volume with differential speed strategies indicating a downward shift in this relationship.

Michael Williamson and Huang Zhou (2012) were also development of contribution factors for crash prediction models in the new highway safety manual for rural two lane roadways in Illinois. The crash prediction models are called Safety performance functions in the HSM were developed using data from multiple states; therefore the models must be calibrated to account for local factors such as weather, road way conditions and drivers characteristics. It is recommended that local SPFs be developed and compared to the HSM SPF when evaluating the safety of a road ways.

E.S. Park et al (2012) studies the safety effect of wider edge lines was examined by analyzing crash frequency data for road segment with and without wider edge lines. The

data from three states, Kansas, Michigan and Illinois have been analyzed. Because of different nature of data from each state a different statistical analysis approach was employed for each state: an empirical Bayes before after analysis of Kansas data an interrupted time series design and generalized linear segmented regression analysis of Michigan data, and a cross sectional analysis of Illinois data. The consistent findings lend support to the positive safety effects of widened lanes installed on rural, two lane highways. Although the magnitudes of crash reductions were somewhat different from state to state the results point in the same directions.

WHEN HAPPENED

Road Accident data collected from Paschim Medinipur, Kotwali police Station from 2016 to 2019.

CAUSES OF ROAD ACCIDENT

Road accident is most unwanted thing to happen to a road user though they happen quite often. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on part of road users, which cause accidents and crashes. Main cause of accidents and crashes are due to human errors. We are elaborating some of the common behaviours of humans which results in accident.

1. Over Speeding
2. Drunken driving
3. Distraction to Driver
4. Red Light jumping
5. Avoiding Safety Gear like seat belt and helmets
6. Non adherence to law driving and overtaking in a wrong manner.

OVER SPEEDING :

Most of the fatal accidents occur due to over speeding. It is a natural psyche of humans to excel if given to a chance man is prone to achieve inflty in speed. Increase in speed multiplies the risk of accident and severity of injury during accident. The ability to judge the forthcoming events also gets reduced while driving at fasten speed which causes error in judgement and finally a crash.

DRUNKEN DRIVING :

Consumption of alcohol to celebrate any occasion is common. But when mixed with driving it turns celebration into a misfortune. All these factors while driving cause accidents and many a times it proves fatal. Apart from alcohol many drugs, medicines also effect the skills and concentration, the risk of accident doubles.

Arshdeep Singh
Date: 10/10/2023

DISTRACTION TO DRIVER :

Though distraction while driving could be minor but it can cause major accidents. Distraction could be outside or inside the vehicle. This division of brain hampers reaction time and ability of judgement. Some of the distractions on road are : 1. Adjusting mirrors while driving 2. Radio in vehicle 3. Animals on the road 4. Banners and billboards.

RED LIGHT JUMPING :

It is a common sight at road intersections that vehicles cross without caring for the light. It has also been seen that the red light jumper crosses the intersection with greater speed to avoid crash and challan but it hampers his ability to judge the ongoing traffic and quite often crashes.

CONSEQUENCES & TRAUMA

Road accidents can have devastating effects on individuals, families and communities.

Physical Injuries : From minor cuts and bruises to severe injuries such as broken bones, spinal cord injuries, traumatic brain injuries and concussions. These injuries can impact a person's health and well-being leading to long-term disabilities and reduced mobility.

Loss of Life : Losing a loved one in a road accident can profoundly impact family members, friends and communities. The emotional and psychological toll can be significant and grieving can take a long time.

Financial Burden : Victims may face medical bills, property damage and lost wages which can add up quickly. In some cases victims may also face legal fees and other expenses related to their accident.

Disability and Reduced Mobility : Disabilities can be temporary or permanent and require ongoing medical treatment and rehabilitation. This can be costly, time-consuming and impact a person's mental health and well-being.

Social and Economic Impact : Road accidents can also have a broader social and economic impact, affecting communities and entire countries. The cost of medical care, lost productivity, property damage can be staggering and the impact on families and individuals can lead to increased reliance on social services and support programs. Governments and communities need to invest in road safety initiatives.

TRAUMA

Survivors may experience shock, anxiety, depression and post-traumatic stress disorder and struggle with guilt, anger and fear. It can also impact a person's relationships and social interactions, leading to isolation and further mental health problems.

ROAD ACCIDENT OF MONGAPORE KHARAGPUR DEVELOPMENT AUTHORITY PLANNING AREA

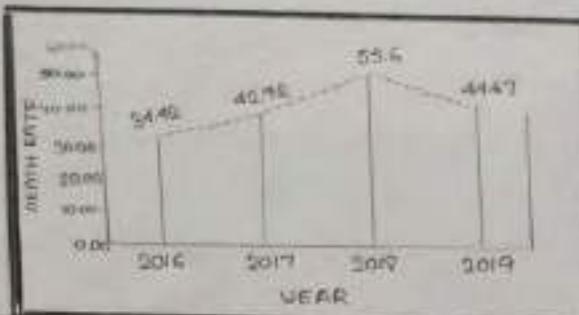


FIG.2 : DEATH RATE OF THE STUDY AREA

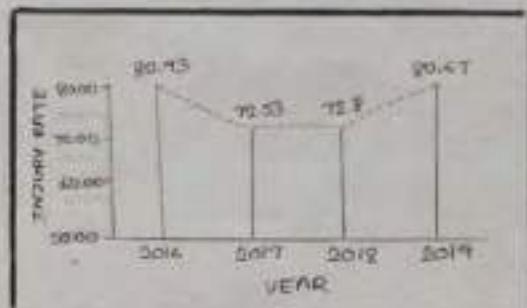


FIG.3 : INJURY RATE OF THE STUDY AREA

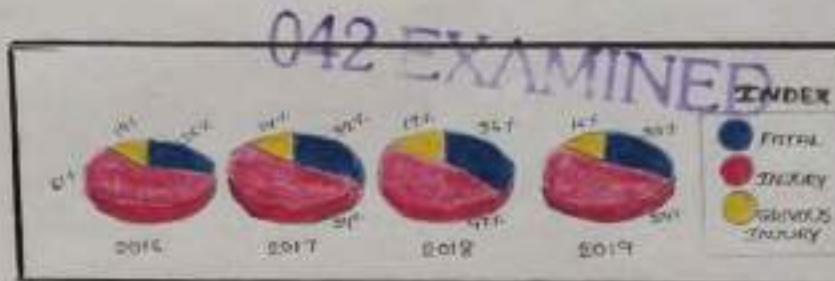


FIG.4 : ACCIDENT BASED IN VICTIMS CONDITIONS

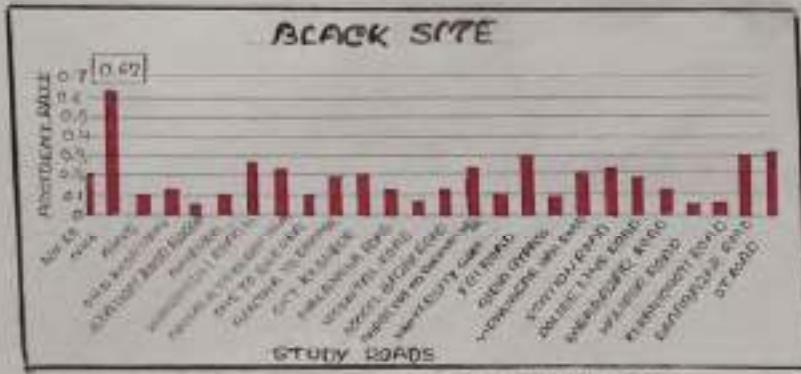


FIG.5 : BLACK SITE RATE OF THE STUDY ROADS

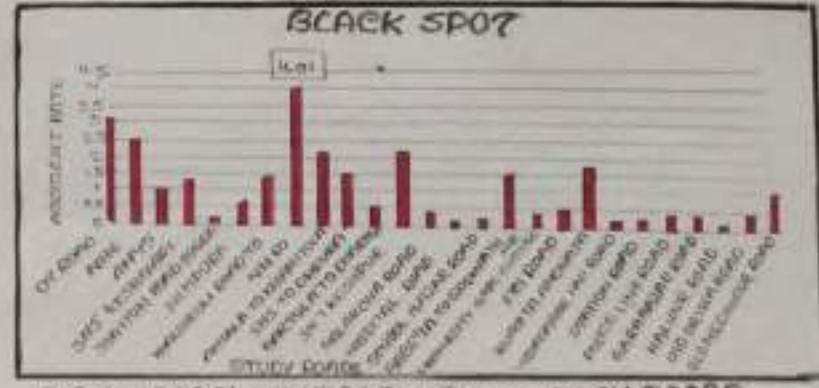


FIG.6 : BLACK SPOT RATE OF THE STUDY ROADS

Signiture
21/6/23

RESCUE AND RELIEF

Rescue and relief response is the second phase of disaster management where aim evacuation, transportation of survivors, search and rescue, emergency medical services and drops or restoration of infrastructure is required. We are going to look at each of these life saving step that can help a road accident victim.

- Arriving at the accident scene

When you come across a road accident, the first thing you need to know is whether the scene is safe to enter and accessible before attempting to render first aid. This is to ensure your safety first before helping the ca.

- Check for Injuries

If you have been injured in the accident check yourself first for any injuries or bleeding. If others are injured assess the extent of their injuries. Look for any bleeding in the head, neck, arms, legs, abdomen and other parts of the body.

- Call Ambulance Services

Immediately call for an emergency ambulance or emergency medical services to inform them about the incident and ask them advice to resuscitate and rush the victim to the nearest medical facility.

- Check for obstructions in the mouth or throat

If the victim has stopped breathing check his mouth for any obstruction. Use your index and middle fingers to remove the obstruction and to clean the airway.

- Perform Life-Saving techniques

If there is no pulse and the victim is unresponsive and not breathing perform CPR immediately.

ly. Place the victim's body in the recovery position keep the neck straight then proceed with CPR.

• Treat bleeding wounds

A clean cloth or soft pad can stop bleeding by applying continuous pressure to the open wound. Press down with your palms and treat the fracture.

• Dealing with spinal injuries ~~Always suspect spinal injuries~~

Neck and spinal injuries are expected in a road accident. If the victim is unconscious or the neck is not normally placed, it's best not to move the victim unless there is immediate danger. Rough handling or moving the victim with suspected neck and spinal injuries can cause more harm.

• Keep the victim warm

Victims feel excessive cold after the accident due to shock. Therefore, keeping them warm is crucial for their survival. Use a jacket, a pullover, or what ever is available on-the scene.

To prevent the incident of road accidents in the country, we need to know how to deal with road-traffic accidents. Attend a first aid course to learn the basis of first aid. Learn how to save lives with simple skills that you can learn in just a few hours.

A handwritten signature in black ink, appearing to read "Rishabh". Below the signature, the date "21/10/23" is written vertically.

ROAD ACCIDENT



BUS ACCIDENT



BUS ACCIDENT



RESCUE



ALCOHOLIC TESTING



CAR-TAXI ACCIDENT



TRUCK-BIKE ACCIDENT

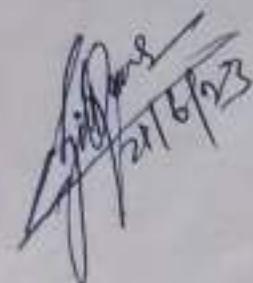
POST MANAGEMENT

Post management of road accident response should be enhanced and health and other agencies should be ensured to provide appropriate emergency treatment and long term rehabilitation accident victims.

1. Ensure pre hospital care produces, including removing the injured persons from the vehicle after an accident and calling the national emergency services telephone no 112 or calling an ambulance first observe and see where the person has pain neck, head, legs, whether the physical condition of the person is worse, whether the person can breathe etc.
2. Quality of care should be ensured by improving hospital trauma care systems and implementing good practices on trauma care systems and quality assurance.
3. The united nation has announced a uniform formula of 5 pillars to prevent road accidents to world decide. The 5 pillars are - A) Road Safety Management B) Risk Free Vehicles C) Conscious Road users D) Post Road accident Action and E) Ensuring appropriate driving Environment.
4. The importance of the "Golden Hour" in giving a adequate treatment to the accident victim in saving the injured should be highlighted to both the health personal and the community.
5. The road transport ministry will create a fund to provide immediate hospitalisation expenses to road crash victims to ensure no one is deprived of medical care for want of money or attendant.

CONCLUSION

The study was an attempt to find out the most vulnerable accident locations in the Midnapore khanapur Development Authority planning area using GIS techniques. A total of twenty six roads are selected for the study, in which national highway, state highway, and district roads are included. The black spot analysis method was used to find the accident locations. Based on the analysis, national highway six (NH 6) and sixty (NH-60) were identified as the most vulnerable accident locations. From 2016 to 2019 out of a total of 848 accidents, 318 incidents have happened between the two roads. The highest black spot was found at National Highway sixty (NH-60), where 83 events happened at the same road parts in the period of 2016-2019. The black spot vulnerable value of this road is 4.01. The method is considered to be useful in identifying the black spots from sufficient secondary data. In addition to this study, we used kernel density to find out the accident density. From 2016 to 2019, highest density has been found in the western part of Midnapore town, where NH-60 passes through. In this study, we also found another high density where NH-6 passes, but from 2016 to 2019, this accident density decreasing slowly. The low density was found in the rest of the study area.



A handwritten signature in black ink, appearing to read "Rajib Majumder" followed by the date "21/07/23".

APPENDIX

TABLE 1 : The Number of traffic accidents within MKDA Planning Area

YEAR	OCCUREN CES	VICTIMS (PERSONS)		
		FATAL	INJURY	GRIEVIOUS INJURY
2016	215	74	174	38
2017	233	100	169	15
2018	250	139	182	63
2019	150	67	121	36

TABLE 2 : The Number of death Rate

YEAR	DEATH RATES
2016	34.42
2017	42.92
2018	55.6
2019	44.67

TABLE 4 : The number of accident rate (Black sites)

PLACE	ACCIDENT RATE
NH60	0.2
NH6	0.62
AH15	0.1
SH5 Keshiyanvi	0.12
station Road Bagda	0.05
Nimpuna	0.1
Khalakshuli Road to Ambala to Kenanilala	0.25
Ambala to Kenanilala	0.22
SH5 to Dherua	0.1
Ambala to Dherua	0.19
SH7 Keshpuri	0.2
Malancha Road	0.11
Hospital Road	0.08
School Bazaar Road	0.12
Berabaria to Gopinathpur	0.22
University College	0.1
PCI Road	0.3
Dinla bypass	0.9
Vidayashagar Hall Road	0.1
station Road	0.11
Police Line Road	0.7
Banabazar Road	0.11
Nalipur Road	0.05
Kenanilala Road	0.07
Dogaribazar Road	0.09
OT Road	0.91

TABLE 3 : The number of injury Rate

YEAR	INJURY RATES
2016	80.93
2017	72.53
2018	92.8
2019	80.67

TABLE 5 : The number of Accident Rate (Black spots)

PLACE	ACCIDENT RATE
OT Road	2.2
NH6	2.5
AH45	1
SH5 Keshiyanvi	1.3
station Road Bagda	0.2
Nimpuna	0.6
Khalakshuli Road to	1.4
NH60	4.01
Ambala to Kenanilala	2.1
SH5 to Dherua	1.5
Ambala to Dherua	0.5
SH7 Keshpuri	2.1
Malancha Road	0.4
Hospital Road	0.1
School Bazaar Road	0.2
Berabaria to Gopinathpur	1.5
University College	0.4
PCI Road	0.5
Bilikila Amchada	1.7
Vidayashagar Hall Road	0.2
station Road	0.3
Police Line Road	0.4
Banabazar Road	0.4
Nalipur Road	0.1
Kenanilala Road	0.9
Dogaribazar Road	1.9

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B. Dudge.



UNIVERSITY OF CALCUTTA



B.A / B.Sc. Semester VI
Geography Honours Practical
Examination, 2023 CBCS

A GROUP PROJECT REPORT

ON
THE IMPACT OF CYCLONE
AILA ON INDIAN SUNDARBAN

PAPER : GEO-A-CC-6-14-P

REGISTRATION NO. : 561-1112-0392-20

ROLL NO. : 203561-21-0013



THE IMPACT OF CYCLONE
AILA ON
INDIAN SUNDARBAN

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INTRODUCTION: Natural disaster can happen at any place at any time. The disaster that hit various parts of the world depends on the climatic conditions of a place. Cyclone one one of the natural hazards that affect India almost every year causing large loss of lives and properties. Hazards associated with tropical cyclones are long duration rotatory high velocity winds, very heavy rain and storm tide. India has a coastline of about 7576 km of which 5200 km is along the mainland. The entire coast is affected by cyclones with varying frequency and intensity. Although the North India Ocean generates only about 7% of the work cyclone their impact is comparative high and devastating, especially when they strike the coasts bordering the North Bay of Bengal.

Four States (Tamil Nadu, Andhra Pradesh, Orissa and West Bengal) and one Union Territories Puducherry on the east coast and one state Gujarat on the west coast are more vulnerable to cyclone hazards. Among them Sundarbans in W.B is one of the hazard prone zones in India so, I have selected this zone on my study area.

The Indian Sundarbans has witnessed many major tropical cyclones that caused extensive damage to the area. Some of the more destructive of these occurred in 1833, 1864, 1942, 1976, 1988 and 2009.

The Severe tropical cyclone Aila struck on 25 May 2009, causing most widespread inundation of the area in living memory. Aila made its landfall in the West Bengal coast at Sagar Island between 1:30 and 2:30 pm India Standard Time (IST).

OBJECTIVES: The objectives of this project are

- * To find out pisa affected zone in Indian Sundarbans.
- * To analyse the impact of Severe cyclone Aila in Sundarbans area.
- * To identify highly effected areas.
- * To focussed on disaster preparedness with emphasis on mitigation major measures.
- * To Review the impact of this cyclone on the environment and socio-economic condition.

METHODOLOGY: The study is based on secondary data which has been collected from several publications in different journal and website. After collecting data, we analysed the data and represents by different maps and diagrams.

STUDY AREA: Aila is one of the important and vulnerable cyclones, which occurred on May 25, 2009, at around 12 noon. The storm badly affected four districts of West Bengal normally South 24 Parganas, North 24 Parganas, Howrah and Kolkata. Sundarbans were very badly affected by this cyclone, the main aim of this paper is to discussed the effect of Aila on Sundarbans. It is mangrove area in the delta formed by the confluence of the Ganges, Brahmaputra and Meghna river in the Bay of Bengal.



LITERATURE REVIEW: The Aila cyclone of 2009 was a severe tropical storm that struck the Indian states of West Bengal. Several studies have been conducted on the impact of the Aila cyclone in West Bengal, focusing on different aspects of the disaster. A literature review of some of the studies on the Aila cyclone in West Bengal is presented below.

* "Assessment of post cyclone Aila agricultural damage in sundarbans, West Bengal, India" by Biswas (2013) assessed the damage caused by the Aila cyclone to agricultural lands in the Sundarbans region of West Bengal.

* "Cyclone Aila and its aftermath: a study of the Sundarbans" by Ghosh (2010) examined the impact of the Aila cyclone on the Sundarbans region of West Bengal, focusing on the social and

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Economic implications of the disaster.

- * "Cyclone Aila and the Sundarbans: from disaster to recovery" by Shaw and Malick (2011) this study analysed the responses of the government and non-government organizations to the Aila cyclone in the Sundarbans region of West Bengal.
- * "Aila cyclone and women's vulnerability in coastal West Bengal, India" by Dutta (2010) focused on the gender-specific impact of the Aila cyclone on women in the coastal areas of West Bengal.
- * "Cyclone Aila and its impact on the economy of the Sundarbans" by Dasgupta (2011) examined the impact of the Aila cyclone on the economy of the Sundarbans region of West Bengal.

CASE STUDY: Severe cyclone Aila hits the coastal part of West Bengal particularly Sundarbans at around 14 hours on 25 May, 2009. Cyclone Aila struck the Sagar Islands at around 12 noon, with wind reaching 120-140 km per hour accompanied by torrential rain of about 400 mm. The storm badly affected four districts of West Bengal,

namely South 24 Parganas, North 24 Parganas, Howrah and Kolkata. Many blocks in Sundarbans were severely affected by Aila. The major rivers like Malda, Gobinda, Piyali-Bidyasharmi, Munni-Ganga, Haldi and Haminbhanga were flooded and about 500 km embankments on the village side were washed out and have caused large scale flooding, leaving lakhs of people



SOURCE - TMD REPORT

marooned in the area. The field camps were under 12 to 15 feet of water for around 12 hours and waterlogging was for almost a week, resulting in soil erosion and huge damage to mud houses, particularly in the malda river Bank.

Saltwater gushed in through breaches in the river dykes and inundated houses and lands. Almost 60% of the area in these

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25-5-23

2 districts has been rendered uncultivable and not suitable for making seedbed. It is caused a havoc in 5 blocks (Sandeshkhali I, II, minarhan, Hasnabad and Hingalganj) of North 24 Parganas. In earning II about 1300 bighas of land was under saline water. In south 24 parganas all the 13 blocks were affected by the saline water. In Sandeshkhali I and II and Hingalganj blocks about 70-80 poultry farms got completely shattered.

Formed	May 25, 2009
Dissipated	May 27, 2009
Highest winds	3 minutes sustained : 110 km/h (70 mph)
Lowest pressure	1 minutes sustained : 120 km/h (75 mph) 968 hpa (mban); 28.59 in Hg

IMPACT: cyclone Aila was a category 1 cyclone that struck the coastal regions of India on May 25, 2009. The impact of cyclone Aila was devastating and the region is still recovering from the damage caused by the storm.

IMPACT ON AQUACULTURE: Aquaculture is one of the important primary activities in Sundarbans, most of the villagers in different blocks of Sundarbans are dependent on this aquaculture, which were drastically destroyed by Aila. It destroyed most of the aquaculture ponds in Sundarbans area. change in fish collection in this area over time period 2005 to 2012. The total aquaculture area was 288 hectare in 1990 and 2163 hectare in 2005, it increases to 6471 hectare in 2008. But this aquaculture area was drastically reduced to 2312 hectare after Aila (Draupadi diagram).



CHANGE IN RESOURCE HARVESTING: Sundarbans

owns huge natural resources. Livelihood of large number of people living surrounding the forest depends on this ecosystem of Sundarbans. According to forest resource harvesting inventory, main resource of Sundarbans are honey and wax. Cyclone Aila caused different impacts on different ecosystem services. The impact of Aila on honey and wax harvesting reduced day by day. Honey collection in Sundarbans found lowest in the sequence from 2008 to 2013. Deterioration of honey production might be due to super cyclone Aila. Honey harvesting increase again after 2013. (Compound bar).

EFFECTS ON RESOURCE HARVESTING



SOURCE: RECORDS OF THE GOVT. OF W.B.DM.

TIMBER COLLECTION: Besides agriculture and aquaculture, timber collection is one of the important primary activities in Sundarbans. The villagers of this area collected the timber from the forest like Ganan, Grena and Sundari. After the Aila, the state government as well as local government strictly prohibited the cut down of trees specially Grena, which decrease the trends of timber collection of Grena after 2009.

IMPACT ON AGRICULTURE: When Aila roared through Bengal in May 2009, agroarian communities in low lying Sundarbans lost all standing crops, overnight. To the tropical cyclone it has been a decade since cyclone Aila roared the Bay of Bengal. But paddy farmers Tapan Mondal is happy of growing legumes and watermelon in the still recovering soil of the Sundarbans. In the aftermath of Aila,

agriculture fields in the sundarbans lay marooned in salt water as flood waters had gushed in, breaching embankments. For the next few months, water stagnated in the low lying field, increasing up salinity and rendering farms unproductive of the total agriculture land affected by Aila, 21.65% were affected in North 24 parganas and 26.93% land were affected in South 24 parganas, so 48.58% of the total affected agriculture land fall in the sundarbans area.

CHANGES IN WATER QUALITY:

Aila induced water quality changes in Sundarbans. Post Aila period the different components in water became changed which affect the water quality. In pre I live

nitrate was 22.68 microgram atom per litre which increases upto 28.52

microgram atom per litre during post aila period. Increased the concentration of phosphate in water up to three times than the previous concentration.

During post Aila period like nitrate and phosphate the others component like pH, salinity, BOD, COD also changed. (Star diagram) During the

cyclonic storm the modi tides rivers and sundarbans had undergone a temporary phase of this equilibrium in terms of sediment accumulation and erosion process. The turbidity of water increase because of sudden impact of the tide associated with high wave.

CHANGES OF WATER QUALITY



■ PRE CYCLONE SCALE
■ POST CYCLONE 1cm=5

SOURCE: W.B.GOVT. REPORT

IMPACT OF BIO-DIVERSITY:

The Sundarbans, a region which houses 265 of the endangered Bengal tigers, was inundated with 6.1m of water. Dozens of the tigers are feared to have drowned in Aila storm surge along with deer and crocodiles. As of 27 May 2009, one

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tiger has been found alive; it was found in a waterlogged cowshed following the cyclone's landfall. Additionally, the forest remains under an estimated 2.4 m of water. On 27 May, conservationists have begun a search for the tigers throughout the forest.

According to the 2011 tiger census, the Sundarbans have about 270 Royal Bengal tigers. The balance in the ecosystem is often disturbed due to the cyclones. Because of large water bodies on all sides covering about 1700 km the Sundarbans area is inundated by cyclones.

INCREASE SALINITY: About 680 km embankments on the village side were washed out and have caused large scale flooding, leaving lakhs of people marooned in the area. The field embankments were under 12 to 15 feet of water for around 12 hours and waterlogging was for almost a week, resulting in soil erosion and huge damage to mud houses, particularly in the Mahla riverbank.

Saline water gushed in through breaches in the river dykes and inundated houses and lands. Almost 60% of the area in these 2 districts has been rendered uncultivable and not suitable for making seedbed. It has caused a havoc in 5 blocks of North 24 Parganas. In Canning II about 1300 bighas of land was under saline water. In South 24 Parganas all the 13 blocks were affected by the saline water.

SOCIO-ECONOMIC IMPACT: Approximately 920000 houses have been damaged, the majority of them in Sundarbans. (chart)

SL No.	PARTICULARS	EXTENT OF DAMAGES
1.	Number of villages Affected	4249
2.	Size of Affected population	25,62,442
3.	Number of people missing	8000

AFTERMATH OF CYCLONE AILA



Impact Aila



High Tide during Aila



House Collapsed



Going To Relief Centre



Aftermath of Aila

SL NO.	PARTICULARS	EXTENT OF DAMAGES
4.	Number of Death	70
5.	Length of embankment breached	400 Kilometers
6.	Number of cattle Lost	212851
7.	Total area of Agriculture land affected	125872 hectares
8.	Estimated Financial Loss in Agriculture	Rs. 337 crores
9.	Number of house Partially Damaged	134701
10.	Total Loss	Rs. 1495.63 crores

SOURCE : Unpublished Records of the government of West Bengal (2009 - 2010).

TRAUMA: Trauma is an immediately after the event, shock and denial are typical. Longer term reactions include unpredictable emotions, strained relationships and even physical symptoms like headaches. Many farmers became traumatized to see the destroy of their cultivated crops with in a second. Presently, to hearing a news of cyclone they become anxious about their crops. A 70 years old woman, became depressed watched helplessly as the tides washed away her mud house and cattle. During cyclone management authorities have rescue the affected people an old woman decided to stay amid the ruins of what used to be her home, perhaps due to the trauma that is so evident on faces here many of them became hopeless to see the devastating effects of Aila. After seeing this devastating cyclone many people became stressed and traumatized. Fisherman are always anxious in this may month for the devastating effects of cyclone.

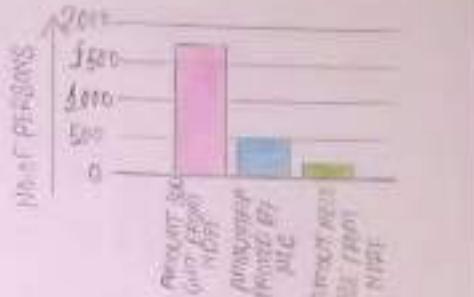
RESCUE AND RELIEF: The state government carried out rescue operations in south 24 Parganas district. chief minister Buddhadeb Bhattacharjee visited many of the affected island in the Sundarbans delta and held meetings with the district administration and Police officials at Jambagarh and nimith villages to chalk out plans

for the rescue operation.

The Sundarbans development authority has started rescue operation in different parts of the district. Komti Gronguly did the army had been called for carrying out rescue operations in different parts of Sundarbans Island.

Addressing hundreds of homeless villagers at a temporary rescue camp assured them to give compensation within next two days. Thousand of pouches of drinking water has been distributed among the cyclone victim and the state government has been distributed among the cyclone victim and the state government has also opened several community kitchens across Sundarbans region. Roughly 100 relief camps were established in West Bengal shortly after the storm passed. On 27 May, 400 forces from the national disaster response force were deployed to the state for relief operations.

RELIEF FUND BY NDRC



SOURCE : DISASTER MANAGEMENT DEPARTMENT

POST MANAGEMENT : Here are some of the post managements were carried out in West-Bengal following the cyclone -

***RESCUE AND RELIEF OPERATIONS** : The government of West Bengal launched a massive rescue and relief operation in the wake of the cyclone. The Indian army, navy and Air force were deployed to assist in the rescue and relief efforts.

***REHABILITATION EFFORTS** : The government of West Bengal launched rehabilitation efforts to help the affected people rebuild their homes and livelihoods. The government provided financial assistance to the affected people to help them rebuild their homes and restart their businesses.

***MEDICAL ASSISTANCE** : The government of West Bengal also set up medical camps to provide medical assistance to the affect

ed people.

* **DISTRIBUTION OF RELIEF MATERIALS** : The government of West Bengal distributed relief materials, such as blankets, clothes and food to the affected people.

* **RECONSTRUCTION OF INFRASTRUCTURE** : The cyclone caused extensive damage to infrastructure, such as roads, bridges and buildings. The government of West Bengal launched reconstruction efforts to repair and rebuild the damaged infrastructure.

PRE-AWARENESS :

* **AWARENESS CAMPAIGNS** - The government of West Bengal launched awareness campaigns to educate people about the dangers of cyclones and the measures that can be taken to protect themselves. The campaigns included the dissemination of information about the cyclone through television, radio and print media.

* **EARLY WARNING SYSTEMS** - The government of West Bengal established early warning systems to alert people about the impending cyclone. The government installed sirens in vulnerable areas to warn people about the approaching cyclone. The government also used mobile phone networks to send out alerts to people in affected areas.

* **CAPACITY BUILDING** - The government of West Bengal also initiated efforts to build the capacity of government officials and other stakeholders to better prepare for and respond to disasters. Training programs were conducted to enhance the skills of government officials, emergency responders and other stakeholders.

RESCUE OPERATION



Cyclone Relief Centre



Management Embankment



Satellite views of Sundarbans after Alia



Distribute essential Goods



Medical Camp

CONCLUSION

The Aila cyclone provided several valuable lessons in disaster management, including the need for effective early warning systems, evacuation plans and emergency response mechanisms. Overall, the Aila cyclone was a tragic event, but it also provided an opportunity to learn valuable lessons and make important improvements in disaster management and response efforts. By working together, stakeholders can ensure that the people of West Bengal are better prepared and response equipped to withstand future natural disasters. The lessons learned from the Aila cyclone will be critical to building a more resilient and sustainable future for the people of West Bengal.

Sumantra
26.06.23

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APPENDIX

1. AQUACULTURE

YEAR	HARVESTING AMOUNT IN QUINTAL
2008	6471
2009	6842
2010	2312
2011	2545
2012	3272

2. RESOURCE HARVESTING

YEAR	HONEY	WAX
2008	213	50
2009	168	44
2010	213	51
2011	219	51
2012	163	63

3. CHANGES IN WATER QUALITY

	PH	SALINITY	DO	BOD	COD
PRE	8.3	6.6	5.6	1.1	10.4
POST	7.9	19.5	4.3	2.2	6.5

4. FOLLOWING CHART SHOWING THE FUND GIVEN BY DIFFERENT AUTHORITIES RS. IN CRORE

SL. NO.	STATE	AMOUNT SOUGHT FR- OM NCDF	AMOUNT APPRO- VED BY HIGH LEVEL COMMI- TTEE (HLC)	AMOUNT RELEASE FROM NCCF
1.	WEST BENGAL	1743.14	616.86	166.87

UNIVERSITY OF CALCUTTA



**B.A / B.Sc. Semester VI Geography
Honours Practical Examination, 2023
CBCS**

A GROUP PROJECT REPORT

ON

**SOCIO-ECONOMIC IMPACT OF ARSENIC
CONTAMINATION IN DIFFERENT BLOCKS OF
MALDAH WEST BENGAL**

PAPER : GEO-A-CC-6-14-P

REGISTRATION NO. : 561-1211-0383-20

ROLL NO. : 203561-11-0017

SOCIO-ECONOMIC IMPACT OF
ARSENIC CONTAMINATION IN
DIFFERENT BLOCKS OF MALDAH WESTBENGAL

CONTENT

1	Introduction
2	objective
3	Materials and method
4	Study area
5	Literature Review
6	case study
7	Causes (Natural, Anthropogenic)
8	Effect (Health effect, Economic impact, Environment impact, socioimpact)
9	Trauma
10	Mitigation
11	Preparedness
12	Conclusion
13	References

Introduction Arsenic (As) is a ubiquitous metalloid element that ranks 20th in crustal abundance. It enters into the groundwater and food chain due to its association with rocks, sediments and soils as well as its discharge from industrial sources and the use of pesticides. It is a toxic substance with exceedingly diverse forms of poisoning. Different species of As affected well water in different degrees of toxicity of these As-S causes the most damage (Mukherjee, A.B.). The world Health organization (WHO) marked this calamity as "the largest poisoning of a population in history" (Smith, et. al, 2000). Arsenic contamination of groundwater is often due to naturally occurring high concentrations of arsenic in deeper levels of groundwater. It is a high-profile problem due to the use of deep tube wells for water supply in the Ganges Delta, causing serious arsenic poisoning to large numbers of people. Chronic toxicity due to drinking of arsenic contaminated groundwater is a major environmental health hazard throughout the world including India. In India occurrence of arsenic in groundwater has been reported from West Bengal, Bihar, Jharkhand, Chattisgarh, Uttar Pradesh and Assam. Though many states have been identified with significant arsenic contamination in groundwater in India. The major affection was detected as early as 1983 in West Bengal. Significant effluent has been observed in the district of Malda, Barddhaman and North and South 24 Parganas. In the past several studies have been carried out in many arsenic affected districts of West Bengal but no such study has so far been done in Malda district. In this paper we have discussed about the seven arsenic affected blocks of Malda district in West Bengal.

Objectives of the Study :-

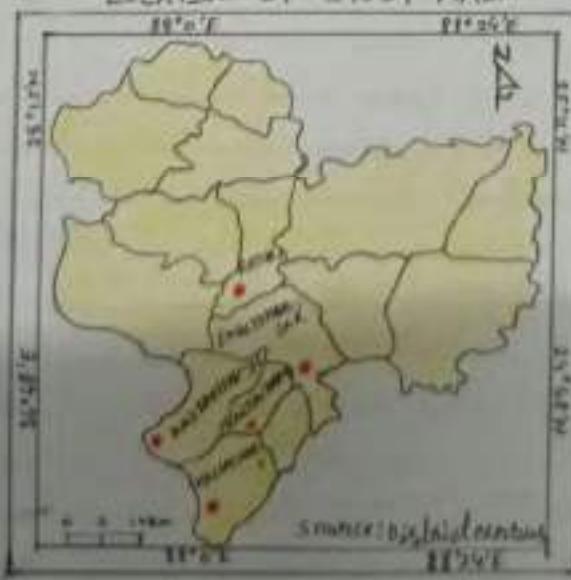
1. To Known the extent of problem in West Bengal with reference to Malda.
2. To indicate the major affected areas of Malda district.
3. To find out the causes of high incidence of arsenic in groundwater of Malda.
4. To study the extent of impact of arsenic contaminated water.
5. To focus on efforts made by the state government as well as local government to tackle the problems.
6. Lastly discuss about the people awareness and preparedness plan of arsenic contamination.

Materials and method: For preparation of this project the data have been collected from secondary sources. e.g. different Govt Reports, Journals, Articles, Internet and West Bengal pollution control board. Factors responsible for As contaminations in water and their effects on human health have been discussed. The areas of highly contamination in groundwater in the course of the study.

Study area: Arsenic contamination of ground water in West Bengal was reported in the early eighties. Till date 1312 villages and 15 Non Municipal urban areas and urban agglomerates in 05 blocks and 9 municipalities in 8 districts are reported as arsenic affected areas. These districts are Malda, Murshidabad, Nadia, North and South 24 Pargana, Howrah, Hugli and Burdwan (CPCB, 2003). In West Bengal this problem comes into focus during the mid of 1980's in few villages of North 24 Pargana, South 24 Pargana, Nadia, Murshidabad and Burdwan. By the end of 2006 this problem spreads from few villages to 3235 villages of 73 blocks of 8 districts. As contaminations is gradually spreading and the affected area are increasing.

out of 19 district in 8 district of West Bengal covering area of about 34000 sq. km with a population 30 million. According to WHO permissible limit of arsenic in ground water is 1 mg/l. But from 2003 Bureau of India Standards (BISI) has also revised the limit of arsenic in drinking water from 0.05 to 1.0 mg/l. Above 8 districts are come into this limit. Malda is one of the major arsenic affected region in West Bengal. So we have selected this Malda district as our project study area.

LOCATION OF STUDY AREA



Literature Review: For this project we have reviewed the following literature related to arsenic contamination.

- Bidyut Kumar Sengupta started about the arsenic contamination of ground water in west Bengal with its impact on social and health condition of the people in his paper 'Arsenic contamination of ground water in west Bengal'.
- A.K. Singh analysed the causes and consequences of arsenic contamination. In ganga Brahmaputra river basin on his paper 'chemistry of arsenic in ground water of ganga Brahmaputra River Basin'.
- The report on Arsenic contamination statistics published of Ministry of Jalshakti. in Delhi (Dec, 2022).
- Debendranath Gaha and Aloka Kumar Gosh have described the the causes and scenario of arsenic contamination in Malda with its mitigational measures in there paper 'Arsenic contamination in Malda .WB'.

Case study:-

Major Arsenic affected area of malda District:-

The affected blocks 1. Kaliachak-I: It is a high populated block of Malda district. Total 66 Mouza come under this block. 352,181 people live in 325 habitation.

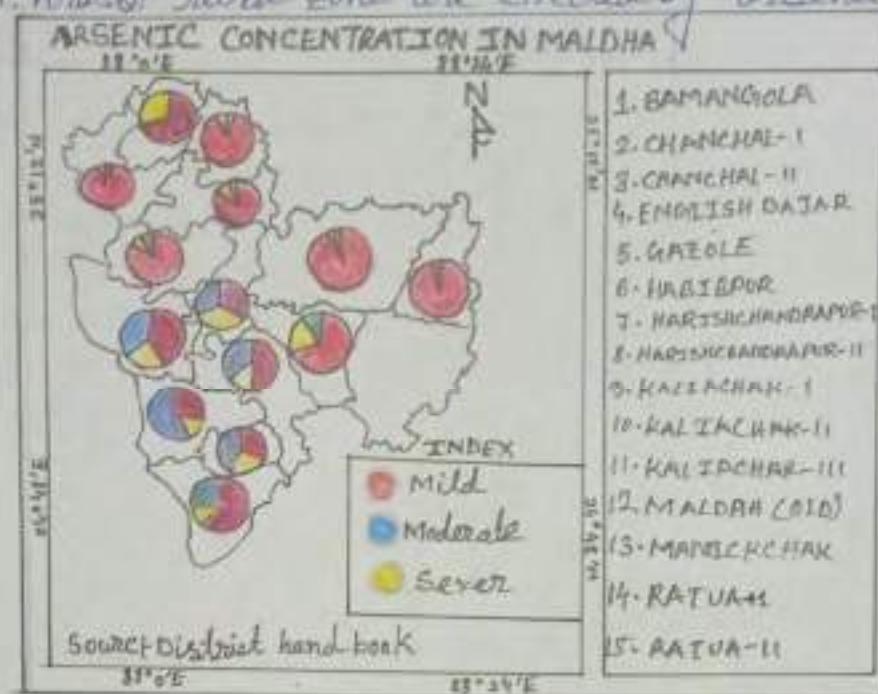
2. Kaliachak-II :- 67 Mouzas are present under Kaliachak-II. 275,845 people are live in 148 villages. Kaliachak-II is highly affected by arsenic 60% area of this zone are come under highly arsenic affected zone.

3. Kaliachak-III: 46 Mouzas are present under Kaliachak-III. 265,097 people are live in 88 villages.

4. Manikchak: Manikchak block holds a large number of area. Total 282,150 people are live in 250 villages in 91 mouzas.

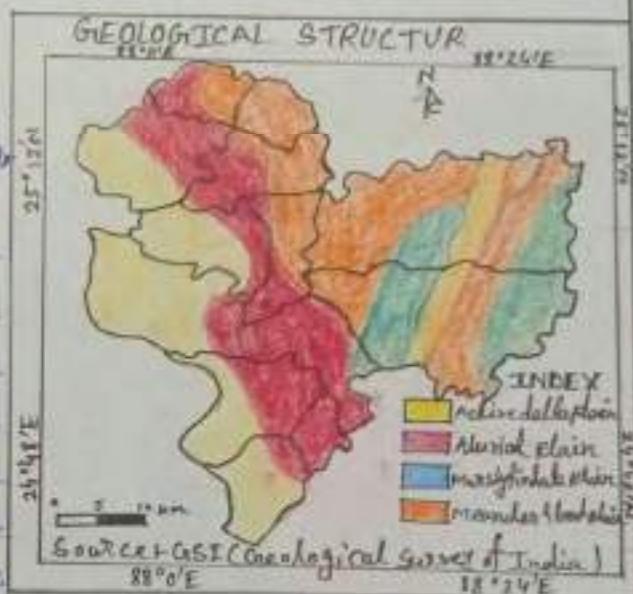
5. English Bazar: In English Bazar 286,786 people are live in 252 villages in 135 mouzas. It is notified that there are urban populations under English Bazar block but among the urban areas there are no place found which is affected by

arsenic some areas of zone are affected by arsenic.
 6. Rural: Areas of rural zone are effected by arsenic.



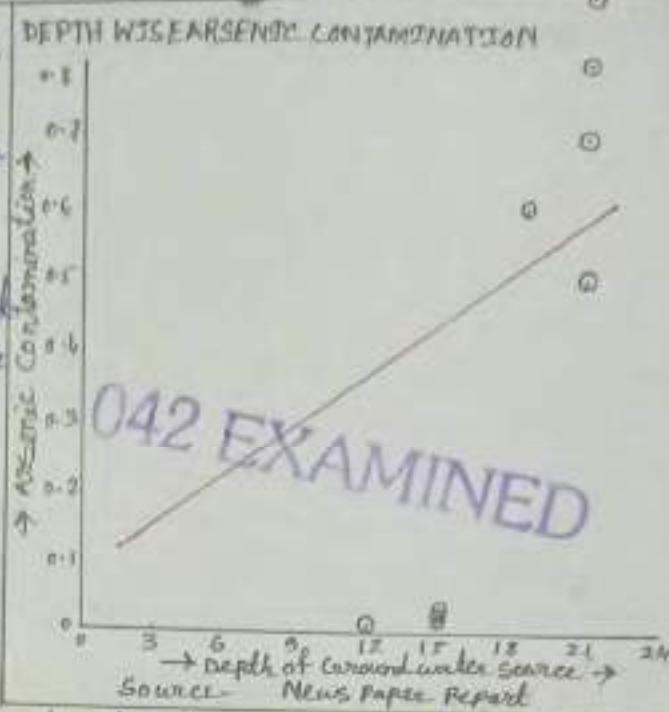
Cause: The causes of arsenic pollution in Malda district are multi-dimensional and complex.

- Natural - 1) Hydrology and Geology: The district is located in the Ganges delta which is characterized by a complex network of alluvial deposits and aquifers. The geological structure of the region combined with the high geological structure of the region with the high ground water extraction rates has resulted in the mobilization and release of naturally occurring Arsenic from the sediment into the aquifer.
- Anthropogenic - 1) Agricultural practices: The use of Arsenic contaminated ground water for irrigation has led to the accumulation of arsenic in the soil and crops. The historical



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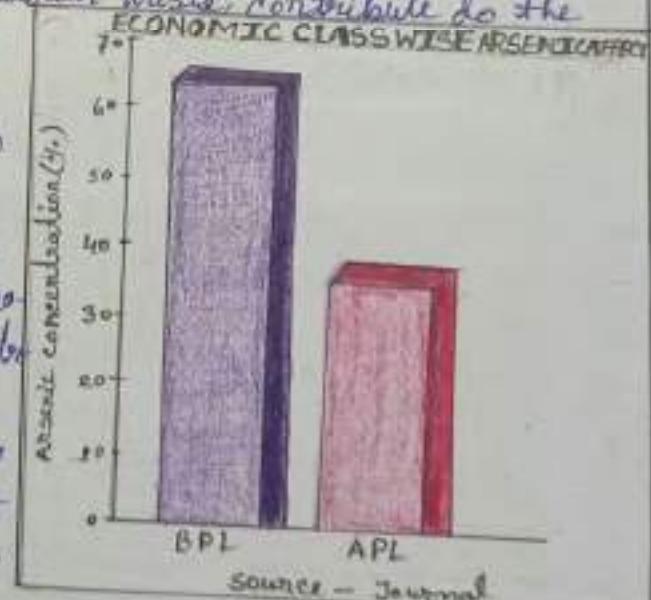
is largely agrarian, and farmers rely heavily on ground water for irrigation, making them vulnerable to the impacts of arsenic contamination due to commercialization of agro products lowering the ground water level (20-60) m the % of arsenic contamination is found to very high.

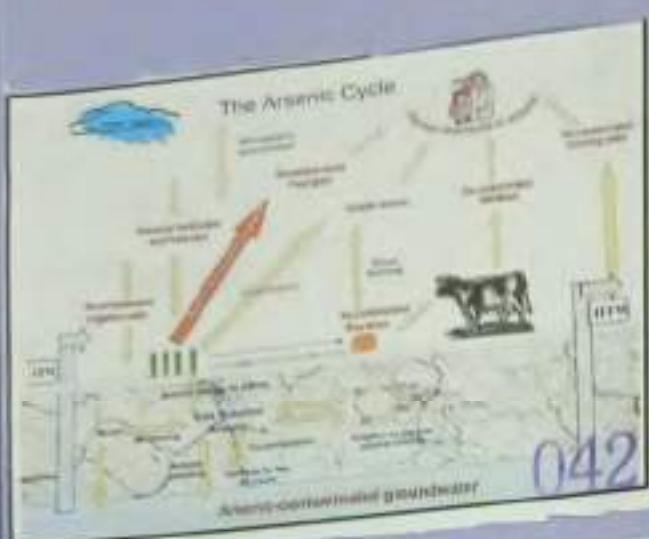


2) Industrial Activities - The district is home to several small scale industries including dyeing and printing units which discharge untreated effluent in to the environment, contaminating ground water and surface water sources.

3) Poor Sanitation - poor sanitation practices, including open defecation and improper disposal of human waste contribute to the contamination of surface water and ground water sources. On this reason higher percentage of cases belonged to BPL category.

4) Climate change - climate change is exacerbating the problem of arsenic pollution in Malda district as changing rainfall patterns and rising temperatures can alter the hydrology of the region and affect the mobilization of arsenic in the sediment. This climate change create water scarcity which are the main cause of this contamination.





042 EXAMINED

ARSENIC CYCLE



ARSENIC AFFECTED NAIL



ARSENIC BLACKFOOT DISEASES



DRINKING ARSENIC CONCENTRATED WATER

5) Lack of Awareness: A lack of awareness among the local population regarding the health impacts of arsenic contamination and safe drinking water practices has contributed to the persistence of the problem.

6) Groundwater Depletion: The high rates of ground water extraction in the district have led to the depletion of ground water resources, which can exacerbate the problem of arsenic contamination of naturally occurring arsenic in the remaining ground water source. In a Gajade block most of the villages almost get sole drinking water during summer.

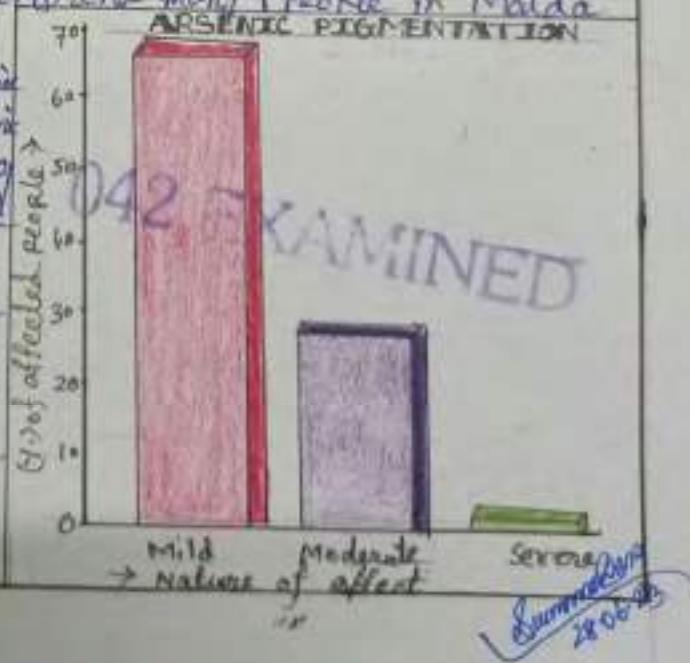
7) Lack of political will: Finally, a lack of political will to address the problem of arsenic pollution in the district has contributed to the persistence of the problem. This has been reflected in inadequate funding for initiatives to address the problem as well as a lack of political leadership to address the root causes of contamination.

Effect :- Arsenic contamination in Maldah district has a number of negative effects on human health, agriculture and the environment.

A) Health effects: Exposure to arsenic contaminated water over a period of time can cause a range of health problems, including skin lesions, cancer, and organ damage. Most of the villagers in Kaliachak I, II, III & English Bazar are affected by different health diseases.

1) Skin problems: Skin lesions are a common symptom of chronic arsenic poisoning and many people in Maldah district have reported experiencing skin problems as a result of arsenic contamination. Due to arsenic contamination the skin become dry, thick, leading to the formation of lesions, spots and pigmentation changes.

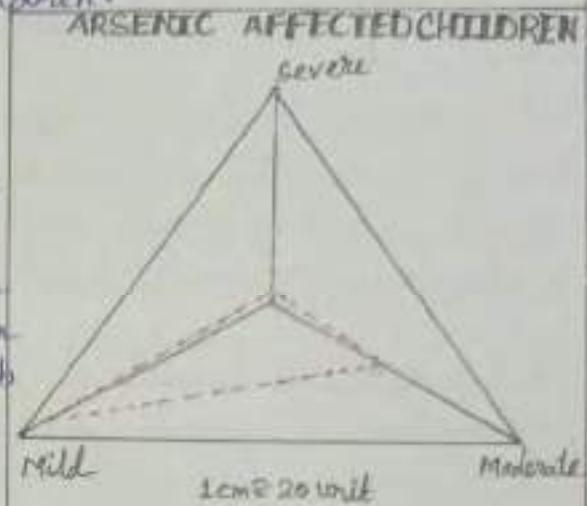
2) Increased cancer risk: Exposure to arsenic over a long period of time can increase the risk of certain types of cancer, including skin, bladder, and lung cancer.



3) Reduced cognitive function: Studies have shown that exposure to arsenic can lead to reduced cognitive function, affecting the ability to learn, remember, and concentrate. This is particularly problematic for children.

B. Economic Impact:

1) Agricultural impact: Arsenic contamination in Maldah district can also have a significant impact on agriculture as crops grown in arsenic-contaminated soil can absorb the toxin, leading to reduced yields and quality.



C. Environmental impact:

Arsenic contamination in ground water can have negative effects on the environment. Arsenic can enter the food chain through contaminated water, soil, and crops, leading to health problems in animals and wild life.

1) Increase treatment cost: The cost of treating arsenic-related health problems can be substantial, and the contamination can also affect the local economy.

D. Social impact: Arsenic contamination in Maldah district can also have social consequences. Many people in affected communities face stigma and discrimination due to their health problems, and there may be social isolation and exclusion. Children who are affected by arsenic exposure may face challenges in school and have limited opportunities in the future.

□ Trauma: Arsenic contamination is one of the main types of water pollution. Besides socio-economic condition, it also affects the mental health. After arsenic contaminated the people's faced many dermatological problems. Many illiterate people believe that this dermatological problem is contagious and avoid that arsenic affects people. Due to avoiding behaviour of surrounding people they segregate them and become ostracized. Many arsenic affected women are insulted by their in-laws family and their friends. Due to the insulting behaviour they become depressed. Some time this depression tends to commit suicide. For the clinical treatment many affected people become economically poor which increase their mental stress.

Mitigation

To mitigate arsenic contamination in Mullah district, several measures can be taken. Arsenic contamination in groundwater is a significant issue in many parts of the world, including some regions of Mullah district. Here are some possible strategies to address the problem:

1. **Public Awareness and Education**: Conduct awareness campaigns to educate the local population about the risks of arsenic contamination and its health effects. Emphasize the importance of using safe drinking water sources and provide information on water treatment methods.

2. **Alternate water sources**: Identify and promote alternative sources of safe drinking water, such as rainwater harvesting, surface water bodies or deep tube wells that are free from arsenic contamination. This could involve drilling new wells or rehabilitating existing ones in areas with low arsenic levels.

3. **Water Testing and Monitoring**: Implement a regular water testing and monitoring program to identify the arsenic-affected areas accurately. This will help in determining the extent of contamination and guiding the selection of appropriate mitigation measures.

4. **Water Treatment**: Implement suitable water treatment technologies to remove or reduce arsenic levels in contaminated water sources. Some effective treatment methods include activated alumina filtration, reverse osmosis, iron removal filters, and oxidation followed by sedimentation and filtration.

5. **Community-based Interventions**: Encourage the formation of community-based organizations to collectively manage water sources, monitor arsenic levels, and promote safe water practices.

6. **Agricultural practices**: Promote agricultural practices that minimize the uptake of arsenic by crops. This can include measures like using arsenic-safe irrigation water, adopting arsenic-tolerant crop varieties, and implementing proper wastewater management to prevent arsenic-contaminated water from seeping into the soil.

7. **Health Awareness and Support**: Provide healthcare facilities, medical check-ups, and support services to individuals affected by arsenic contamination. Raise awareness about the symptoms of arsenic poisoning.

and encourage affected individuals to seek medical attention.

2. Long-term Solution: Explore options for long-term solutions, such as identifying and implementing sustainable arsenic-free water sources or developing regional water treatment plants to serve affected communities. It's important to note that addressing arsenic contamination requires a multidisciplinary approach involving government agencies, researchers, and the local community. The implementation of these measures should be supported by sufficient funding, effective governance, and ongoing monitoring to ensure their success in mitigating arsenic contamination in Malda district.

□ Preparedness: In terms of preparedness to address arsenic contamination in Malda district several measures can be taken:

- Water Testing and monitoring of water:** Regular testing and monitoring of water sources are essential to identify areas with arsenic contamination. This involves establishing a systematic process of collecting water samples, conducting laboratory tests, and analyzing the results. Local authorities, along with relevant government agencies and NGOs, can collaborate to ensure regular monitoring and testing.

Awareness and Education: Raising awareness about the risks of arsenic contamination and its associated health effect is crucial. Public education campaigns can be conducted to inform the local population about the sources of arsenic contamination, its symptoms, and preventive measures. This can be achieved through community meetings, workshops, and the distribution of educational materials in local languages.

Alternative safe water sources: Providing alternative sources of safe drinking water is a priority. This can involve setting up community-level water treatment plants, installing deep tube wells, or implementing rainwater harvesting systems. Efforts should be made to ensure the availability of safe water sources in areas most affected by arsenic contamination.

Health services and Treatment: Establishing adequate healthcare services to diagnose and treat arsenic-related health conditions is essential. This includes training healthcare professionals to identify symptoms and provide appropriate medical care. Regular health camps can be organized in affected areas to facilitate early detection and treatment.

Mitigation and Remediation: Implementing mitigation and remediation measures is crucial to address the long-term issue of arsenic contamination. This can involve exploring technologies for arsenic removal from water sources, implementing water treatment plants, or considering alternative water supply options like piped water systems from non-contaminated sources.



ARSENIC EFFECTED TUBEWELL



RAINWATER HARVESTING



WATER PURIFIER



ARSENIC PURIFICATION FILTER

Collaboration and Government Support: Addressing arsenic contamination requires the collective effort of various stakeholders, including government bodies, local authorities, NGOs and the community. Collaborative initiatives should be encouraged to coordinate actions, share resources and seek necessary financial support from the government and other funding agencies.

It is important to note that the above measures are general guidelines, and specific actions should be tailored to the local context and the severity of arsenic contamination in Maldah district. Local authorities and experts should conduct a detailed assessment of the situation to develop a comprehensive preparedness plan and prioritize actions accordingly.

Conclusion: In conclusion, arsenic contamination in Maldah district poses a significant health and environmental risk. The presence of high levels of arsenic in the region, impacting the well-being of the local population. Arsenic, a highly toxic substance, can lead to various health issues, including skin lesions, respiratory problems, cardiovascular diseases, and even cancer when ingested over an extended period. According to arsenic contamination in Maldah district is a complex and challenging task that requires the combined efforts of the government, local community and various stakeholders. Continued commitment and collaborative action are necessary to mitigate the adverse effects of arsenic contamination and protect the health and well-being of the residents in the district.


28/06/27

□ References & some references about arsenic contamination in maldia district

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APPENDIX

1. Depth wise Arsenic contamination

Depth of ground water source (cm)	Amount of detected arsenic in tested sample (mg/l)
15	0.01
20	0.7
20	0.5
20	0.15
15	0.02
12	0.01
20	0.5
20	0.5
15	0.03
18	0.6
20	0.8
20	1.0

2. Effects on children

Nature	%
Mild	2.98
Moderate	23.50
Serene	73.52

3. Economic class wise Arsenic concentration

Poverty level	%
APL	63
BPL	35

4. Arsenic Pigmentation Problems

Nature	%
Mild	66.8
Moderate	27.27
Serene	0.6

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B.A. SEMESTER VI GEOGRAPHY HONOURS PRACTICAL EXAMINATION (CBCS-2023)

PAPER: GEO-A-CC-6-14-P

GEOGRAPHY PRACTICAL NOTEBOOK

REG. NO.: 561-1211-0190-20

ROLL NO.: 202561-11-0097

042 EXAMINED

THE IMPACT OF LANDSLIDE AND
MANAGEMENT OF LANDSLIDE IN
KURSEONG DARJEELING :
A CASE STUDY OF LIMBUGAON LANDSLIDE

CONTENTS

- ① Introduction
- ② Study Area
- ③ Objective
- ④ Methodology
- ⑤ Literature Review
- ⑥ When
- ⑦ Cause -
 - ⓐ The Torrential Rainfall
 - ⓑ The location of the village
 - ⓒ The Fragile Topography of the village
- ⑧ Impact -
 - ⓐ Demographic Impact
 - ⓑ Social Impact
 - ⓒ Environmental Impact
 - ⓓ Economic Impact
 - ⓔ Vegetation Depletion
 - ⓕ Other Impact-
- ⑨ Trauma
- ⑩ Rescue and Relief -
 - ⓐ Roll of the local Government
 - ⓑ Roll of Local Communities
- ⑪ Post Management
- ⑫ Conclusion
- ⑬ Reference

042 EXAMINED

INTRODUCTION

A Landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of "mass wasting" which denotes any down-slope movement of soil and rock under the direct influence of gravity. Term "Landslide" encompasses five modes of slope movement: falls, topples, slides, spreads and flows. These are further subdivided by the type of geologic material (bedrock, debris or earth). Debris flows (commonly referred to as mudflows or mudslides) and rock falls are examples of common landslide types. Hills slopes become unstable due to ground water pressure, earthquakes, erosions and volcanic eruptions, which causes landslide.

The landslides are a common feature in Himalayas, western Ghats, and in river valleys the state of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and all the seven states of northeast India, is most vulnerable to landslides. In Southern India Maharashtra, Karnataka, Tamil Nadu, and Kerala bear the brunt of landslides.

OBJECTIVES

The objectives of this project will orient under the following heading:

- The first objectives of this project is to investigate about the landslide that occurred in Limbagaon on 1st July 2015.
- The other objectives is to find out the approaches adopted by the community and the local government for the management of the landslide.

ABOUT STUDY AREA

Limbugaoon is a small village located in Tingling Tea Estate of Kunseong. The name of the village is derived from 'Limbu' a tribe of Darjeeling hills and Nepal and 'Goon' meaning village. The village is located under Sumeri I Gram panchayat which comes under Minik Teshal of Darjeeling district, West Bengal. The headquarters for both police station and block office for the village is Minik.

The approximate elevation of the village is 4433 ft and the approximate latitude and longitude of the region is 26°51'58" N and 88°11'46"E. The village is surrounded by different tea gardens such as Tingling Tea Estate, Paschim Phuguri Tea Garden and Pumba Phuguri Tea Garden.

According to one of the respondents the village consisted of 35 to 40 houses but in the year 2015 when a landslide destroyed the village half of the village was relocated and was rehabilitated to a nearby area.

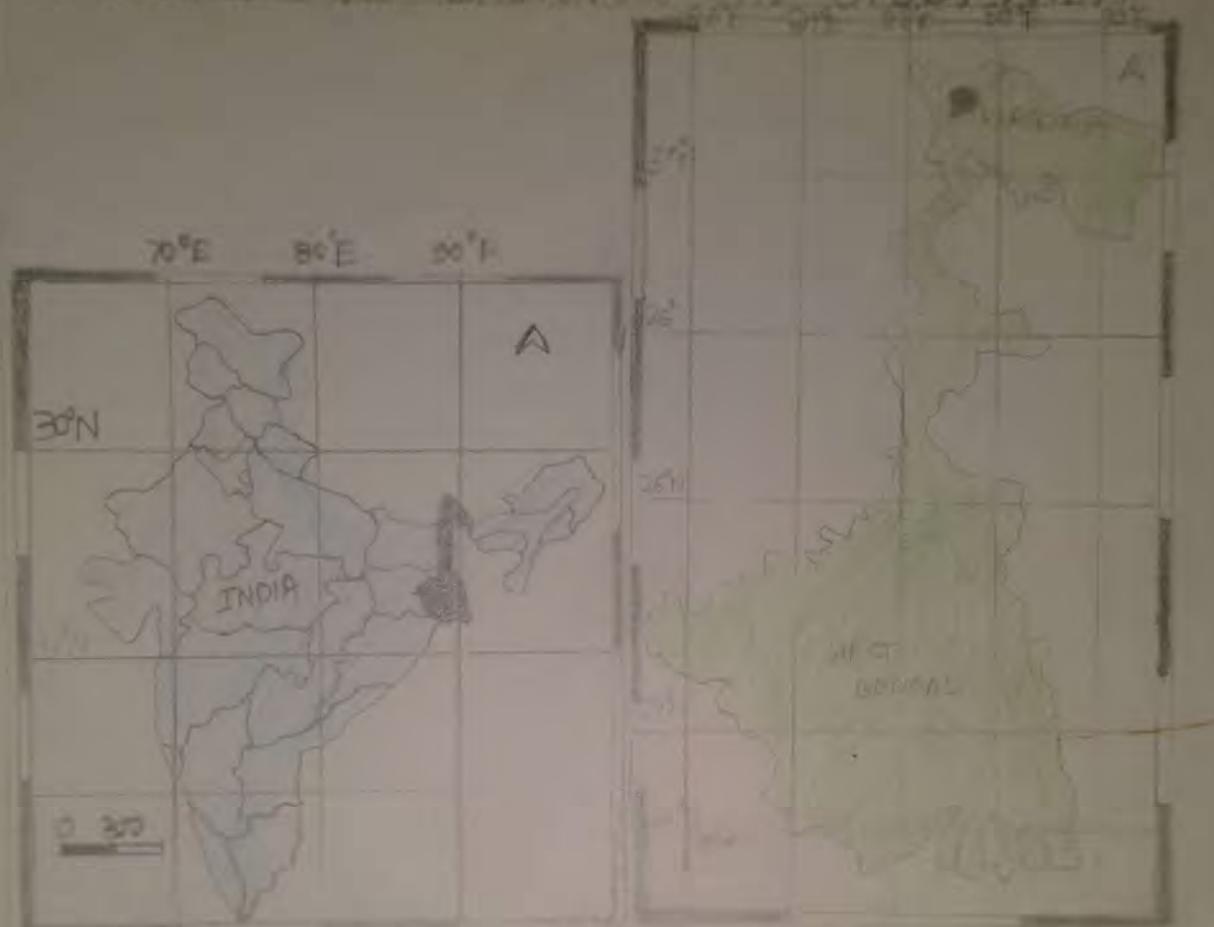
The people of the village are dependent on Tingling Tea Garden for their source of income. Most of the population is engaged as laborers in the tea garden. Few of the villagers also practice agriculture and animal husbandry to earn their income.

About the educational status of the area there are no schools in the village though only a few kilometers away there is one government primary school and one private school. To acquire their higher education the students travel to the a school named Rabindranath High School located in Sumeri Bazaar which is around 4 kms from the village. For the college education the students have to travel to Minik College which is located in Minik around 8 kms. away from the village. For medical purpose there are no health centres in the village. The villagers have to either travel to Sumeri town or Minik for medical emergencies.

Signature

ABOUT Study AREA

LOCATION MAP SHOWING THE STUDY AREA



Map SHOWING THE STATE
OF WEST BENGAL

Map SHOWING THE KUDJORONG
SUBDIVISION



MAP SHOWING THE LIMBUAON (Study Area)

[Signature]
A. S. D. N.

METHODOLOGY

The study is based on Secondary data which has been collected from several publication in different Journal and website. After collecting data, we analysed the data and represent by different maps and diagrams.

LITERATURE REVIEW

The investigation of landslide dangers and their management has become a critical subject matter of Sociology.

Ghosh, In this work calls attention to the landslide issue of the Darjeeling Himalaya.

Again Shanks(1972), clarifies in his work about the job of calamitous precipitation in the forming of the lower Himalaya. Ambalagon et al (202), The quantitative methodology have built up based on major Causative variables of Slope firmness. The study an instance of landslides risk Zonation in the Maharashtra region, utilizing landslide peril assessment factor (LHEF) rating plan. In this strategy joined major Intrinsic causative variable of Slope firmness and embraced a straightforward, economical viable and peaceful methodology.

A Sengupta et.al (2010), The authors have studied the geological and geotechnical parameters of the major trouble spots in the eastern Himalayas along national highway NH-31A and NH-44 to understand the factors affecting the landslides in the region. The main factors triggering landslides in this region has been Confirmed Such as the regional geology or rock type, structure of the bed rocks, excessive rainfall and human Interference and diversion of streams.

Macdonald (2003), the author has made a step towards providing a general understanding of the principal types of disasters and in particular, how they can affect the buildings. The stress is given on the effect of good design and planning which can reduce the impact of disasters on the built environment. Legislation for good standards of construction reduces vulnerability only if implemented properly.

A.F Shaik et.al (2015), the landslide, which hit on 30th July 2014, early in the morning was believed to have been caused by a burst of heavy rainfall. The other causes identified and categorized as natural such as Heavy rainfall environmental destruction, sudden changes in water table and anthropogenic causes such as deforestation, construction activities without environmental consequences. These had effected the region with huge loss of property, assets and people's moral.

Ghosh, et al, in his work features the provincial dissemination of disasters in west Bengal. Most important the data assembled from the National Disaster Management Authority, ministry of Home Affairs, and Government of India.

Articles

"LANDSLIDE AND MANAGEMENT OF LANDSLIDE IN KURSEONG, DARJEELING A CASE STUDY OF LIMBU GAON LANDSLIDE" International Journal of Emerging Technologies in Innovative Research (www.jettir.org). ISSN-0849-5102

<http://www.jettir.org/papers/JETIR1904753.pdf>

On 1st July, 2015 at around 3 A.M village of Limbagona
Tingri estate had to face the tremendous wrath of landslide.
This landslide swept a major portion of the village thus
erecting the area and the villagers.

Cause:- The Causes of the landslide can be several;
some of which are mentioned below:

The Torrential Rainfall :-

The first major cause of the landslide is due to the
torrential rainfall that was taking place in the region
since last few days but on the night of 1st July,
2015 the rainfall increased tremendously due to cloud
burst thus the disaster took place.

The location of the village:-

The second cause is the location of the village as
mentioned above is located below the main road that
connects Siliguri with Darjeeling via Mirik. The road condition
is proper but the drainage condition of the road is
very poor. So, since it was raining for last three days
before the landslide took place so due to the lack
of proper drainage facility the overflown water was
pouring down the village. Due to the reason the overflown
water was pouring mixed with the torrential rainfall
was making the already fragile area more fragile. Thus, the
cloud burst be also a major reason behind the landslide that
occurred in the village.

The Fragile Topography of the village:-

The other major cause is the fragile topography of the
village. Since the whole of Darjeeling hills is situated
in a very fragile geological condition because of
its composition of rocks and minerals like shale, quartzite
mica, chert and sandstone the village is also no exception.

Apart from this the village is located in a very steep slope with no protection wall so the fragile topography combined with the location of the area is also one of the major reasons behind the landslide.

IMPACT:-

Landslide is a common natural phenomenon seen in mountain territory of Darjeeling Himalaya.

⇒ Demographic Impact:- In 2015, Darjeeling had population of 1,846,823 of which male and female were 937,259 and 909,564 respectively. The main effected area is Tingling. The total death toll reached upto 13 and several people were displaced. The toll in Landslide battered Ambigaon in Tingling has risen to up even as 40 people still missing said Thomas Tupa, the president of the Victims Committee - an apolitical organisation.

⇒ Social Impact:- Like any other disasters landslide disasters also effected the Community or Society in a number of ways such as physiological trauma, family disruption, lowering of quality of life, disruption of Community etc.

- Disruption of Community and Social life, due to loss or interruption of Cultural heritage religious/rituals functions and performances.

- Marked decrease in the mobility of effected people due to loss of transportation network.

- Loss of Livelihood due to loss of agricultural farm from Landslide and Crops, non functioning of govt. offices.

- Hunger and starvation due to loss of grains Crops, Income, dysfunction of food supply chain, drinking water scarcity.

- Reduced opportunities of education to children due to damage or destruction of educational institutions and injuries or death of teachers, employees.

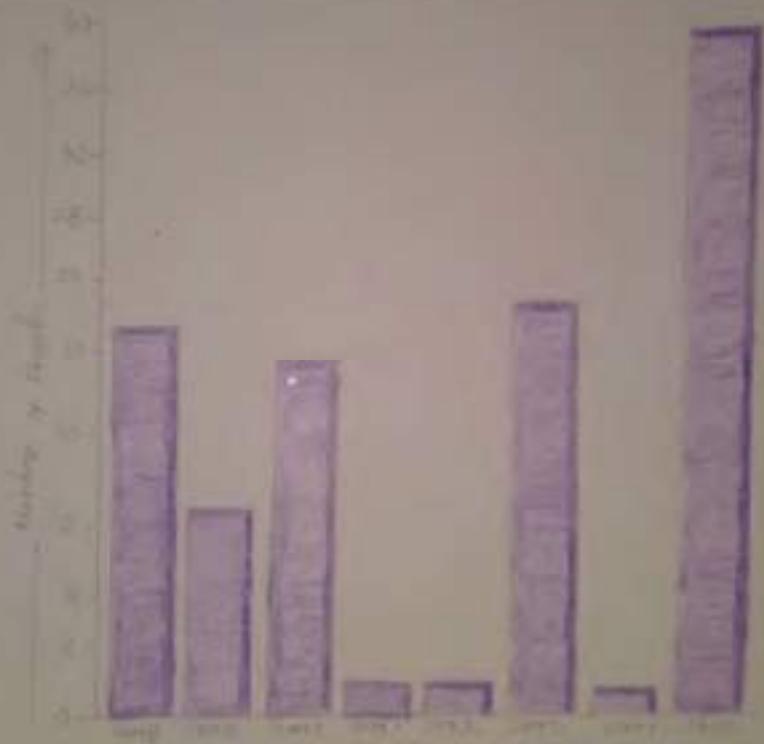
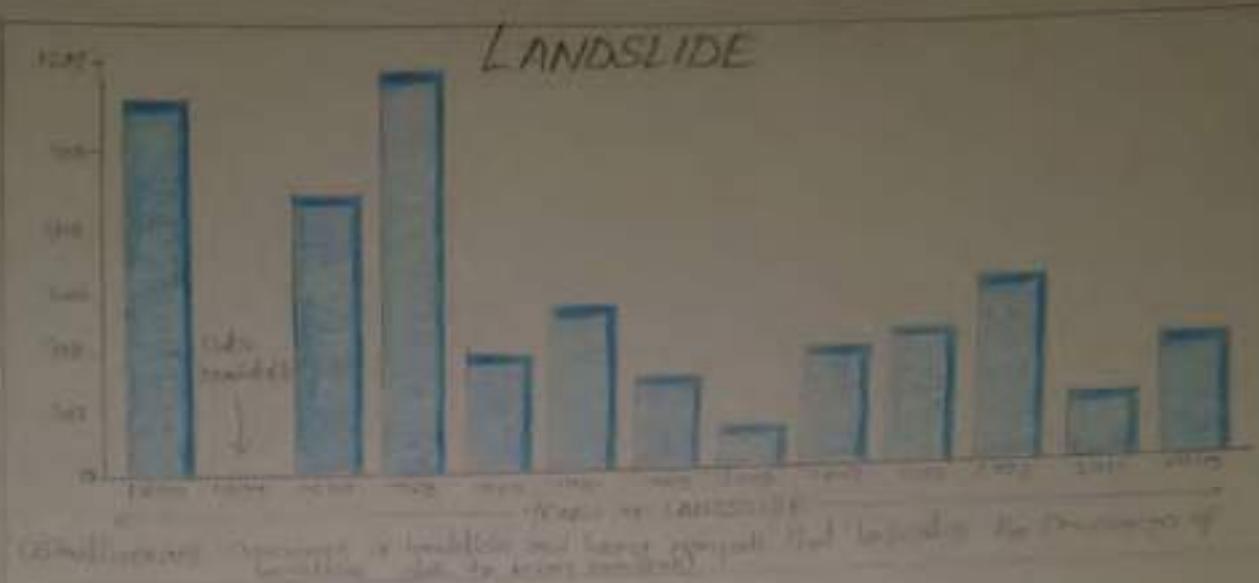
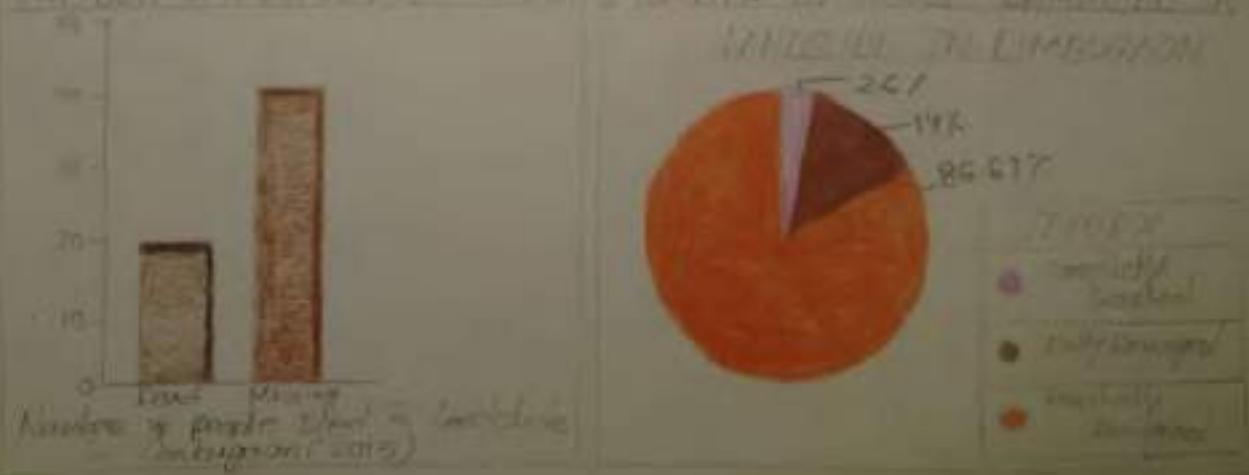


Fig 12

Total Number of people killed by landslides in Bangladesh

NUMBER OF PEOPLE KILLED DUE TO LANDSLIDES IN
THERE ARE 71 LANDSLIDES



- Local
- Migrant
- Total

Number of people killed by landslides in Bangladesh

Environmental Impact :-

The Impact of Landslides &seas on physical environment comprising abiotic and biotic environment include the following

- Creation of mounds due to piling of enormous volume of debris and mud.
- Elevation of high ground.
- formation of temporary / semi-permanent lakes due to drowning of valleys by debris deposit
- Hill slopes are steepened but valleys are filled with debris.

Economic Impact :-

Economic Impact include adverse as enumerated above on people their homes and properties, agricultural lands and crops, timber, life lines, such as roads, highways, communication system, araten supplies, education institutions etc.

- Reduction of real estate properties due to high risk factor.
- Reassessment of landslide hazard risks.
- loss of human and animal productivity because of death injuries and physiological problems.
- provision for additional money for temporary housing or long-term shelter for displaced people by landslide disaster.

Vegetation Depletion :-

- ① Areas where cuttings or human modification of the land have destroyed vegetation.

Other Impact :- steps that have been altered for construction of buildings and changing the course of the river for landslide.

TRAUMA:

post traumatic stress. Disaster is a disorder that develops in some people who have experienced a shocking, scary and dangerous event. It is natural to feel afraid during and after a traumatic situation (landslide). It widely occurs among victim or witness of disasters. There are literature suggesting that people emerging from their struggle with such Tragedies as bereavement.

Positive personal gain often adverse life events and trauma is known as post-Traumatic Growth (PTG). Although Traumatic or distressing events can cause long-lasting psychological symptoms. A person who undergoes a traumatic experiences haunted victim that hit by landslide, after their drama impacts their lives and changed their perceptions of reality.

Psychological Impacts of Trauma in three categories as follows:-

- ① PTSD symptoms (re-experiencing, avoidance, diminished interest, detachment from others etc)
- ② Change in obj internalized objects and self (helplessness and entrapped dependency, projective identification and splitting, regression to 'primitivized' object relations, imposing as a 'false self', loss of self-cohesion.)

RESCUE AND RELIEF

- ① Apart from Tingling primary school relief Corps were also set up at the tea garden's hospital, Chetla, tea garden Syrce, assistant manager's bungalow and also at Sorenji Community hall not only for the villagers of the Limbugaon village but also the Seine the people of other villages located near Limbugaon.

LANDSLIDE



(ii) Apart from local government and SSB; various other agencies such as National Disaster Response Force (NDRF), District Magistrate (DM) office and various Non-Governmental Organization (NGOs) like distributed relief such as tarpaulin, food, medicines, drinking water to the victims of the landslides and the people who were temporarily rehabilitated to the rescue camps.

(iii) Prime Minister Shri Narendra Modi had announced a Compensation of ~~Rs~~ 2 lakh Rupees for the family members of the death and also the then Chief Executive of Gorkha Territorial Administration (GTA) and autonomous district Council for the Darjeeling and Kalimpong area of the west Bengal state in India. Shri Pinal Gorain announced Compensation of 2 lakh Rupees for the kin of those who was killed and Rs 50,000 to those injured (Gazette, 2015).

LOCAL COMMUNITIES-

• Role - (i) The local communities helped the rescue personnel from the local DM office, the SSB and the NDRF during the search and rescue operations.

(ii) Till the relief arrived in the rescue camps food, water and medicines were provided by the community from the village as well as communities from the village as communities from neighbouring villages too.

(iii) Apart from village communities relief materials were also provided by different organizations such as universities, colleges, clubs etc.

(iv) The villagers also transported the identified victims to a safe and secure spot and provided the best possible medications.

POST MANAGEMENT

- Stay away from the slide area. There may be danger of additional slides.
- Listen to Local radio or television stations for the latest emergency information.
- Watch for flooding which may occur after a landslide or debris flow. Floods sometimes follow landslides and debris flows because they may both be started by the same event.
- Check for injured and trapped persons near the slide, without entering the direct slide area. Direct movements to their locations.
- Help neighbours who may require special assistance infants, elderly people and people with disabilities. Elderly people and people with disabilities may require additional assistance people who care for them or who have large families may need additional assistance in emergency situations.
- Look for and report broken utility lines and damaged roadways and railways to appropriate authorities. Reporting potential hazards will get the utilities turned off as quickly as possible, preventing further hazard and injury.
- Replant damaged ground as soon as possible. Since erosion caused by loss of ground cover can lead to floods, flooding and additional landslides in the near future.
- Seek advice from a geotechnical expert for evaluating landslide hazards or designing corrective techniques to reduce landslide risk. A professional will be able to advise you of the best ways to prevent or reduce landslide risk without creating further hazard.

CONCLUSION

The Darjeeling Himalaya region is the most vulnerable to a landslide as well as avalanche, fall, stamp disaster. The primary effects of the June, July landslide disaster are the disconnection of the roads, loss of lives, the breaking of bridges etc. The people have lost their home and supposed homelessly and took shelters that are provided by state government. Thus the landslide disaster of 2015 triggers severely the natural environment of the Darjeeling Himalayas. It is caused by the natural phenomena viz heavy torrential rainfall but the intensity and magnitude are enhanced by the anthropogenic activities. A recent geological survey conducted for the Darjeeling landslide. However, on the basis of historical record it can be said that intense rainfall is the key factor for the June July 2015 landslide. As the developmental activity is increased in the mountainous region thereby the land use management is significant to reduce the vulnerability of the landslides.

042 EXAMINED

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LINKS

- ① www.jectin.org
- ② <https://www.telegraphindia.com/west-bengal/landslide-victims-call-strike-in-minik/cid/1524473>
- ③ <https://www.usgs.gov/landslides...>
- ④ <http://s.hathitrust.org/8090/15/05-Literature%20review.pdf>

APPENDIX

HEAVY RAINFALL THAT INDICATES THE OCCURANCES OF LANDSLIDE DUE TO HEAVY RAINFALL

Year	Rainfall (In MM)
1899	1040
1934	Data Unavailable
1950	760
1968	1120
1980	340
1991	460
1993	260
2003	120
2004	340
2005	360
2006	520
2011	180
2015	390

NUMBER OF PEOPLE DIED IN LANDSLIDE IN DARJEELING

Year	Number of people Died
1998	22
1999	12
2000	21
2001	2
2002	2
2003	23
2004	1
2015	39

NUMBER OF HOUSE EFFECTED DUE TO LANDSLIDE

Damaged house in landslide	Number of house Damaged
Completely	4
Fully Damaged	22
Partially Damaged	130

Reg. No - 12/11/01920-20
Roll - 202521-11-0857

Number of people effected

	Number of People effected
Dead	19
Missing	40

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BEHAVIOURAL GEOGRAPHY

INTERDISCIPLINARY INTEGRATION IN GEOGRAPHY

HISTORY

• HISTORY OF BEHAVIORAL GEOGRAPHY
• THEORIES OF BEHAVIORAL GEOGRAPHY
• METHODS OF BEHAVIORAL GEOGRAPHY

THEORIES

• HUMAN SETTLEMENTS
• HUMAN ADAPTATION
• HUMAN ACTIVITIES
• HUMAN NEEDS

METHODS

• SURVEY
• INTERVIEW
• CASE STUDY
• DOCUMENTARY ANALYSIS
• FIELD WORK

APPLICATIONS

• HUMAN SETTLEMENTS
• HUMAN ADAPTATION
• HUMAN ACTIVITIES
• HUMAN NEEDS

APPLICATIONS

• HUMAN SETTLEMENTS
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• HUMAN NEEDS



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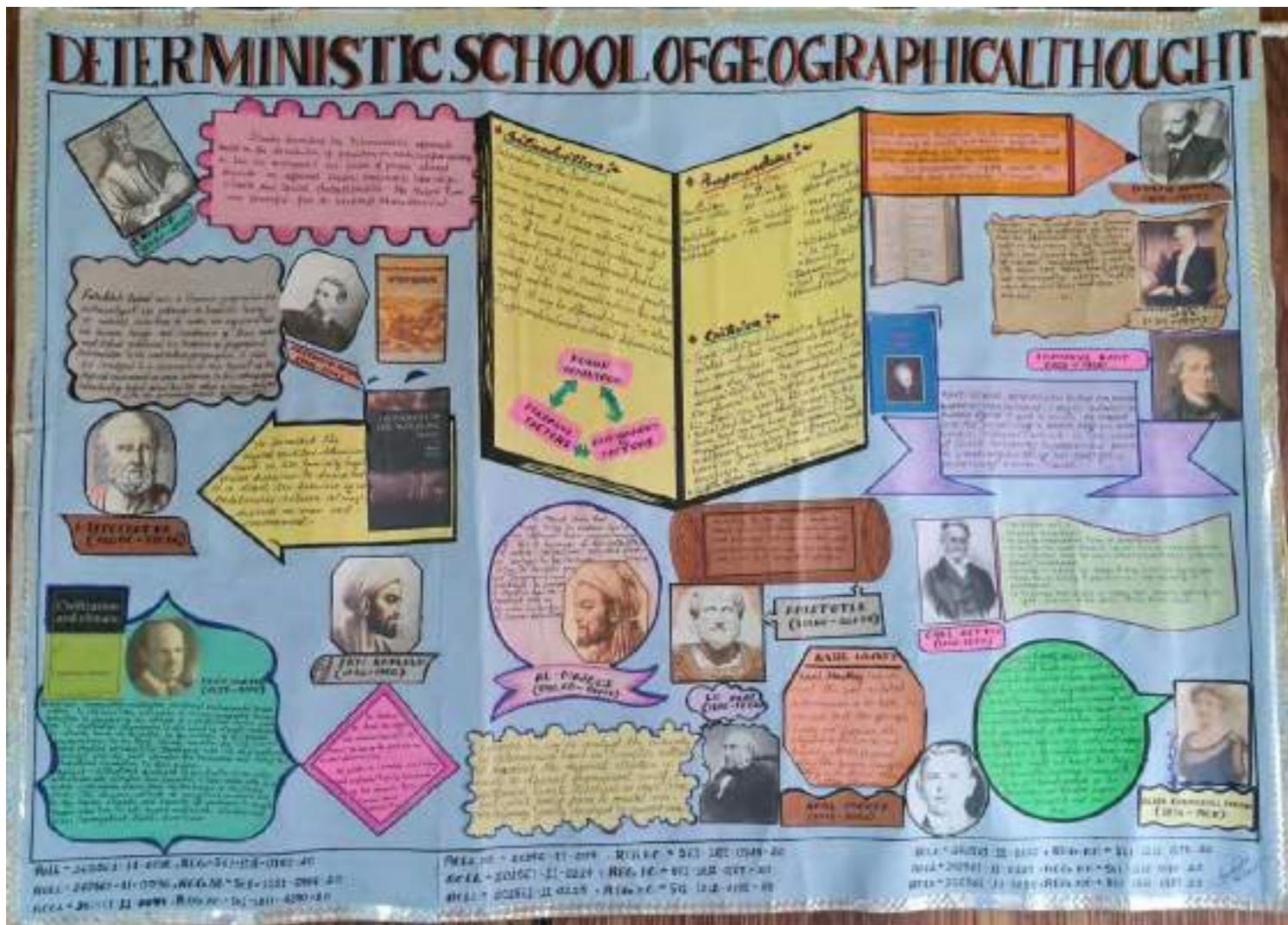
TOPIC: BEHAVIORAL GEOGRAPHY



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DETERMINISTIC SCHOOL OF GEOGRAPHICAL THOUGHT



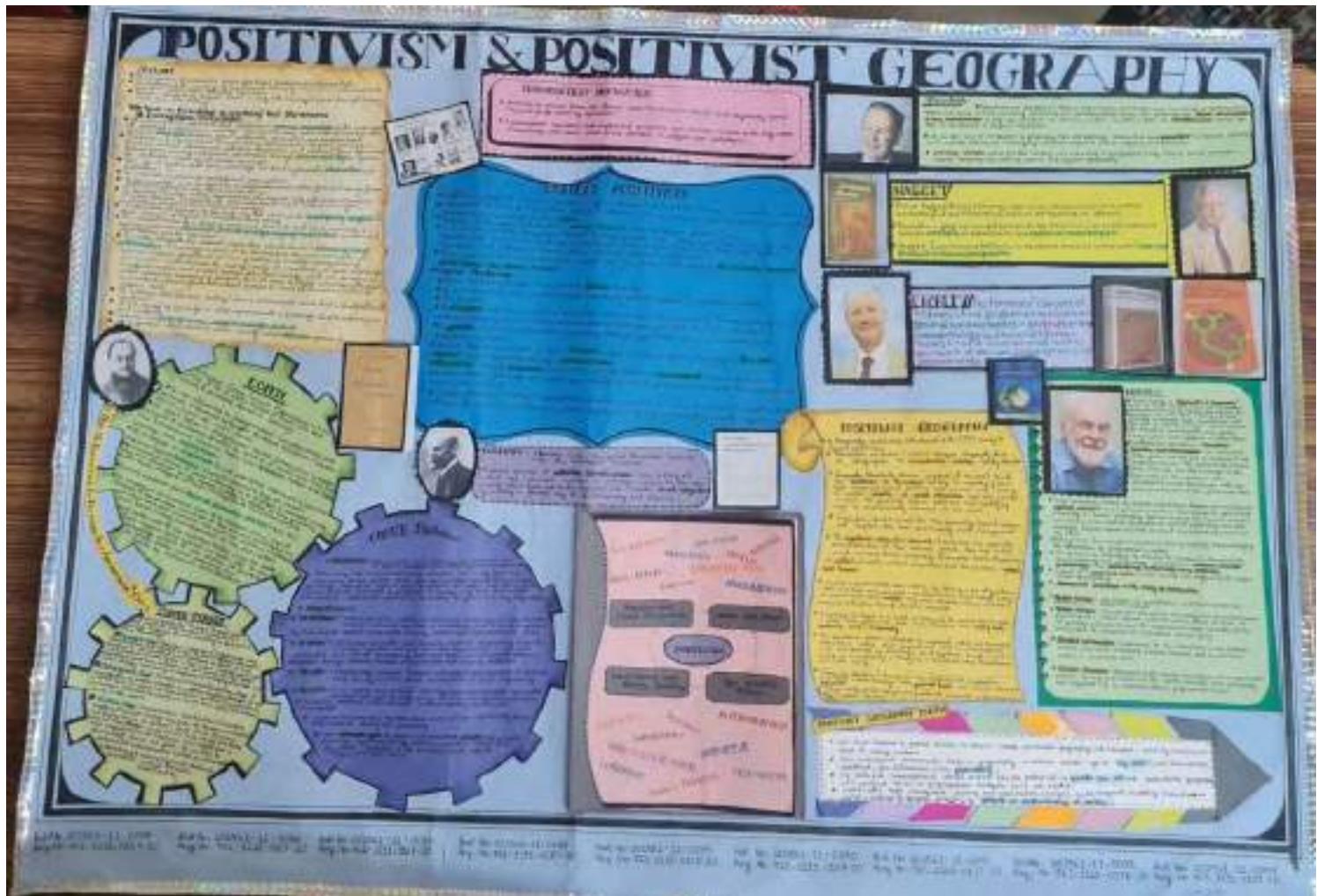




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POSITIVISM & POSITIVIST GEOGRAPHY





POSSIBILISTIC SCHOOL OF THOUGHT

PROONENT OF POSSIBILISM

INTRODUCTION

The Possibilistic School of Thought is a branch of philosophy that emphasizes the importance of possibility and potentiality over certainty. It argues that knowledge is not limited to what is known, but also includes what is possible or conceivable.

CHARACTERISTICS

- Focuses on the concept of possibility rather than certainty.
- Emphasizes the potentialities of things over their actualities.
- Believes in the existence of multiple realities and possibilities.
- Encourages open-mindedness and inquiry into the realm of possibility.

PROFESSOR LUDVÍK FERDINAND VON WEISZSÄCKER

Ludvík Ferdinand von Weiszsäcker was a German philosopher and physicist who developed the Possibilistic School of Thought. He believed that reality is not fixed but can be influenced by our thoughts and actions. His work has had a significant impact on philosophy, science, and management.

MANAGEMENT

The Possibilistic School of Thought has been applied to management, particularly in the field of strategic planning. It encourages managers to consider multiple possible scenarios and to be open to new ideas and approaches. This can lead to more innovative and effective decision-making.

PHILOSOPHY

The Possibilistic School of Thought is closely related to philosophy, particularly in the areas of metaphysics and epistemology. It challenges traditional views of reality and knowledge, and promotes a more dynamic and fluid understanding of the world.

SCIENCE

The Possibilistic School of Thought has also influenced science, particularly in the field of quantum mechanics. It suggests that particles have multiple possible states simultaneously, and that observation can affect the outcome.

ART

The Possibilistic School of Thought has inspired many artists and writers, particularly those interested in exploring the realm of possibility and the limits of knowledge.



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B.A. History Honours

Sl. No.	Content	Page No.
1.	Syllabus Extract indicating field work and project work	2 – 6
2.	List of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23)	7 - 8
3.	Permission letter for field work from the competent authority	9 – 11
4.	Sample photographs of the field work	12 - 13
5.	Report: Objective and Outcome of field work	14



UNIVERSITY OF CALCUTTA

Notification No. CSR/ 12 /18

It is notified for information of all concerned that the Syndicate in its meeting held on 28.05.2018 (vide Item No.14) approved the Syllabi of different subjects in Undergraduate Honours / General / Major courses of studies (CBCS) under this University, as laid down in the accompanying pamphlet:

List of the subjects

<u>Sl. No.</u>	<u>Subject</u>	<u>Sl. No.</u>	<u>Subject</u>
1	Anthropology (Honours / General)	29	Mathematics (Honours / General)
2	Arabic (Honours / General)	30	Microbiology (Honours / General)
3	Persian (Honours / General)	31	Mol. Biology (General)
4	Bengali (Honours / General /LCC2 /AECC1)	32	Philosophy (Honours / General)
5	Bio-Chemistry (Honours / General)	33	Physical Education (General)
6	Botany (Honours / General)	34	Physics (Honours / General)
7	Chemistry (Honours / General)	35	Physiology (Honours / General)
8	Computer Science (Honours / General)	36	Political Science (Honours / General)
9	Defence Studies (General)	37	Psychology (Honours / General)
10	Economics (Honours / General)	38	Sanskrit (Honours / General)
11	Education (Honours / General)	39	Social Science (General)
12	Electronics (Honours / General)	40	Sociology (Honours / General)
13	English ((Honours / General/ LCC1/ LCC2/AECC1))	41	Statistics (Honours / General)
14	Environmental Science (Honours / General)	42	Urdu (Honours / General /LCC2 /AECC1)
15	Environmental Studies (AECC2)	43	Women Studies (General)
16	Film Studies (General)	44	Zoology (Honours / General)
17	Food Nutrition (Honours / General)	45	Industrial Fish and Fisheries – IPFV (Major)
18	French (General)	46	Sericulture – SRTV (Major)
19	Geography (Honours / General)	47	Computer Applications – CMAV (Major)
20	Geology (Honours / General)	48	Tourism and Travel Management – TTMV (Major)
21	Hindi (Honours / General /LCC2 /AECC1)	49	Advertising Sales Promotion and Sales Management –ASPV (Major)
22	History (Honours / General)	50	Communicative English –CMEV (Major)
23	Islamic History Culture (Honours / General)	51	Clinical Nutrition and Dietetics CNDV (Major)
24	Home Science Extension Education (General)	52	Bachelor of Business Administration (BBA) (Honours)
25	House Hold Art (General)	53	Bachelor of Fashion and Apparel Design – (B.F.A.D.) (Honours)
26	Human Development (Honours / General)	54	Bachelor of Fine Art (B.F.A.) (Honours)
27	Human Rights (General)	55	B. Music (Honours / General) and Music (General)
28	Journalism and Mass Communication (Honours / General)		

The above shall be effective from the academic session 2018-2019.

SENATE HOUSE
KOLKATA-700073
The 4th June, 2018

Paul
4/6/18
(Dr. Santanu Paul)
Deputy Registrar

**CBCS SYLLABUS
IN
HISTORY (HONOURS)**

CALCUTTA UNIVERSITY

2018

Structure of B.A (Hons.) History Course under CBCS

HIS-A-CC-1-14- TH & TU

- Paper 1 **SEM -1:** History of India (From the Earliest times to C 300 BCE)
- Paper 2 **SEM-1:** Social Formations and Cultural Patterns of the Ancient World other than India
- Paper 3 **SEM-2:** History of India (c 300 BCE to c.750 CE)
- Paper 4 **SEM-2:** Social Formations and Cultural Patterns of the Medieval World other than India
- Paper 5 **SEM-3:** History of India (c.750 – 1206)
- Paper 6 **SEM-3:** Rise of the Modern West –I
- Paper 7 **SEM-3:** History of India (c.1206 – 1526)
- Paper 8 **SEM-4:** Rise of the Modern West – II
- Paper 9 **SEM-4:** History of India (c.1526-1605)
- Paper 10 **SEM-4** History of India (c.1605 – 1750s)
- Paper 11 **SEM-5:** History of Modern Europe (c.1780-1939)
- Paper 12 **SEM-5:** History of India (c.1750s– 1857)
- Paper 13 **SEM-6:** History of India (c. 1857 – 1964)
- Paper 14 **SEM-6 :** History of World Politics: (1945-1994)

HIS-A- DSE TH & TU

Discipline Specific Elective DSE (Any Four) Choosing any one paper in Semester -5 and another in Semester 6 taking one from Group –A and the other from Group –B

- Paper 1 **DSE-A-1 SEM -5:** History of Bengal (c.1757-1905)
- Paper 2 **DSE-A-3 SEM -6:** History of Bengal (c.1905-1947)
- Paper 3 **DSE-B-2 SEM -5:** History of Southeast Asia – The 19th Century
- Paper 4 **DSE-B-4 SEM -6:** History of Southeast Asia – The 20th Century
- Paper 5 **DSE-B-1 SEM -5:** History of Modern East Asia – I China (c.1840 – 1949)
- Paper 6 **DSE-B-3 SEM -6:** History of Modern East Asia – II Japan (c.1868 – 1945)
- Paper 7 **DSE-A-2 SEM -5:** History of United States of America – I (c.1776 – 1945)
- Paper 8 **DSE-A-4 SEM -6:** History of United States of America – II (c.1776-1945)

Skill Enhancement Courses SEC –A & B (Any Two) Choosing one from group-A and one from group-B) in Semester 3 and 4

- SEC -A 1: SEM-3 Archives and museums**
- SEC -B 1: SEM-4 Understanding Popular Culture
- SEC-A 2: SEM-3 Understanding Heritage
- SEC-B 2: SEM-4 Art Appreciation: an Introduction to Indian Art**

***Generic Elective Courses (GE) - Same as Core courses (CC) offered in the BA General Syllabus.**

Skill Enhancement Courses (SEC –A & B) Credits,-2 each

SEC –A (1): Archives and museums

This course introduces students to the institutions that house and maintain documentary, visual and material remains of the past. Museums and archives are among the most important such repositories and this course explains their significance and how they work. Students will be encouraged to undertake collection, documentation and exhibition of such materials in their localities and colleges. Visit to National Archives and National Museum are an integral part of the course.

I. Definition and history of development (with special reference to India)

II. Types of archives and museums: Understanding the traditions of preservation in India Collection policies, ethics and procedures Collection: field exploration, excavation, purchase, gift and bequests, loans and deposits, exchanges, treasure trove confiscation and others. Documentation: accessioning, indexing, cataloguing, digital documentation and de-accessioning Preservation: curatorial care, preventive conservation, chemical preservation and restoration

III. Museum Presentation and Exhibition:

IV. Museums, Archives and Society: (Education and communication Outreach activities

Essential Readings:

Agrawal, O.P., Essentials of Conservation and Museology, Sundeep Prakashan, New *Delhi*, India, 2007.

Choudhary, R.D. Museums of India and their maladies. Calcutta: Agam Kala Prakashan, New Delhi, 1998 (In Bengali).

Guha, Thakurta, Tapati, Monuments, Objects, Histories: Institution of Art in Colonial Post Colonial India, New York, 2004

Kathpalia, Y. P. Conservation and Restoration of Archive Materials. UNESCO, 1973

Mathur Saloni, India by Design: Colonial History and Cultural Display, University of California, 2007

Nair, S.M. Bio-Deterioration of Museum Materials. 2011

Roychowdhury, Madhuparna. Displaying India's Heritage : Archaeology and the Museum Movement in Colonial India. Delhi: Orient Blackswan 2015

Sengupta, S. Experiencing History Through Archives. Delhi: Munshiram Manoharlal. 2004.

Agrawal, O.P., Essentials of Conservation and Museology, Delhi, 2006

Chainani, S. 2007. Heritage and Environment. Mumbai: Urban Design Research Institute, 2007

SEC –B (2): Art Appreciation: an Introduction to Indian Art

The purpose of this course is to introduce students to Indian art, from ancient to contemporary times, in order to understand and appreciate its diversity and its aesthetic richness. The course will equip students with the abilities to understand art as a medium of cultural expression. It will give students direct exposure to Indian art through visuals, and visits to sites and museums.

I. Prehistoric and protohistoric art: Rock art; Harappan arts and crafts

II. Indian art (c. 600 BCE – 600 CE):

World Heritage Site Managers, UNESCO World Heritage Manuals
[Can be downloaded/ accessed at www.unesco.org]

Notions of art and craft Canons of Indian paintings Major developments in stupas, cave, and temple art and architecture Early Indian sculpture: style and iconography Numismatic art

III. Indian Art (c. 600 CE – 1200 CE) : Temple forms and their architectural features Early illustrated manuscripts and mural painting traditions Early medieval sculpture: style and iconography Indian bronzes or metal icons

IV. Indian art and architecture (c. 1200 CE – 1800 CE) :

Sultanate and Mughal architecture Miniature painting traditions: Mughal, Rajasthani, Pahari
Introduction to fort, palace and hayeli architecture

V. Modern and Contemporary Indian art and Architecture:

The Colonial Period Art movements: Bengal School of Art, Progressive Artists Group, etc.
Major artists and their artworks Popular art forms (folk art traditions)

Essential Readings

Neumayer, Erwin, Lines of Stone: The pre-historic rock-art of India,
South Asia Books, 1993

Goswamy, B.N., Essence of Indian Art, Asian Art Museum of San
Francisco, 1986

Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in
Bengal, 1850-1920, Cambridge University Press, 1992

Suggested Readings:

Mitter, Partha, Indian Art, Oxford History of Art series, Oxford University Press, 2001
Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K.
Printworld and National Museum Institute (Introduction).
Beach, M.C., The New Cambridge History of India I: 3, Mughal and Rajput Painting, Cambridge
University Press, 1992.
Ray, Niharjan, An Approach to Indian Art, Calcutta, 1970

BUDGE BUDGE COLLEGE
Academic Session: 2022-2023
Department of History

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

History Honours
SEC –A (1): Archives and museums &
SEC –B (2): Art Appreciation: An Introduction to Indian Art
Murshidabad, 19/12/2022 to 22/12/2022

Serial Number	Roll No.	Registration No.	Name
1	202561-21-0041	561-1112-0191-20	Abhranil Sarkar
2	212561-21-0048	561-1112-0201-21	Anakan Das Adhikary
3	212561-11-0091	561-1211-0170-21	Anisha Barua
4	212561-21-0045	561-1112-0180-21	Avijit Kayal
5	212561-21-0021	561-1111-0193-21	Baishali Das
6	222561-11-0090	561-1211-0188-22	Dipannita Adak
7	222561-11-0072	561-1211-0140-22	Esha Paul
8	202561-11-0288	561-1215-0204-20	Fatema Khatun
9	222561-11-0008	561-1211-0016-22	Jasmin Khatun
10	202561-11-0289	561-1215-0208-20	Khadija Khatun
11	202561-11-0236	561-1212-0209-20	Krishna Bar
12	222561-11-0083	561-1211-0169-22	Kuyasa Kanthal
13	202561-11-0109	561-1211-0213-20	Mehnaz Khan
14	202561-11-0302	561-1211-1254-20	Monisha Khatun
15	212561-11-0098	561-1211-0183-21	Nasrin Khatun
16	212561-21-0017	561-1111-0169-21	Nilay Malik
17	212561-11-0178	561-1212-0194-21	Riya Sardar
18	202561-11-0298	023-1212-0071-19	Nisha Ghorui
19	202561-11-0239	561-1212-0220-20	Parinita Naskar
20	212561-11-0115	561-1211-0220-21	Pritha Bera
21	202561-11-0116	561-1211-0223-20	Pritha Mondal
22	212561-11-0175	561-1212-0186-21	Priti Dalui
23	202561-11-0240	561-1212-0225-20	Ranadipa Dalui
24	212561-21-0024	561-1111-0214-21	Ranit Adhikary
25	222561-11-0074	561-1211-0143-22	Renua Khatun
26	212561-11-0089	561-1211-0167-21	Reshma Khatun
27	222561-11-0131	561-1211-1156-22	Rimi Adhikary
28	222561-11-0075	561-1211-0144-22	Ritu Adhikary
29	202561-11-0122	561-1211-0232-20	Sakina Khatoon
30	212561-21-0016	561-1111-0165-21	Samriddha Jana
31	212561-11-0179	561-1212-0195-21	Sanchita Mondal
32	212561-11-0201	561-1214-0221-21	Sayani Khan
33	212561-21-0023	561-1111-0212-21	Sayon Pyne
34	212561-21-0034	561-1111-0284-21	Sk Hasanur
35	212561-11-0094	561-1211-0173-21	Sneha Das
36	222561-11-0005	561-1211-0012-22	Sohini Paramanick
37	212561-21-0046	561-1112-0181-21	Soumen Naskar
38	212561-21-0066	561-1112-1239-21	Subrata Mondal
39	202561-11-0128	561-1211-0245-20	Suchismita Ray
40	212561-21-0025	561-1111-0217-21	Suman Jati

Serial Number	Roll No.	Registration No.	Name
41	212561-11-0220	561-1215-0197-21	Sumona Parvin
42	202561-11-0130	561-1211-0248-20	Supriti Kayal
43	222561-21-0059	561-1112-1157-22	Surojit Mondal
44	212561-11-0092	561-1211-0171-21	Susmita Ghosh
45	222561-11-0088	561-1211-0183-22	Taniya Khatun
46	222561-11-0091	561-1211-0189-22	Tina Ghosh
47	222561-11-0087	561-1211-0181-22	Tista Biswas
48	212561-11-0101	561-1211-0190-21	Upasana Chakraborty

Date : 12.12.2022

To
The Principal
Budge Budge College
Kolkata - 700137



Sub:-Prayer to conduct field trip to Murshidabad between 19.12.2022

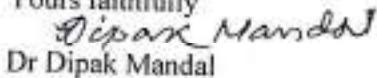
to 23.12.2022

Respected Madam,

I will be highly obliged if you kindly allow the Department of History to conduct a field trip to Murshidabad between 19.12.2022 to 23.12.2022. Murshidabad is a historically significant place. The students of first and third semester will participate in the field trip.

Thanking you

Yours faithfully


Dr Dipak Mandal

Associate Professor and H.O.D (Dept of History)



Budge Budge College

Estd. 1971

NAAC Accredited B+ & UGC 12B, 2(f)

Affiliated to the University of Calcutta

Ref. No.....

Date

BUDGE BUDGE COLLEGE
LIST OF PARTICIPANTS' OF THE FIELD STUDY IN HISTORY – 2022
Department of History
19/12/2022 – 22/12/2022

Sl. No	NAME	GENDER	AGE	DESIGNATION
1.	DR. DEBJANI DATTA	F	59	PRINCIPAL
2.	DR. DIPAK MANDAL	M	47	ASST. PROF. & HEAD
3.	DR. SWETA DUTTA	F	43	ASST. PROF.
4.	MS. CHUMKI SARKAR	F	48	SACT
5.	MR. SUMIT SANTRA	M	31	SACT
6.	MR. TAPAS SHOW	M	37	LAB ATTENDANT
7.	KUYASA KANTHAL	F	17	STUDENT
8.	DIPANNITA ADAK	F	17	STUDENT
9.	SOHINI PARAMANICK	F	18	STUDENT
10.	TINA GHOSH	F	17	STUDENT
11.	TANIYA KHATUN	F	17	STUDENT
12.	RENUA KHATUN	F	18	STUDENT
13.	RIMI ADHIKARY	F	17	STUDENT
14.	SUROJIT MONDAL	M	19	STUDENT
15.	ESHA PAUL	F	18	STUDENT
16.	JASMIN KHATUN	F	19	STUDENT
17.	TISTA BISWAS	F	19	STUDENT
18.	RITU ADHIKARY	F	17	STUDENT
19.	SAMRIDDHA JANA	M	20	STUDENT
20.	NILAY MALIK	M	18	STUDENT
21.	RIYA SARDAR	F	19	STUDENT
22.	SUMAN JATI	M	19	STUDENT
23.	SNEHA DAS	F	19	STUDENT
24.	ANKAN DAS ADHIKARY	M	19	STUDENT
25.	RANIT ADHIKARY	M	18	STUDENT
26.	SOUMEN NASKAR	M	18	STUDENT
27.	AVIJIT KAYAL	M	21	STUDENT
28.	SAYANI KHAN	F	19	STUDENT
29.	SUBRATA MONDAL	M	21	STUDENT
30.	UPASANA CHAKRABORTY	F	18	STUDENT
31.	BAISHALI DAS	F	18	STUDENT
32.	SUMONA PARVIN	F	19	STUDENT
33.	NASRIN KHATON	F	19	STUDENT
34.	SAYON PYNE	M	18	STUDENT

Debjani Datta
DR. DEBJANI DATTA
 Principal
 Budge Budge College

Budge Budge College

Estd. 1971

NAAC Accredited B+ & UGC 12B, 2(f)

Affiliated to the University of Calcutta

Ref. No.....

Date

SI. No	NAME	GENDER	AGE	DESIGNATION
35.	PRITI DALUI	F	18	STUDENT
36.	SANCHITA MONDAL	F	19	STUDENT
37.	SUSMITA GHOSH	F	19	STUDENT
38.	SK HASANUR	M	19	STUDENT
39.	KRISHNA BAR	F	19	STUDENT
40.	PRITHA MONDAL	F	19	STUDENT
41.	SAKINA KHATOON	F	20	STUDENT
42.	MEHNAZ KHAN	F	20	STUDENT
43.	ABHRANIL SARKAR	M	22	STUDENT
44.	SUCHISMITA RAY	F	20	STUDENT
45.	RANADIPA DALUI	F	20	STUDENT
46.	KHADIJA KATUN	F	19	STUDENT
47.	FATEMA KATUN	F	20	STUDENT
48.	MONISHA KATUN	F	21	STUDENT
49.	SUPRITI KAYAL	F	20	STUDENT
50.	ANISHA BARUA	F	19	STUDENT
51.	RESHMI KATUN	F	20	STUDENT
52.	PRITHA BERA	F	21	STUDENT
53.	NISHA GOURI	F	20	STUDENT
54.	PARINITA NASKAR	F	21	STUDENT

Debjani Datta
 DR. DEBJANI DATTA
 Principal
 Budge Budge College

I. Department of History: Field Visit – Hazarduari, Murshidabad





History Field Trip Report

The Department of History conducted a field trip to Murshidabad from 19.12.2022 to 23.12.2022. The students from Semester 1, 3 and 5 participated in the trip. The department visited various places like the Katra Mosque, Kat Golap er Bagan Bari, Hazar Duari Palace and museum, Jagat Seth's house, Siraj-ud-daula's grave and Moti Jheel. Murshidabad is a very historically significant place.

Objective: Battle of Plassey, its causes, consequence and significance is an integral part of the syllabus. Hence, the objective was to provide additional exposure to the students regarding these aspects and historical events by visiting the historical sites in Murshidabad.

Outcome: The students were immensely benefitted by this trip. The visit to Hazar Duari museum was helpful to the students because History of Archives and Museums is also an important part of the syllabus and they visited an archive for the first time and examined old records.

B.Sc. Zoology Honours

Sl. No.	Content	Page No.
1.	Syllabus Extract indicating field work and project work	2 – 6
2.	List of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23)	7 – 10
3.	Permission letter for field work from the competent authority	11
4.	Objective and Outcome of field work	12 – 13
5.	Sample photographs of the field work	14
6.	Sample report of the Project 1	15 – 58
7.	Sample report of the Project 2	59 – 73
8.	Sample report of the Project 3	74 – 87



UNIVERSITY OF CALCUTTA

Notification No. CSR/ 12 /18

It is notified for information of all concerned that the Syndicate in its meeting held on 28.05.2018 (vide Item No.14) approved the Syllabi of different subjects in Undergraduate Honours / General / Major courses of studies (CBCS) under this University, as laid down in the accompanying pamphlet:

List of the subjects

<u>Sl. No.</u>	<u>Subject</u>	<u>Sl. No.</u>	<u>Subject</u>
1	Anthropology (Honours / General)	29	Mathematics (Honours / General)
2	Arabic (Honours / General)	30	Microbiology (Honours / General)
3	Persian (Honours / General)	31	Mol. Biology (General)
4	Bengali (Honours / General /LCC2/AECC1)	32	Philosophy (Honours / General)
5	Bio-Chemistry (Honours / General)	33	Physical Education (General)
6	Botany (Honours / General)	34	Physics (Honours / General)
7	Chemistry (Honours / General)	35	Physiology (Honours / General)
8	Computer Science (Honours / General)	36	Political Science (Honours / General)
9	Defence Studies (General)	37	Psychology (Honours / General)
10	Economics (Honours / General)	38	Sanskrit (Honours / General)
11	Education (Honours / General)	39	Social Science (General)
12	Electronics (Honours / General)	40	Sociology (Honours / General)
13	English ((Honours / General/ LCCI/ LCC2/AECC1))	41	Statistics (Honours / General)
14	Environmental Science (Honours / General)	42	Urdu (Honours / General /LCC2/AECC1)
15	Environmental Studies (AECC2)	43	Women Studies (General)
16	Film Studies (General)	44	Zoology (Honours / General)
17	Food Nutrition (Honours / General)	45	Industrial Fish and Fisheries – IFFV (Major)
18	French (General)	46	Sericulture – SRTV (Major)
19	Geography (Honours / General)	47	Computer Applications – CMAV (Major)
20	Geology (Honours / General)	48	Tourism and Travel Management – TTMV (Major)
21	Hindi (Honours / General /LCC2/AECC1)	49	Advertising Sales Promotion and Sales Management – ASPV (Major)
22	History (Honours / General)	50	Communicative English – CMEV (Major)
23	Islamic History Culture (Honours / General)	51	Clinical Nutrition and Dietetics CNDV (Major)
24	Home Science Extension Education (General)	52	Bachelor of Business Administration (BBA) (Honours)
25	House Hold Art (General)	53	Bachelor of Fashion and Apparel Design – (B.F.A.D.) (Honours)
26	Human Development (Honours / General)	54	Bachelor of Fine Art (B.F.A.) (Honours)
27	Human Rights (General)	55	B. Music (Honours / General) and Music (General)
28	Journalism and Mass Communication (Honours / General)		

The above shall be effective from the academic session 2018-2019.

SENATE HOUSE
KOLKATA-700073
The 4th June, 2018



(Dr. Santanu Paul)
Deputy Registrar

UNIVERSITY OF CALCUTTA

**CBCS SYLLABUS OF ZOOLOGY
2018**

**F
O
R**

**THREE-YEAR HONOURS
DEGREE COURSE OF STUDIES**



Outline Structure of CBCS Curriculum for Zoology (Hons), C.U.

PART I; SEM I				
Subject Code	Name of Paper	Theory	Practical	Internal assessment
CC 1	Non Chordata – I (Protists to Pseudocoelomates)	50	30	20
CC 2	Molecular Biology	50	30	20
PART I; SEM II				
CC 3	Non Chordata – II (All Coelomate Phyla)	50	30	20
CC 4	Cell Biology	50	30	20
PART II; SEM III				
CC 5	Chordata	50	30	20
CC 6	Animal Physiology: Controlling & Co-ordinating System	50	30	20
CC 7	Fundamentals of Biochemistry	50	30	20
SEC-A (1/2)	Apiculture / Sericulture	80	NA	20
PART II; SEM IV				
CC 8	Comparative Anatomy of Vertebrate	50	30	20
CC 9	Animal Physiology: Life sustaining system	50	30	20
CC 10	Immunology	50	30	20
SEC- B(1/2)	Aquarium Fisheries/ Medical Diagnosis	80	NA	20
PART III; SEM V				
CC 11	Ecology	50	30	20
CC 12	Principle of Genetics	50	30	20
DSE A(1/2)	Parasitology/Biology of Insect	50	30	20
DSE B (1/2)	Endocrinology/Reproductive Biology	50	30	20
PART III; SEM VI				
CC 13	Developmental Biology	50	30	20
CC 14	Evolutionary Biology	50	30	20
DSE A (1/2)	Animal Biotechnology/Animal Cell Biotechnology	50	30	20
DSE B (1/2)	Animal Behaviour & Chronology/Fish & Fisheries	50	30	20

Abbreviations:

CC: Core Course; **DSE A/B:** Discipline Specific Elective A/B; **SEC A/B:** Skill Enhancement Course

PART III: SEMESTER 5 CORE COURSE 11. Ecology

Ecology Lab, ZOOA-CC5-11-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
1. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community 2. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, salinity, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO ₂ 3. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary/ any place of ecological interest/ ecological uniqueness/ Zoological garden		

PART III: SEMESTER 6

DSE1. Animal Cell Biotechnology

Animal Biotechnology Lab, ZOOA-DSE(A)-6-2-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
1. Genomic DNA isolation from <i>E. coli</i> and Plasmid DNA isolation (pUC 18/19) from <i>E. coli</i> 2. To study following techniques through photographs - Southern Blotting, Northern Blotting, Western Blotting, PCR, DNA fingerprinting 3. Project report on animal cloning & Application & ethical Issues.		

PART III: SEMESTER 6

DSE1. Animal Behaviour and Chronobiology

Animal Behaviour and Chronobiology Lab, ZOOA-DSE(B)-6-1-P

Full Marks 50	60 Hours	2 Credits
List of Practical		
1. To study nests and nesting habits of the birds and social insects. 2. To study the behavioural responses of wood lice to dry and humid conditions(demonstration only). 3. To study geotaxis behaviour in earthworm. 4. To study the phototaxis behaviour in insect larvae. 5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report. 6. Study of circadian functions in humans (daily eating, sleep and temperature patterns).		

BUDGE BUDGE COLLEGE
Academic Session: 2022-2023
Department of Zoology

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

B.Sc. ZOOLOGY HONOURS

Semester-V

Course Name: Ecology

Course Code: ZOO-A-CC-5-11-P

Serial No.	Name of student	University Roll Number	Project Title	Supervisor
1	ANANNYA MONDAL	203561-11-0026	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
2	SEBIKA GHOSH	203561-11-0029	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
3	SWASTIKA KUMAR	203561-11-0032	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
4	BRISHTY CHAKRABORTY	203561-11-0035	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
5	NAZMA KHATUN	203561-11-0039	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
6	PARAMITA PRAMANIK	203561-11-0048	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
7	AFSANA PARVEEN	203561-11-0057	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
8	SIDHARTA ADHIKARY	203561-21-0004	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das

Serial No.	Name of student	University Roll Number	Project Tittle	Supervisor
9	SK NADIR RAFED	203561-21-0005	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das
10.	PRAJJAL PAL	203561-21-0018	"A field report on visit to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park"	Dr. Partha Pratim Choudhuri, Dr. Debjani Datta, Dr. Papia Das

B.Sc. ZOOLOGY HONOURS
Semester-VI

Course Name: Animal Biotechnology
COURSE Code: ZOO-A-DSE-A-6-02-P

Serial No.	Name of student	University Roll Number	Project Tittle	Supervisor
1	UPASANA DAS	203561-11-0004	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
2	ANANNYA MONDAL	203561-11-0026	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
3	SEBIKA GHOSH	203561-11-0029	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
4	SWASTIKA KUMAR	203561-11-0032	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
5	BRISHTY CHAKRABORTY	203561-11-0035	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
6	NAZMA KHATUN	203561-11-0039	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
7	PARAMITA PRAMANIK	203561-11-0048	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
8	TRINA MONDAL	203561-11-0055	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
9	AFSANA PARVEEN	203561-11-0057	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri

Serial No.	Name of student	University Roll Number	Project Tittle	Supervisor
10	NANDITA PRAMANICK	203561-11-0061	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
11	SIDHARTA ADHIKARY	203561-21-0004	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
12	SK NADIR RAFED	203561-21-0005	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
13	KRISHNENDU GAYEN	203561-21-0015	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
14.	SHUVOOJIT MONDAL	203561-21-0017	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri
15.	PRAJJAL PAL	203561-21-0018	"A Project Report on Animal cloning, its applications & ethical issues"	Dr. Partha Pratim Choudhuri

B.Sc. ZOOLOGY HONOURS
Semester-VI

Course Name: Animal Behaviour and Chronobiology
COURSE Code: ZOO-A-DSE-B-6-01-P

Serial No.	Name of student	University Roll Number	Project Tittle	Supervisor
1	UPASANA DAS	203561-11-0004	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
2	ANANNYA MONDAL	203561-11-0026	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
3	SEBIKA GHOSH	203561-11-0029	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
4	SWASTIKA KUMAR	203561-11-0032	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
5	BRISHTY CHAKRABORTY	203561-11-0035	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera

Serial No.	Name of student	University Roll Number	Project Tittle	Supervisor
6	NAZMA KHATUN	203561-11-0039	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
7	PARAMITA PRAMANIK	203561-11-0048	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
8	TRINA MONDAL	203561-11-0055	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
9	AFSANA PARVEEN	203561-11-0057	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
10	NANDITA PRAMANICK	203561-11-0061	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
11	SIDHARTA ADHIKARY	203561-21-0004	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
12	SK NADIR RAFED	203561-21-0005	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
13	KRISHNENDU GAYEN	203561-21-0015	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
14.	SHUVOJIT MONDAL	203561-21-0017	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera
15.	PRAJJAL PAL	203561-21-0018	"A Project on Study Of Circadian Functions In Human"	Dr.Barnali Bera

of

17/10/2022

To
The Principal
Budge Budge College
Budge Budge
24 Parganas (South)

P
27/10/2022

Sub: Request for sanction of an advance of Rs. 60,000.00 for conducting field study at Okhrey and Varsey, West Sikkim.

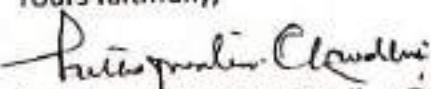
Madam,

This is to inform you that the Department of Zoology is going to organize a field study as a part of the curriculum of the syllabus of the University of Calcutta for the students of B. Sc. (Hons) 5th Semester at Okhrey and Varsey, West Sikkim, between 14th and 21st of November, 2022. In this connection, I do request you to sanction an amount of Rs. 60,000.00 to meet the expenses related to full maintenance (Fooding, Lodging, etc.) and transport support for 4 staff members and partial support to 8 students, who will be participating in the said field study.

Enclosing herewith the list of participants of the above trip for your verification and necessary action.

Thanking you,

Yours faithfully,


(Partha Pratim Chaudhuri) 17/10/22
Head, Dept. of Zoology

Department of Zoology

Field Trip 2022-2023

Field Trip to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park by Semester V students, Zoology Honours, Budge Budge College.

Trip Duration/Time: 14th November, 2022 to 22nd November, 2022

Objective of Field Trip

The field study gives an opportunity to observe the animals in their natural abode. The field trips are a way of enhancing classroom learning by making real world connections. It is required to have a complete knowledge on the subject. During exposing to the nature's laboratory during field work and getting a chance to interact with creatures living in diverse habitat, one's knowledge seems to be completed. Field study also helps in generating love to nature in our mind which will definite be helpful in conservation of precious diversity. The different places of Himalaya and its biodiversity is considered one of the megadiversity zone with various flora and fauna give the chance of observing the wonders of nature from close quarters.

Project Outcome

Hands-on Experience: Field trips allow students to experience hands-on learning opportunities. They can experience real-life situations that enable them to apply what they have learned in class. Students can observe the animals' diversity which they have studied in their books. They can collect the information about their behaviour in natural habitat also which makes them more dutiful towards the preservation and conservation of that particular animal. During the present trip the students got the chance to observe different flora and fauna of Alpine Forest area in their natural abode.

Better Teacher-Student Relationship: Field trips help teachers connect with their students on an emotional level. When teachers take their classes on field trips, they get to know their

students in ways that they don't usually do when simply teaching them in a classroom setting. Teachers can use this connection to motivate their students to learn more about whatever topic they're studying at the time of the trip. The present trip has gifted a nice teacher-student bonding.

Foster Collaboration: Students learn more when they work together. Field trips provide an opportunity for students to collaborate on a project or task, which fosters their ability to work together.

Develop Life-Skills: Field trips help students to build self-confidence by exploring new places and situations on their own.

Improve Learning Outcomes: Field trips also give students a chance to practice skills they've learned in class, such as reading maps, following directions and interacting with strangers. This helps solidify what they've learned in class. During the present trip students got the opportunities to observe how people live in small villages in the hilly regions, came to know about their daily life struggles which helped them to make better understanding about life.

Department of Zoology

Field Trip to Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park by Semester V students, Zoology Honours, Budge Budge College.





UNIVERSITY OF CALCUTTA

B.Sc Honours Semester : V

Examination : 2022

FIELD REPORT



UNIVERSITY ROLL NO	203561-11-0032
UNIVERSITY REG. NO	561-1211-0421-20
SUBJECT	ZOOA
PAPER	CC11
EXAMINATION	PRACTICAL

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EXAMINED
Date of 26/10/07
VNR-VTU

ACKNOWLEDGEMENT

The period of **7days** excursion from **14-21th NOVEMBER** at "**Okhrey, Varsey and Rangaroon**" had been truly encouraging and informative. I have gained a lot of knowledge regarding biodiversity, forest ecosystem and experience gained here would be highly beneficial for my future career as well.

Who always guided me during my excursion at "**Okhrey, Varsey and Rangaroon**"-----

- **Dr. Debjani Datta (Principal)**
- **Dr. Partha Pratim Chaudhuri (Head of the Department of Zoology)**
- **Dr. Papia Das (Assistant Professor, Department of Zoology)**

Who candled my spirit of learning by his presence and guidance.

I would also like to thank our staff member, **Mr. Tapas Show** and all my fellow friends of our College who have helped me immensely during the excursion, making my trip an enriching one.

EXAMINED
Dent. of Zoology
VNUKUL KUMAR

NECESSITY AND PRIORITY OF THE PROJECT

(1) Necessity of the Biodiversity Conservation in the State of Sikkim:

In the State of Sikkim, more than 4,500 flowering plants are found, and among those plants in particular, there are 550 species of **Orchids** and 36 species of **Rhododendron**. Furthermore, in view of the global biodiversity conservation, there are more than 50 flowering plants which are considered to be in danger of extinction, and precious flowering plants are conserved in the State of Sikkim. The State of Sikkim is located in the area of the **Biodiversity Hotspot of Eastern Himalaya Region**, and flowering plants per unit area are abundant compared with the other neighbouring states and countries such as Nepal and Bhutan. Moreover, other than flowering plants, there are many animal species living in the State of Sikkim; more than 50 kinds of fishes, 690 kinds of butterflies, 16 kinds of amphibian (one species recognized in danger of extinction), 78 kinds of reptiles, 550 kinds of birds (11 species recognized in danger of extinction), 154 mammals (12 species recognized in danger of extinction).

(2) Necessity of the Forest Management in the State of Sikkim:

The forest cover in Sikkim was 37% in 1975. However, the forest cover increased steadily, and it became 46% in 2005. However, the open forest accounts for around 25%, and forest cover in Sikkim does not satisfy the national forest cover target, which is two third of the total geographical area in the hilly states. Considering the severe natural environment of the northern part of Sikkim to grow trees, although is difficult to achieve the national target, Department of Forest, Environment, and Wildlife Management (DFFWM) considers to increase the forest cover substantially in the near future for people living in the forest fringe area who are heavily dependent on the natural forest resources such as fuel wood for the source of energy, and fodder, medicinal plants, herbs for their own consumption. Although the scale is not so clear, there seems to be illegal collection of the forest products within the public lands by the local people. Furthermore, soil moisture conservation capacity is not enough to prevent landslides which occur in many part of Sikkim.

BIODIVERSITY

What is Biodiversity?

BIODIVERSITY, short for **biological diversity**, is the term used to describe the variety of life found on Earth and all of the natural processes. This includes ecosystem, genetic and cultural diversity, and the connections between these and all species. To describe this immense variety and richness of life on this planet, the term "**Biodiversity (Bio Diversity) or Biological Diversity**" was coined. The origin of the term is credited to two papers published in 1980 (Lovejoy, 1980; Norse and Mc Manus, 1980). However, after the Rio Earth Summit (1992), biodiversity gained a global audience.

The diversity of life on earth is immense. Although taxonomists have so far recognized less than 2 million species, some biologists opined that as many as 5 and 30 million living species may inhabit the earth, most of them small insects in Tropical forests (Wilson, 1992). Scientists believe that total number of on earth is in between 10 million to 80 million (Stork, 1988; Wilson 1988). Each species contains upto 400,000 genes and virtually no two members of the same species are genetically identical. Nature has taken more than 600 million years to develop this exceedingly complex spectrum of life on this planet.

Values of Biodiversity:

The different aspects of biodiversity all have a very strong influence on each other. We have only just started to understand the relationships between living things and their environments. It is helpful to think of an ecosystem as a woven carpet; if you pull on a loose thread it might only affect the thread and those closest to it or it might unravel the whole carpet.

Biodiversity also helps us in our day-to-day lives. Unfortunately, the greenhouse gases produced by human activities are building up in the atmosphere and causing climate change. Climate change is a major threat to biodiversity. Climate change affects air and ocean temperatures, the length of seasons, sea levels, the pattern of ocean and wind currents, levels of precipitation, as well as other things. These changes affect the habitats and behaviour of many different species. Many will not be able to adapt fast enough and may become extinct.

Types of Biodiversity:

Biodiversity can be subdivided as three types----

- I. Genetic Diversity
- II. Species Diversity
- III. Ecosystem Diversity

Genetic Diversity :-

At finer levels of organisation, biodiversity includes the genetic variation within species, both among geographically separated populations and among individuals within the single population.

Differences between individual organisms have two causes: variation in the genetic material which all organisms possess and which is passed on from generation to generation; and variation caused by environmental influence on each individual organism. New genetic variation, which arises by gene and chromosome mutation in individuals and in sexually reproducing organisms, is spread in the population by a recombination of genetic material during cell division preceding sexual reproduction.

A great deal of work needs to be done on the conservation of genetic diversity within wild species in India. Protecting the Gir Habitat, for instance, has saved the Asiatic Lion. India also has a long tradition of domestic animal breeding for specific qualities. These include cattle, goats and sheep as well as horses and pigeons for sport.

The replacement of numerous locally adapted varieties with a few high yielding strains in the large contiguous areas presents the danger of the spread of serious diseases capable of wiping out the entire crop, as happened prior to the Bengal rice famine in 1942.

A productive and stable agriculture requires genetic diversity on the farm. Genetically diverse crop varieties enable farmers to fit their cropping systems to heterogeneous conditions, to enhance the food security of their households and to exploit a range of crop products.

The challenges are at least two-fold; to meet farmers' needs for wide genetic diversity whether through enhanced access to local varieties or newly introduced genetic resources; and to find strategies for linking longer-term conservation goals with immediate product needs.

♦ Species Diversity :-

Biodiversity at its most basic level includes the full range of species on earth from micro-organisms such as viruses, bacteria through the multicellular kingdom of plants, animals and fungi. Thus, it refers to the variety of species within a region. It is measured on the basis of number of species in the region. Species' richness varies geographically. Out of an estimation 30 million species on earth, only one-sixth has been identified and authenticated in the past 200 years. Only 250,000 species of the total stock are plants.

Keystone species have an important role in maintaining the diversity of a whole community of other species. Keystone species would include pollinators, top predators and the decomposer organisms and so-forth. The wild species are of considerable potential benefit to man in medicine, agriculture and industry as a natural source of drugs, food, fuel, fibre, industrial base compounds and additives.

* Ecosystem Diversity :-

On the wider scale, biodiversity includes variations in the biological communities in which species live, the ecosystem in which communities exist, and the interactions among these levels.

In the living world, interdependence and interaction between organisms and their environment are a very common practice to assert one's existence on this planet. On the other hand, nature always tries to remain in homeostatic state and various life forms help to maintain this equilibrium. For both these cases, biodiversity serves as the source of livestock. To human beings, it opens avenues for understanding the laws and ways of nature and for making the optimum sustainable use of life support systems gifted to man by nature.

The regulation of biogeochemical cycles, maintenance of predator-prey relationships by various types of food chains and food webs and finally the balance of nature are maintained through biodiversity. Again it indirectly influences the climatic factors, soil nature, chemistry of air etc. that are the abiotic elements of an ecosystem. Ecosystem diversity could be best understood if one studies the communities in various ecological niches within the given ecosystem.

Q) Levels of Biodiversity:

* Alpha Diversity (α -diversity) :-

The term **alpha diversity** (α -diversity) was introduced by **R. H. Whittaker** together with the terms beta diversity (β -diversity) and gamma diversity (γ -diversity). Whittaker's idea was that the total species diversity in a landscape (gamma diversity) is determined by two different things, the mean species diversity in sites or habitats at a more local scale (alpha diversity) and the differentiation among those habitats beta diversity.

Ecologists have used several slightly different definitions of alpha diversity. Whittaker himself used the term both for the species diversity in a single subunit and for the mean species diversity in a collection of subunits. It has been argued that defining alpha diversity as a mean across all relevant subunits is preferable, because it agrees better with Whittaker's idea that total species diversity consists of alpha and beta components.

Definitions of alpha diversity can also differ in what they assume diversity to be. Often researchers use the values given by one or more diversity indices such as species richness, the Shannon index or the Simpson index. However, it has been argued that it would be better to use the effective number of species as the universal measure of species diversity.

* Beta Diversity (β -diversity) :-

The term beta diversity (β -diversity) was introduced by R. H. Whittaker together with the terms alpha diversity (α -diversity) and gamma diversity (γ -diversity). The idea was that the total species diversity in a landscape (γ) is determined by two different things, the mean species diversity at the habitat level (α) and the differentiation among habitats (β). Whittaker proposed several ways of quantifying differentiation, and subsequent generations of ecologists have invented more. As a result, the definition of beta diversity has become quite contentious. Some use beta diversity as a broad umbrella term that can refer to any of several indices related to compositional heterogeneity. Others argue that such broad usage should be avoided because it leads to confusion. Instead, they propose that the term beta diversity be used to refer to one phenomenon only (true beta diversity), and that other things be referred to by other names.

Gamma diversity and alpha diversity can be calculated directly from species inventory data. The simplest of Whittaker's original definitions of beta diversity is

$$\beta = \gamma/\alpha.$$

Here gamma diversity is the total species diversity of a landscape, and alpha diversity is the mean species diversity per habitat. Because the limits among habitats and landscapes are diffuse and to some degree subjective, it has been proposed that gamma diversity can be quantified for any inventory dataset, and that alpha and beta diversity can be quantified whenever the dataset is divided into subunits. Then gamma diversity is the total species diversity in the dataset and alpha diversity the mean species diversity per subunit. Beta diversity quantifies how many subunits there would be if the total species diversity of the dataset and the mean species diversity per subunit remained the same, but the subunits shared no species.

❖ Gamma Diversity (γ -diversity) :-

The term **gamma diversity** (γ -diversity) was introduced by **R. H. Whittaker** together with the terms alpha diversity (α -diversity) and beta diversity (β -diversity). Whittaker's idea was that the total species diversity in a landscape (γ) is determined by two different things, the mean species diversity in sites or habitats at a more local scale (α) and the differentiation among those habitats (β). According to this reasoning, alpha diversity and beta diversity constitute independent components of gamma diversity.

Researchers have used different ways to define diversity, which in practice has led to different definitions of gamma diversity as well. Often researchers use the values given by one or more diversity indices, such as species richness, the Shannon index or the Simpson index. However, it has been argued that it would be better to use the effective number of species as the universal measure of species diversity. This measure allows weighting rare and abundant species in different ways, just as the diversity indices collectively do, but its meaning is intuitively easier to understand. The effective number of species is the number of equally-abundant species needed to obtain the same mean proportional species abundance as that observed in the dataset of interest (where all species may not be equally abundant).

EXAMINED
Dept. of Zoology
VIVEK JADON
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Biodiversity Hotspot:

A biodiversity hotspot is a biogeographic region with a significant reservoir of biodiversity that is under threat from humans. The concept of biodiversity hotspots was originated by **Norman Myers** in two articles in "**The Environmentalist**" (1988), & 1990 revised after thorough analysis by Myers and others in "**Hotspots: Earth's Biologically Richest and Most Endangered Terrestrial Eco regions**".

To qualify as a biodiversity hotspot on Myers 2000 edition of the hotspot-map, a region must meet two strict criteria:

1. It must contain at least 0.5% or 1,500 species of vascular plants as endemics, and
2. It has to have lost at least 70% of its primary vegetation. Around the world, 25 areas qualify under this definition, with nine other possible candidates. These sites support nearly 60% of the world's plant, bird, mammal, reptile, and amphibian species with a very high share of endemic species.

Four regions that satisfy these criteria exist in India and are described below.

The Western Ghats and Sri Lanka

The Western Ghats are a chain of hills that run along the western edge of peninsular India.

The Eastern Himalayas

The Eastern Himalayas is the region encompassing Bhutan, northeastern India, and southern, central, and eastern Nepal.

Indo-Burma

The Indo-Burma region encompasses several countries. It is spread out from Eastern Bangladesh to Malaysia and includes North-Eastern India south of Brahmaputra river, Myanmar, the southern part of China's Yunnan province, Lao People's Democratic Republic, Cambodia, Vietnam and Thailand. The Indo-Burma region is spread over 2 million sq. km of tropical Asia.

Sundaland

Sundaland is a region in South-East Asia that covers the western part of the Indo-Malayan archipelago. It includes Thailand, Malaysia, Singapore, Brunei and Indonesia. India is represented by the Nicobar Islands.

Distribution by Origin:

- ↓ North and Central America
- ↓ South America
- ↓ Europe and Central Asia
- ↓ Africa
- ↓ South Asia
- ↓ South East Asia and Asia Pacific

AIMS AND OBJECTIVES OF OUR FIELD STUDY

- * To gain a general idea about the forest ecosystem.
- * To gather a knowledge regarding the biodiversity of the area.
- * To learn about population distribution of various animal species.
- * To understand the diverse habit, habitat and behaviour of various animals and their original area of living.
- * To gather knowledge about inter relationship between biotic and various abiotic components of the ecosystem.
- * Knowledge about threats and determining protection and conservation.
- * Discovering our teachers in new ways.
- * Relationship and harmony with friends.

THE TEAM

• TEACHERS

- Dr. Debjani Datta (Principal)
- Dr. Partha Pratim Chaudhuri (Head of the Department of Zoology)
- Dr. Papia Das (Assistant Professor, Department of Zoology)

• LAB ATTENDANT

Mr. Tapas Shaw

• STUDENTS

1. Afsana Parveen	6) Prajjal Pal
2. Anannya Mondal	7) Sebika Ghosh
3. Brishty Chakraborty	8) Sidharta Adhikary
4. Nazma Khatun	9) Sk Nadir Rafeed
5. Paramita Pramanik	10) Swastika Kumar



Fig : Group Photo

ITINERARY

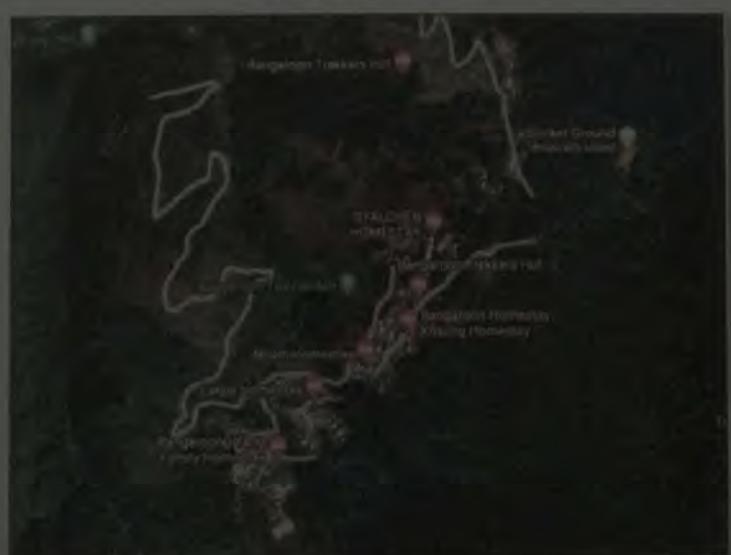
DAILY ITINERARY PROGRAMME		
14th November - 2022	08.35 P.M.	Sealdah to New Siliguri Jn. by 13149 up Kanchan Kanya Exp.
15th November - 2022	8.00 A.M. 9.00 A.M. 2.30 P.M.	Reached at Siliguri Jn. We started our journey to Okhrey, West Sikkim Reached at Okhrey, West Sikkim
16th November - 2022	6.30 A.M. 8.30 A.M. to 1.30 P.M.	Local Birds Study
17th November - 2022	8.00 A.M. to 10.00 A.M 10.00 A.M.	Local Birds Study Visited Monastery
18th November - 2022	7.30 A.M. to 2.30 P.M.	Visited Varsey Rhododendron Sanctuary
19th November - 2022	7.15 A.M. 12.30 P.M. 5.00 P.M to 6.00 P.M.	Way to Rangaroon Reached at Rangaroon Local Study
20th November - 2022	6.00 A.M to 7.30 A.M 8.15 A.M to 10.00 A.M 11.00AM to 3.00 P.M	Local Birds Study Visited Senchal Forest, Rangaroon Local Study
21th November - 2022	10.00 A.M 11.15 A.M 11.30 A.M 3.30 P.M 7.00 P.M 8.20 P.M	Way to Darjeeling Reached at Darjeeling Visited Padmaja Naidu Himalayan Zoological Park Set to Return from Darjeeling Reached at Siliguri Jn. By 13150 UP Kanchan Kanya Exp. Leaves Siliguri Jn.
22th November - 2022	8.45 A.M	Return to Sealdah Station.



Oldney, West Sikkim



Yagsey, West Sikkim



Rangaroon

Fig: Our Study Map

A Brief History Of Sikkim

The history of Sikkim begins with ancient Hindu and Tibetan contacts, followed by the establishment of a kingdom (Chogyal) in the 17th century. Sikkim emerged as a polity in its own right against a backdrop of incursions from Tibet and Bhutan, during which the kingdom enjoyed varying degrees of independence. In the early 18th century, the British Empire sought to establish trade routes with Tibet, leading Sikkim to fall under British suzerainty until independence in 1947. Initially, Sikkim remained an independent monarchy, however in 1975, its subjects voted by plebiscite to become a state of India.

Not much is known about Sikkim ancient history except that the original inhabitants were the Lepcha (or "Rong"), Limbu (Tsong) and Bhutias. Sikkim also finds its mention on many Hindu texts as Indrakil or "Garden of Lord Indra."

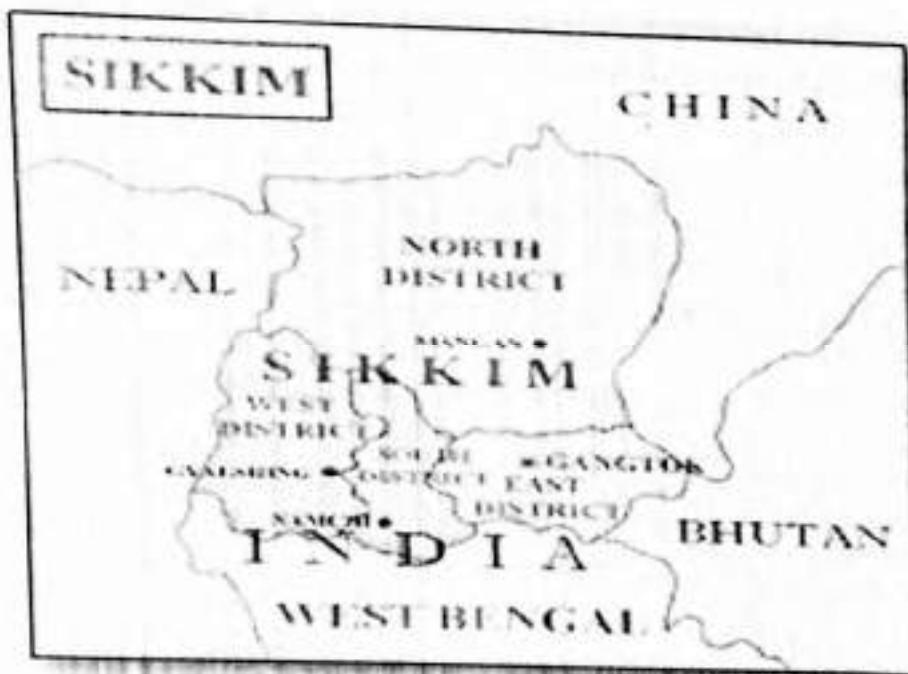


Fig: Map of Sikkim

EXAMINED
Date of issue
Vidhan Sabha
Sikkim

Sikkim is only state in India which is divided into four states like East Sikkim, West Sikkim, North Sikkim and South Sikkim.

West Sikkim is the second largest district in the Indian state of Sikkim with an area of 1,166 sq km. West Sikkim lies between 27°-27°55" North latitudes and 88°-88°36" East Longitudes. Average elevation is 2,694 m. Maximum elevation is 7,320 m. Minimum elevation is 298 m. The breathtaking view of Mt. Kanchenjunga along with scared lakes, deep forest of pine, fir with so many known and unknown floras and faunas make it one of the best tourist regions in the Sikkim. The erstwhile capital of the Sikkim beginning in 1642, West Sikkim remains the capital city for almost 50 years until it shifted to Rabdentse. The region was under the ownership of Nepalese for nearly 30 years in the 18th and 19th centuries. It comes under Sikkim after the Anglo-Nepalese war from 1814 to 1816. Spread over 1,166 sq. km., West Sikkim has a sizeable Nepali population owing to their possession for three decades. Also, Nepali is the predominant language, along with the Bhutia, Lepcha, Limbu, etc. Now, Geyzing is the capital of West Sikkim, which is also recognized as Gyalshing. Geyzing is also connected to the West Bengal towns of Darjeeling and Kalimpong via Jorethang. The town enjoys a temperate climate for most of the year and snow sometimes falls in the vicinity. Other important towns include Pelling, Yuksom and Dentam. The district shares its borders with South Sikkim and North Sikkim in the east and north respectively and with the state of West Bengal in the south. It also has an international border with Nepal to its west.

★ Okhrey:

Okhrey is a small village situated in West Sikkim district, India. Okhrey is mostly inhabited by Sherpas. Okhrey comes under Daramdin BAC Block Administrative Center, and is approximately 110 kilometres (68 mi) from the capital Gangtok. The nearest town from Okhrey is Sombaria at a distance of around 15 kilometres (9.3 mi). The main occupation of the people of Okhrey is farming, and they mainly produce potatoes. The temperature of Okhrey can fall to -2 °C (28 °F) in winter, and it has a moderate climate during summer.

EXAMINED

Dept. of Zoology

VIVEKANANDA COLLEGE

★ Varsey Rhododendron Sanctuary:

The **Varsey Rhododendron Sanctuary** or Barsey Rhododendron Sanctuary occupies 104 km² in the Singalila Range in western Sikkim. It borders on Nepal to the west, and on the state of West Bengal to the south across the Rambong Khola stream. The Rhododendrons bloom during March and April. The Varsey Sanctuary can be reached from three points, Hille, Dentam and Soreng. The most popular entry is Hille since it is approachable by road and Varsey is only 4 km trek from this point along an undulating path shaded by different species of rhododendron.



A



B

Fig.: (A,B) Okhrey, West Sikkim



C



D



E



F EXAMINED

Fig.: (C,D,E,F) Varsey Rhododendron Sanctuary

FAUNAL DIVERSITY

■ BIRDS

- DATE: 16/11/2022
- DESTINATION: Okhrey, West Sikkim (Zone - I)
- TIME : 6:00am -1:00pm

Table - 1. Birds Diversity Observed in Zone - I :-

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME	NUMBER
1.	Striated Laughingthrush	<i>Grammatoptila striatus</i>	2
2.	Grey Wagtail	<i>Motacilla cinerea</i>	1
3.	Red-billed Leiothrix	<i>Leiothrix lutea</i>	1
4.	Chestnut-tailed Minla	<i>Actinodura strigula</i>	6
5.	Grey Treepie	<i>Dendrocitta formosae</i>	2
6.	Rufous Sibia	<i>Heterophasia capistrata</i>	1
7.	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1
8.	Fulvettta	<i>Alcippe poioicephala</i>	1
9.	Chestnut	<i>Lonchura atricapilla</i>	2
10.	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	1
11.	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	3
12.	Green Backed Tit	<i>Parus monticolus</i>	1
13.	White Browed Fulvettta	<i>Fulvetta vinipectus</i>	1
14.	Golden Breasted Fulvettta	<i>Lioparus chrysotis.</i>	27
15.	Rufous Capped Babbler	<i>Stachyridopsis ruficeps</i>	1
16.	Yellow Billed Magpie	<i>Pica nuttalli</i>	1

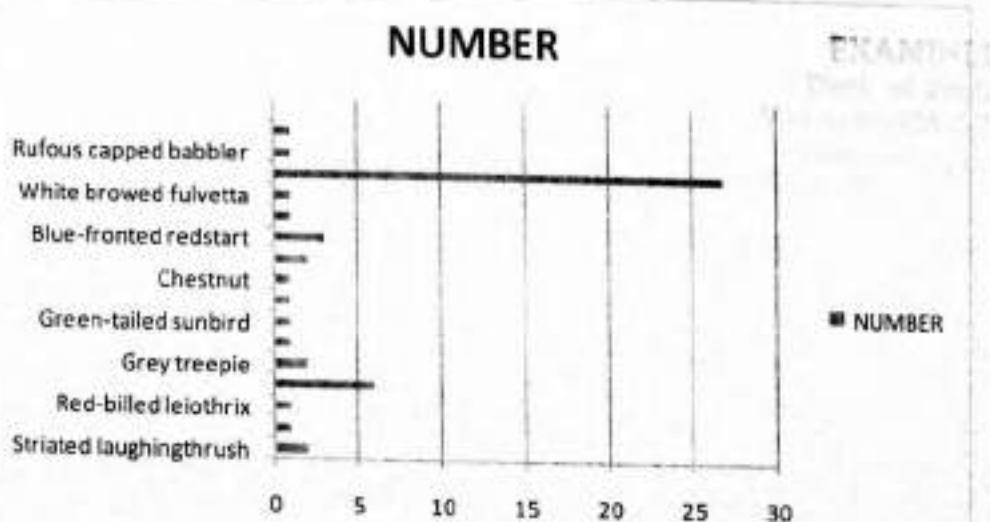


Fig : Graphical Representation of Okhrey, West Sikkim (Zone - I)

- DATE: 17/11/2022
- DESTINATION: Okhrey, West Sikkim (Zone - II)
- TIME: 7:00am- 12:00pm

Table - 2. Birds Diversity Observed in Zone - II :-

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME	NUMBER
1.	Rufous Sibia	<i>Heterophasia capistrata</i>	2
2.	Sikkim Treecreeper	<i>Certhia discolor</i>	1
3.	Striated Laughingthrush	<i>Grammatoptila striatus</i>	2
4.	Red Tailed Minla	<i>Minla ignotincta</i>	1
5.	Chestnut Tailed Minla	<i>Actinodura strigula</i>	1
6.	Velvet Fronted	<i>Sitta frontalis</i>	1
7.	Grey Treepie	<i>Dendrocitta formosae</i>	1

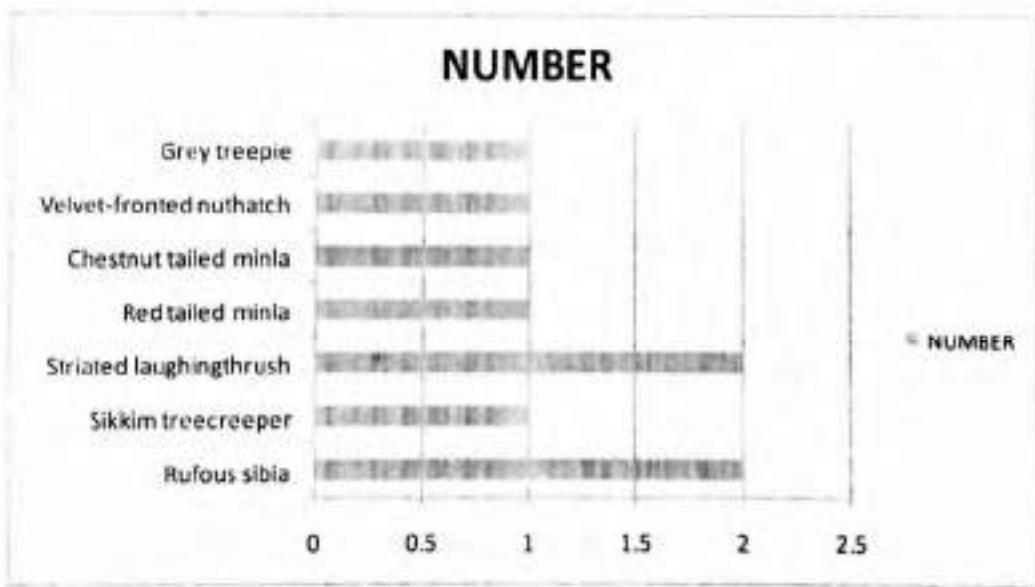


Fig : Graphical Representation of Okhrey, West Sikkim (Zone - II)

EXAMINED
Date: 17/11/2022
By: Dr. S. C. Dutt
With thanks to Mr. T. K. Bhattacharya

DATE: 18/11/2022

DESTINATION: Varsey Rhododendron Sanctuary (Zone - III)

TIME: 9:00am - 2:00pm

Table - 3. Birds Diversity Observed in Zone - III :-

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME	NUMBER
1.	Common Green Magpie	<i>Cissa chinensis</i>	2
2.	Black-throated Parrotbill	<i>Paradoxornis nipalensis</i>	2
3.	Fire Tailed Myzornis	<i>Myzornis pyrrhura</i>	4
4.	Eurasian Cuckoo	<i>Cuculus canorus</i>	1
5.	Green-crowned Warbler	<i>Seicercus burkii</i>	4
6.	The White-crested Laughingthrush	<i>Garrulax leucolophus</i>	1
7.	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	1
8.	Speckled Wood Pigeon	<i>Columba hodgsonii</i>	3

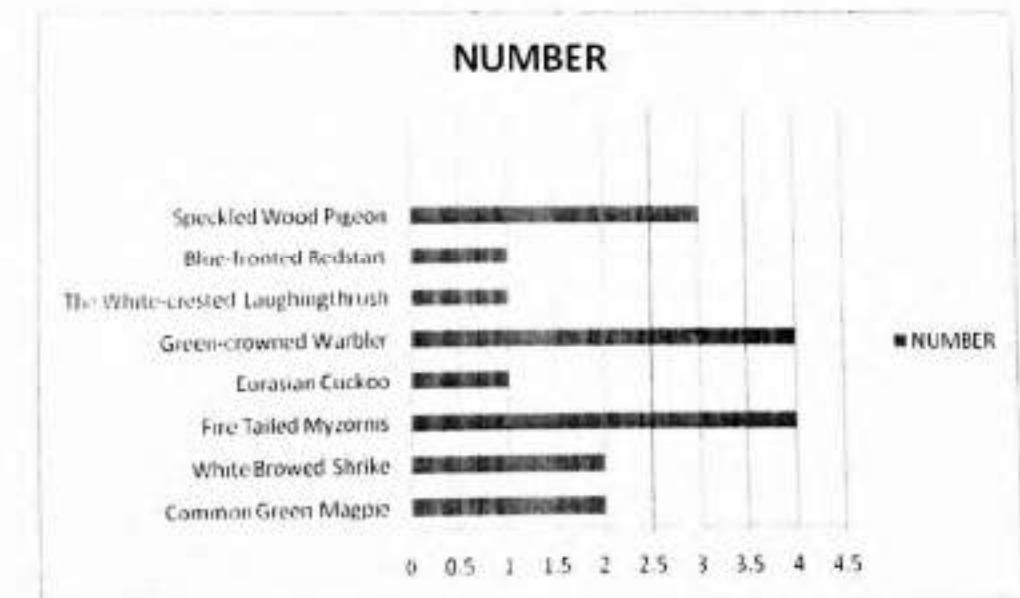


Fig : Graphical Representation of Varsey Rhododendron Sanctuary (Zone - III)

COMPARISON OF THE MAJOR BIRD POPULATION
OF THE THREE ZONES

TABLE -4

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME	TOTAL NUMBER
1.	Asian Barred Owlet	<i>Glaucidium cuculoides</i>	1
2.	Blue-fronted Redstart	<i>Phoenicurus frontalis</i>	4
3.	Chestnut	<i>Lonchura atricapilla</i>	2
4.	Chestnut Tailed Minla	<i>Actinodura strigula</i>	7
5.	Common Green Magpie	<i>Cissa chinensis</i>	2
6.	Eurasian Cuckoo	<i>Cuculus canorus</i>	1
7.	Fire Tailed Myzornis	<i>Myzornis pyrrhura</i>	4
8.	Fulvetta	<i>Alcippe poioicephala</i>	1
9.	Golden Breasted Fulvetta	<i>Lioparus chrysotis.</i>	27
10.	Green Backed Tit	<i>Parus monticolus</i>	1
11.	Green-crowned Warbler	<i>Seicercus burkii</i>	4
12.	Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	1
13.	Grey Treepie	<i>Dendrocitta formosae</i>	3
14.	Grey Wagtail	<i>Motacilla cinerea</i>	1
15.	Red Tailed Minla	<i>Minla ignotincta</i>	1
16.	Red-billed Leiothrix	<i>Leiothrix lutea</i>	1
17.	Rufous Capped Babbler	<i>Stachyridopsis ruficeps</i>	1
18.	Rufous Sibia	<i>Heterophasia capistrata</i>	3
19.	Sikkim Treecreeper	<i>Certhia discolor</i>	1
20.	Speckled Wood Pigeon	<i>Columba hodgsonii</i>	3
21.	Striated Laughingthrush	<i>Grammatoptila striatus</i>	2
22.	The White-crested Laughingthrush	<i>Garrulax leucolophus</i>	1
23.	Velvet Fronted	<i>Sitta frontalis</i>	1
24.	White Browed Fulvetta	<i>Fulvetta vireopectus</i>	1
25.	Black-throated Parrotbill	<i>Paradoxornis nipalensis</i>	2
26.	Yellow Billed Magpie	<i>Pica nuttalli</i>	1



Fig : Asian Barred Owlet



Fig : Green-tailed Sunbird



Fig : Chestnut Tailed Minla



Fig : Black-throated Parrotbill



Fig : Rufous Sibia



Fig : Green-tailed Sunbird (Male)

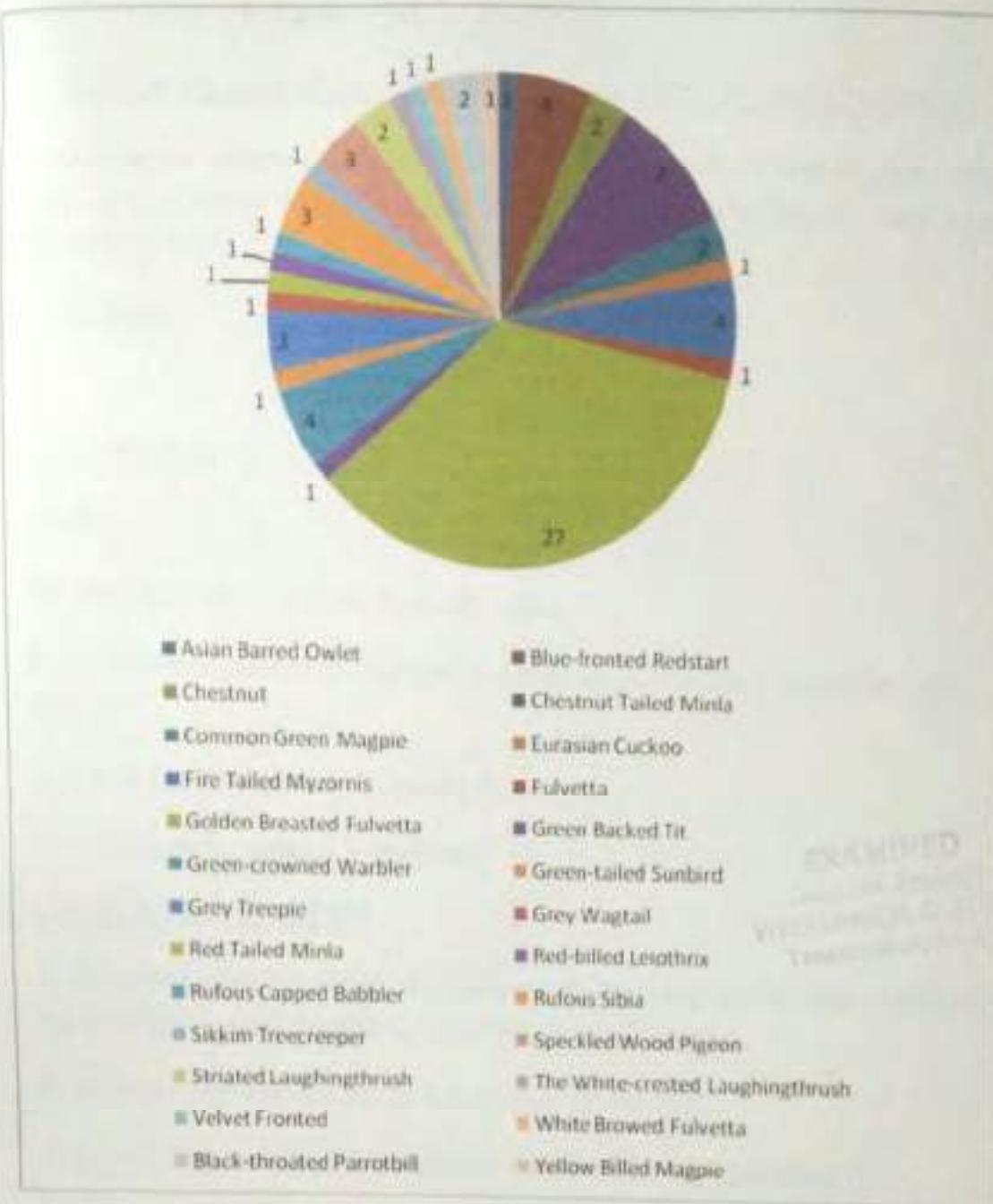


Fig : Graphical Representation Of The Major Bird Population Of The Three Zones

Remark –

On comparing the major bird population of the three zones of our field study, it was found that Golden Breasted Fulvetta population was much more in number compared to that of the others. So apparently we can say that it seems to be the dominant species. But as the duration of the field study was for a short span of time, so we can't conclude that it is the dominant species of that zone.

Diversity Analysis:

CALCULATION OF SHANON – WIENER DIVERSITY INDEX ON BIRDS

Most popular measure of species diversity is Shannon- Wiener index, based on information theory which describe a system contain more information when it has many possible states.

FORMULATION:-

$$H = -\sum P_i(\ln P_i)$$

Where,

H= the Shannon – Wiener diversity index.

P_i = fraction of the entire population made up of species i, estimated using (n_i/N)

Σ = sum from species 1 to species S.

\ln = denotes the natural logarithm.

TO CALCULATE THE INDEX:-

1. Calculate p_i using divide the numbers of individuals of species i found in sample by the total number of individuals of all species.
2. Multiply the fraction by its natural log $\{P_i (\ln P_i)\}$.
3. Repeat this for all of the different species. The last species is "S".
4. Sum all the $\{P_i (\ln P_i)\}$ produce to get the value of H

RANGE OF SHANNON WIENER INDEX:

Usually between 1.5 and 3.5.

The main advantage of this index is that the rare species of one individual contributes some value to the Shannon index, so if an area has many rare species, their contributions would accumulate.

ZONES	NUMBER OF BIRDS SPECIES	Pi	In Pi	H (In)
OKHREY (Zone- I)	52	0.658	-0.418	-0.275
OKHREY (Zone- II)	9	0.113	-2.180	-0.246
VARSEY	18	0.227	-1.48	-0.335
TOTAL	79			

CALCULATION:

$$\begin{aligned}
 H &= -\sum P_i(\ln P_i) \\
 &= - \{(-0.275)+(-0.246)+(-0.335)\} \\
 &= - \{(-0.275-0.246-0.335)\} \\
 &= - \{-0.856\} \\
 &= 0.856
 \end{aligned}$$

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Remark – The value of Shannon diversity index for real communities are often found to fall between 1.5 and 3.5. Hence the value (0.856) obtained in this study clearly indicates that the diversity is not quite high in the study area.

A Brief History Of Rangaroon

Rangaroon is a tea garden and an adjacent village not far from Darjeeling town. This village is situated at a distance of 16 km from Darjeeling in West Bengal. The estate lies near the boundary of **Senchal Wildlife Sanctuary** at an altitude of 6100 ft above sea level. Rangaroon means turning of a great river; the river **Rungdong** takes a turn at the valley of this tea garden. It produces some of the world's finest quality tea and is home to the famous Rangaroon Tea which had won the hearts of British colonists. The view of Mt. Kanchenjunga and other snow capped peaks from Rangaroon is truly awe inspiring. Rangaroon also offers its visitors a spectacular view of the Tiger Hill, Observatory Hill and the Darjeeling town. With a small population and a tea-growing area of around 90 hectares, it is a popular destination among tourists. It's an ideal place for Nature Lovers as well as Bird Watchers.

Rangaroon can be considered as heart of the **Senchal wildlife Sanctuary**. It is one of the oldest wildlife sanctuaries of India and covers an area of 38.6 km² (14.9 sq mi). The elevation ranges from 1,500 to 2,600 m (4,900 to 8,500 ft). It provides habitat for barking deer, wild boar, Himalayan black bear, Indian leopard, jungle cat, rhesus monkey, Assam macaque, Himalayan flying squirrel. The sanctuary is also rich in bird life. The two Senchal lakes supply drinking water to the town of Darjeeling.



A



B



C



D

Fig : (A,B,C,D) Senchal Forest, Rangaroon

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Tirukuravur, Kodaikanal



E



F

Fig : (E,F) Rangaroon Tea Garden

FAUNAL DIVERSITY

* BIRDS

- DATE: 20/11/2022
- DESTINATION: Rangaroon (Zone - IV)
- TIME : 6:00am - 3:00pm

Table - 5. Birds Diversity Observed in Zone - IV :-

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME	NUMBER
1.	Green Backed Tit	<i>Parus monticolus</i>	2
2.	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	4
3.	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	1
4.	Green Tailed Sunbird	<i>Aethopyga nipalensis</i>	2
5.	Grey Tea Pie	<i>Dendrocitta formosae</i>	4
6.	Chest Nuthatch	<i>Sitta europaea</i>	1
7.	Kalij Pheasant	<i>Lophura leucomelanos</i>	4

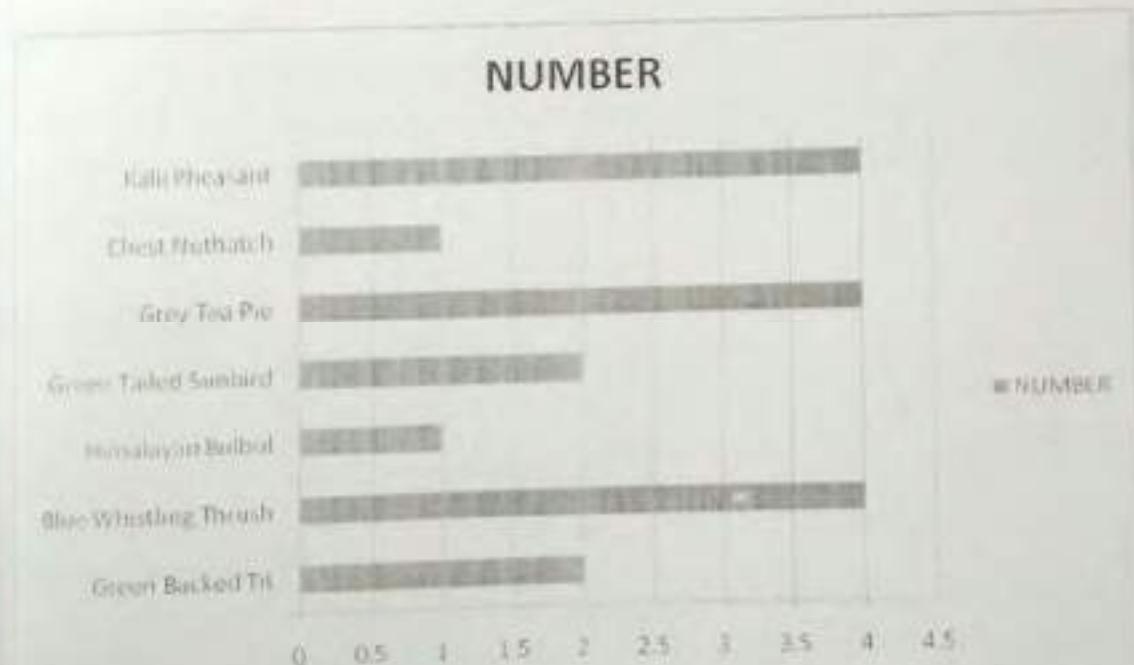


Fig : Graphical Representation of Rangaroon (Zone - IV)

THREATS

The Biodiversity of Sikkim faces a number of threats due to biotic as well as abiotic factors. The Sikkim Biodiversity Action Plan 2003 deliberated upon these issues and identified a number of threats which need be addressed under the present situation, in order to conserve the state's biodiversity. The current and anticipated threats are summarized below:

1. Soil erosion:

Sikkim being a hill State with and unstable soil conditions often suffers from soil erosion due to biotic factors as well as natural factors. This is compounded by the very high rainfall, span over a large part of the year. The main causes of such erosion and landslides, which also destroy biodiversity of the area, are unplanned roads, hydro-electric projects and other development.

2. Deforestation:

Despite the high percentage of the forest of the State, deforestation and loss of habitats emerge as constant threats, which are mainly due to need of forest resources by the urban and semi urban population, development projects and power projects.

3. Air pollution:

Due to rapid expansion of domestic tourism, a large number of vehicles move every day consuming tons and tons of fossil fuel and causing air pollution as well as noise pollution, which in long term can affect fauna and their propagation, especially along fringe of protected areas and reserve forests.

4. Poaching of animals:

Evidences suggest involvement of some local people as well as visitors from other parts of the country many a times engaged in poaching of animals (red panda, deer).

5. Unplanned tourism:

Inappropriate planning and limited implementations have gone into regulating their movement, mode of transport, life style including generation of garbage, construction for the accommodation, road development or environment friendly responsible behaviour, etc.

Visit At:-

PADMAJA NAIDU
HIMALAYAN
ZOOLOGICAL PARK

➤ TOUR DESCRIPTION :

- Date - 21.11.22
- Time - 11.30A.M
- Weather Condition - Humidity – 45%

• TEACHERS

- Dr. Debjani Datta (Principal)
- Dr. Partha Pratim Chaudhuri (Head of the Department of Zoology)
- Dr. Papia Das (Assistant Professor, Department of Zoology)

• LAB ATTENDANT

Mr. Tapas Show

• STUDENTS

1) Afsana Parveen	6) Prajjal Pal
2) Anannya Mondal	7) Sebika Ghosh
3) Brishty Chakraborty	8) Sidharta Adhikary
4) Nazma Khatun	9) Sk Nadir Rafed
5) Paramita Pramanik	10) Swastika Kumar



Fig : Group Photo

INTRODUCTION :

• Definition of Zoological Garden:

The Zoological Garden is the institute where mainly wild animals (exotic and endemic) are restricted within enclosures, bred, displayed to public and also used for education and scientific study. The abbreviation 'zoo' was first used for London Zoological garden which opened for scientific study 1828. Nowadays the importances of Zoological Garden are gradually increasing not only for displaying the wild animals for amusement and entertainment of the visitors. The Zoological Garden or parks provide recreation and amusement of general people of the society, create awareness among common people regarding the ecological importance of wild life animals and provide opportunities for public and prove awareness about endangered species.

• Importance of Zoological Garden:

- ✓ It is an example of **ex-situ conservation**.

Ex situ conservation is a technique of conservation of biological diversity outside its natural habitats. Its concept was developed earlier before its official adoption under the Convention on Biological Diversity signed in 1992 in Rio de Janeiro. Ex-situ conservation includes a variety of activities, from managing captive populations, education and raising awareness, supporting research initiatives and collaborating with in situ efforts. It is used as valuable tools in studying and conserving biological resources for different purposes through different techniques such as zoos, captive breeding, aquarium, botanical gardens, and gene banks.

The ever increasing threats to natural ecosystems has caused several habitats and thereby species to become severely threatened with extinction. Faced with this extinction crisis the ex-situ conservation of threatened species is an alternative that has relevance in the present context. Zoos today function not only as venues for exhibition of animals and education of the visiting public but also as centers of conservation and research.

- ✓ Zoological garden acts as **captive breeding centre**.

Captive Breeding programs are departments within zoos, rescues, sanctuaries and so on in which animals are kept in enclosures and are bred to produce future generations of their species. The main aim of captive breeding programme is to help conserve animals that are endangered or threatened in the wild so that a species doesn't become extinct. **Captive breeding** is the process of capturing, breeding, raising and sometimes reintroducing a wild species (threatened and endangered) in a controlled environment outside their natural habitats under the care of wildlife biologists and other experts.

Captive breeding at Padmaja Naidu Zoological Park has raised the inventory of several animals, many of which are not found even in the wild in the country. The increase in the population of zebras and giraffes through captive breeding is an achievement in itself because both these species aren't found in the wild anywhere in India. Alipore Zoological Garden has achieved success in captive breeding of macaws which is rarely heard off in Indian zoos. Besides captive breeding programmes of marmoset, barking deer are also successfully undergoing in The Padmaja Naidun. zoological park Recently captive breeding programme of Royal Bengal Tiger has been initiated since 2014 to increase the number of the big cats at the Zoological Gardens.

✓ Zoo as research centre:

Zoological Garden give scientists the opportunity to study species that are difficult to observe in their natural habitat. Captive animals in zoological garden provide sample research opportunities in field like genetics and veterinary medicine.⁷

Padmaja Naidu Himalayan Zoological Park:

The Zoological Garden of darjeeling established in 1958. It has 67.89 acres At present, Zoological Garden, darjeeling has 162 nos. Mammals, 744 nos. Birds and 86 nos. Reptiles. It is home to some of the captivebreeding projects involving the Manipur brow-antlered deer, Blackbuck, Bengal Florican etc.



Fig : Map of Padmaja Naidu Himalayan Zoological Park

➤ Awareness Programmes Organised By Padmaja Naidu Zoological Park:

- Since 2017 Alipore Zoo is organizing **Zoo Festival** as public awareness programme to create love for animals among general public and students. In this festival, t-shirt competition, quiz and extempore competition on wild life were organized where students from different schools and colleges participate.
- Padmaja Naidu Zoological Park participates in animal exchange programme. As a part of exchange programme Mouse Deer, Asiatic Lion, Jaguar were taken to Padmaja naidu Zoo from Nehru Zoological Park, Hyderabad and Eastern Grey Kangaroo from Kanazawa Zoological Park, Yokohamaha, Japan. Thus, Alipore zoological garden has a great role in the conservation of wild animals from India and abroad and it is continuously contributing in public awareness, education and research for sustainable conservation of wildlife fauna.
- Alipore Zoological Garden, Kolkata has launched a scheme of "**adoption**" of zoo animals. Public, either institutions or individuals are invited for adopting animals of the zoo. One of the main objectives of the zoo management is to create awareness and love for the wild life among the general public. Creating a sense of participation and attachment to the zoo animals create bonding and a sense of involvement. Adoption of zoo animals is very popular in international zoos and several Indian zoos have started this practice. Besides bonding this also provide a source of revenue for better zoo management and for better up keep of animals.

➤ Objectives And Importance Of Visit To Padmaja Naidu Zoological Park

- Provide opportunity to observe different animals of the world both India and abroad under one roof.
- One can get an idea about ex-situ conservation and captive breeding.
- Get opportunities to observe animals including some endangered and exotic animals up close.
- Get an idea about the ecology, behavior and morphology of different animals. So to gain knowledge on behavior and morphology of different animals, the process of their ex-situ conservation and finally to see some of the endangered animals that are difficult to observe in their natural habitat.

➤ MODE OF STUDY

During our visit to Padmaja Naidu Zoological Park , we conducted a three hours observation sessions to study behavior of different animals in captive condition. We were divided into three groups each consisting of seven individuals and observed activity of each animal for thirty minutes. We keenly observed the behavioral and the morphological characters of the animal. We also took note on their food habits, their mode of living, their health, their breeding pattern. Besides we also observed many different species from different parts of sections viz, birds, reptiles and mammals and noted their distribution, feeding habit etc..

➤ OBSERVATION

❖ BIRD GALLERY:

We observed different varieties of aquatic and terrestrial birds many of which are exotic. Among them eight birds were selected for their detailed behavioral study.

1. Common Name : Silver Pheasant

Scientific Name : *Lophura nycthemera*

Morphological features:

- i. This is a relatively large pheasant of order Galliformes and the family Phasianidae.
- ii. Body length 125cm. and weight 500-2500 gms.
- iii. Male has a long black crest, a black chin and throat, with white a glossy bluish black belly.
- iv. Their tail can be quite long with the central feathers.
- v. Most noticeable feature is bright red face.

Distribution: South-western China, eastern Burma, southern Vietnam, Thailand Cambodia

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Tiruchirappalli

2. Common Name : Roseate Cockatoo

Scientific Name : *Eolophus roseicapillus*

Morphological features:

- i. It is also known as rose-breasted cockatoo, galah cockatoo, roseate cockatoo. Pink and grey are the most common and widespread cockatoo.
- ii. Body-lenth 35cm. and weight- 270-350g.
- iii. It is endemic on the mainland and was introduced to Tasmania, where it found in pink and grey colour.

Distribution: It found In all Australan states, and are only absent from the dnest areas. Adelaide, Perth and Melbourne are common to abundant in open habitats.

3. Common Name : Himalayan Monal

Scientific Name : *Lophophorus impejanus*

Morphological features:

- i. Himalayan monal belongs to the genus and Lophophorus family pheasant.
- ii. Body-lenth 70cm. and weight- 1800-2300g.
- iii. Male has multi coloured climate, while female has full colour.
- iv. Borabor features in male include a long, metallic green crest, coppery green feathers on the back.
- v. The female has prominent white patch on the throat and white spot on tail.

Distribution: In north western, central and eastern Himalaya.

4. Common Name : Temminck's Tragopan

Scientific Name : *Tragopan temminckii*

Morphological features:

- i. It is one of the most beautiful in all the pheasant.
- ii. Body-length 64cm. and weight- 1600g.
- iii. The male are large bright crimson coloured with round black-bordered pearl-grey spots or oceli on under parts.
- iv. Male is distinguished by large spots and bright orange neck.

Distribution: Northeast India through Mayanmar to north east Vietnam to central China.

5. Common Name : Hill Myna

Scientific Name : *Gracula religiosa*

Morphological features:

- i. This is a stocky jet-black myna with bright orange-yellow patches of naked skin and fleshy wattles on the side of its head and nape.
- ii. The bill and strong legs are bright yellow, and there are yellow Wattles on the nape and under the eye.
- iii. Sexes are similar; juveniles have a duller bill..
- iv. Its large, white wing patches are obvious in flight, but mostly covered when the bird is sitting

Distribution: South Asia and Southeast Asia.



Fig : Silver Pheasant



Fig : Roseate Cockatoo



Fig : Himalayan Monal



Fig : Temminck's Tragopan



Fig : Hill Myna

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Dated: 01/08/2014
VETERINARIAN
Tatyasaheb

❖ MAMMALIAN GALLERY:

1. Common Name : Common Leopard

Scientific Name : *Panthera pardus*

Morphological features:

- i. The Common Leopard is a member of the Felidae family.
- ii. Body length is 7ft. & weight 68kg
- iii. Gestation period: 87-94 days.
- iv. Life Span : 18-20 years.
- v. Conservation Status : "Endangered" to "Critically Endangered" to "Threatened" depending on the geographic region (IUCN) Schedule I(WPA).

Distribution: The common Leopard has an extremely broad distribution across Africa and South and Southeast Asia.

2. Common Name : Royal Bengal Tiger

Scientific Name : *Panthera tigris tigris*

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Morphological features:

- i. Body length is 110-120 inch (male); 94-104 inch (female).
- ii. Weight is 221.2kg (male); 139.7kg (female).
- iii. Diet: Chital, sambar, gaur, barasingha, water buffalo, nilgai, hog deer, gray langur, hares and peafowl.
- iv. Life span: 10 to 15 years (wild); 16 to 20 years (captivity)
- v. Gestation period 104 to 106 days
- vi. Conservation Status : Present IUCN status- Endangered (IUCN) Schedule I(WPA)

Distribution: The Bengal tiger is found primarily in India with smaller populations in Bangladesh, Nepal, Bhutan, China and Myanmar.

3. Common Name : Himalayan Tahr
Scientific Name : *Hemitragus jemlahicus*

Morphological features:

- i. The Himalayan Tahr is diurnal and lives in small groups of 2-20 individuals, excluding older solitary males. Males are larger than females.
- ii. The hair on head and face is short. The body is covered with tangled masses of coarse, flowing hair.
- iii. Body Length 90 -140 cm and weight is 36 to 90kg.
- iv. Sexual maturity - 2 to 3 yrs.
- v. Gestation Period - 7 months.
- vi. Diet: Eat almost any vegetation they can find, from grass herbs to the leaves of shrubs and trees.
- vii. Conservation Status: Near Threatened (IUCN) Schedule I (WPA).

Distribution: Its native habitat is in the rugged wooden hills and mountain slopes of the Himalaya from Central Asia in Northern Kashmir to China.

4. Common Name : Jungle Cat

Scientific Name : *Felis chaus*

Morphological features:

- i. With its long legs and comparatively short tail the Jungle cat has a very distinctive appearance.
- ii. Its pale green eyes give it a coldly cruel expression. The colour of its fur varies from sandy grey to yellowish grey.
- iii. Body length: 50-94 cms and weight is 4-16kgs.
- iv. Gestation Period: 63-68 days
- v. They mainly feed on small mammals, birds, reptiles, amphibians, fish domestic poultry.
- vi. Conservation Status : Least Concern (IUCN) Schedule II (WPA).

Distribution: The Jungle Cat has established itself over a wide territory ranging from north Africa through south-western Asia to India, Ceylon, Burma and Indo-China.

5. Common Name : Grey Langur
Scientific Name : *Seminopithecus entellus*

Morphological features:

- i. Langurs are long-limbed, long tailed and largely gray, with a black face and ears living in medium to large groups usually with one dominant male.
- ii. Body Length: 75cm (male), 65cm (female). Body weight: 18kg (male), 12kg (female).
- iii. The breeding season is April to May and Young per birth is 1.
- iv. Gestation Period: 190-210days.
- v. Usually they eat leaves, flowers, fruits and roots.
- vi. Conservation status: Least Concern (IUCN) Schedule II (WPA).

Distribution: Practically distributed in the whole of India, from the himalayas to Cape Comorin except the western deserts, and Ceylon.

6. Common Name : Himalayan Wolf

Scientific Name : *Canis lupus himalayensis*

Morphological features:

- i. The Himalayan wolf has been suggested by several Indian biologists for recognition as a critically endangered species , distinct from *Canis lupus*.
- ii. Its size, large skull, and teeth distinguish the wolf from the rest of the family.
- iii. Gestation Period: 61 -63days.
- iv. Life span is 12 to 15 years. They feed primarily on medium to large sized ungulates.
- v. Conservation Status: Schedule I (WPA).

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Thakurpukur, Kali-Ghat

Distribution: Their population is found only the upper Trans-Himalayan region of India across the two northern most states Himachal Pradesh and Jammu & Kashmir with only about 350 individuals in the wild.



Fig : Common Leopard



Fig : Royal Bengal Tiger



Fig : Himalayan Tahr



Fig : Jungle Cat



Fig : Himalayan Wolf

CONCLUSION

The field study gives us an opportunity to observe the animals in their natural abode. The morphology, anatomy, behaviour, food, feeding habits of animal whatever we study in our text books in the confined class rooms cannot provide us always the perfect picture required to have a complete knowledge on the subject. When we are exposed to the nature's laboratory during the field work and interact with creatures living in diverse habitat, our knowledge seems to be complete. Fields study also helps in generating love to nature in our mind which will definite be helpful in conservation of our precious diversity.

The different places we visited were full of wonderful variety of birds & we learnt to appreciate them. The places were enriched in floral & faunal diversity. It gave us the chance of observing the wonders of nature from close quarters. It was a great experience to observe the things that we had learnt in books to come to life in front of our eyes.

Altogether the tour in **Okhrey, Varsey, Rangaroon and Padmaja Naidu Himalayan Zoological Park** was a great one. We enjoyed every second of it. It made us to do so many things in such a short time & so enjoyable that we pray this type of tours should be held more frequently so that we can learn more & help us to invent the true nature around us away from our books.

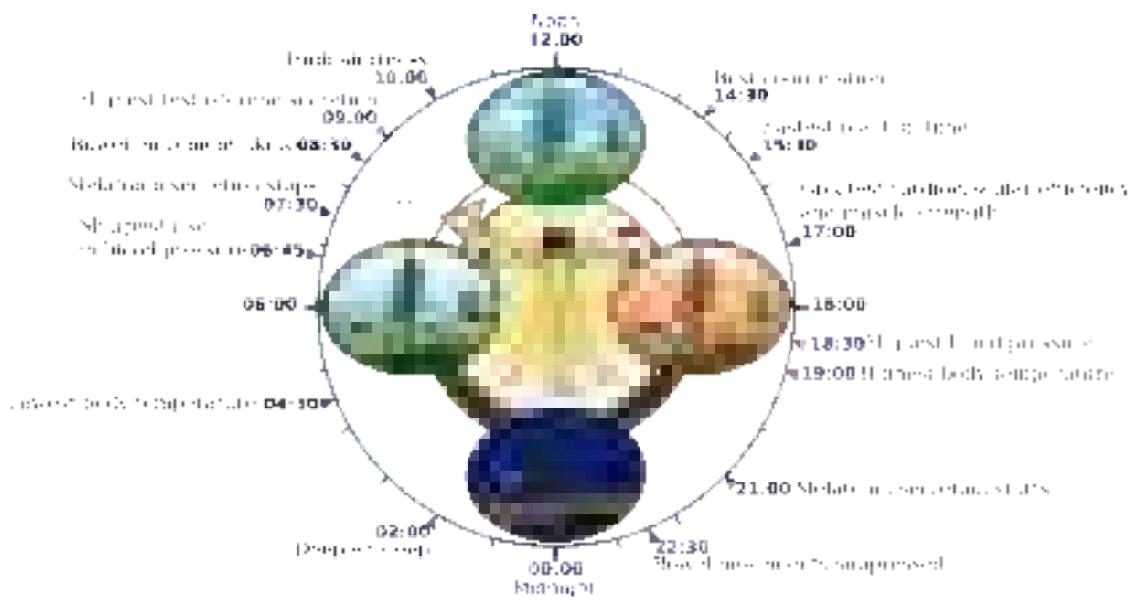
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1/1/2023

UNIVERSITY OF CALCUTTA
SEMESTER VI HONOURS PRACTICAL EXAMINATION
(UNDER CBCS)

2023

DSE(B)-6-1 PRACTICAL (ZOOA)

A PROJECT ON
STUDY OF CIRCADIAN FUNCTIONS IN HUMANS
(Daily eating, Sleep and Temperature patterns)



Roll No. - 203561-11-0004

Registration No. - 561-1211-0357-20

INTRODUCTION

RHYTHMICITY

Rhythmicity is a wonderful phenomenon of nature. Various kinds of rhythms are evident in the biological world - day-night cycle, seasonal cycle, moon cycle, tide cycle etc. Organisms also exhibit rhythmicity in behavioural activities called **Biological rhythms** or **Biorhythms**. Biological rhythms are regulated by biological clock.

'**Biological clocks**' are internal timing mechanisms that involve both self sustaining physiological pacemakers and environmental cyclic synchronizers (zeitgebers).

WHAT IS CIRCADIAN RHYTHM?

It is a type of biological rhythm. This term was first coined by the American ethologist, Franz Halberg in 1959. The source of the word Circadian is from two Latin words "Circa" meaning "about" and "dian" meaning "a day". The circadian rhythm is an internal process that naturally regulates our biological processes within a 24-hour time frame. In a simple term, this implies that for an example, everyone's routinised eating time has a great impact on the way our body process the food digestion. Similarly, sleeping pattern of a person also has a great impact on the way of functioning our brain as well as organs of human body. Circadian Rhythm is basically a biological clock that is built in our brain throughout the functionality of everyone's day and night processes, as per the 24-hour clock. Circadian rhythm is also called the biological/circadian clock and refers to behavioral, physiological, and molecular changes with a cycle length of approximately 24 hour. The circadian clock can be divided into 2 parts: the central clock, residing in the supra-chiasmatic nucleus (SCN) of the hypothalamus, which receives light cues, and the peripheral clocks residing in various tissues throughout the body. The peripheral clocks play an integral and unique role in each of their respective tissues, driving the circadian expression of specific genes involved in a variety of physiological functions

HUMAN CIRCADIAN RHYTHM

The circadian rhythm of human body is a self - control system to regulate our eating habits, activities and body functionally, like getting hungry and food digested, passing urine and maintaining blood pressure, sleeping and awakening process, and body temperature. Thus, our food, eating style and time, life disciplinary process, lights (day and night) we see and our body experience, and other day to day lifestyle components are the crucial factors that shape up everyone's circadian rhythm. As circadian rhythm is unique and vary for every individual, the sociological, cultural, political, economic, technological and environmental aspects do also influence the

biological function, mind, brain, thinking and feelings of human. Disruption of a circadian rhythm can become a main source for the severity of possible diseases within human body.

HOW HUMAN REGULATE THE CIRCADIAN RHYTHM

Human body becomes active from awakening at a time and goes through a frame of 24 hours in a day. During this period, our body experiences diverse emotional, behavioural and biological nature (like sleeping, resting, hungry, thirsty, urine passing, etc.) When a human body has a pattern of such experiences for a period of continuous duration, the body gets synchronised to the experience and that can possibly become transformed into our 24-hour routine.

Humans show a periodicity of 24 hours in case of various physiological activities such as hormone levels in blood, blood pressure, EEG, ECG and other activities such as rest cycle, body temperature etc. The circadian rhythms are regulated by small nuclei in the middle of the brain called the supra chiasmatic nuclei (SCN). The secretion of various hormones from different endocrine glands show a rhythmic pattern. The most important gland exhibiting this rhythmic pattern is pineal gland. Serotonin hormone, the secretion of this gland, is highest in noon and lowest at midnight, whereas melatonin hormone is highest at night and it stops in the early hours of morning.



Fig: HUMAN BIOLOGICAL CLOCK

STUDY OF BODY TEMPERATURE FOR 24 HOURS

INTRODUCTION

Body temperature is regarded as the “basic variable” of circadian rhythm and is used as a circadian rhythm marker. Normal human body-temperature is the typical temperature range found in humans. The circadian component in body temperature is under the control of the supra chiasmatic nuclei (SCN) and is also modulated by exogenous influences such as postural changes, physical activity, ambient temperature, meals and sleep. Human body temperature has a circadian rhythm with a 0.8-1°C oscillation between a diurnal maximum and a nocturnal minimum.

Types of Body Temperature:

- i) **Core temperature:** Temperature of deep tissues of the body.
- ii) **Surface temperature:** Temperature of the outer most surface of the body.

MATERIALS REQUIRED:

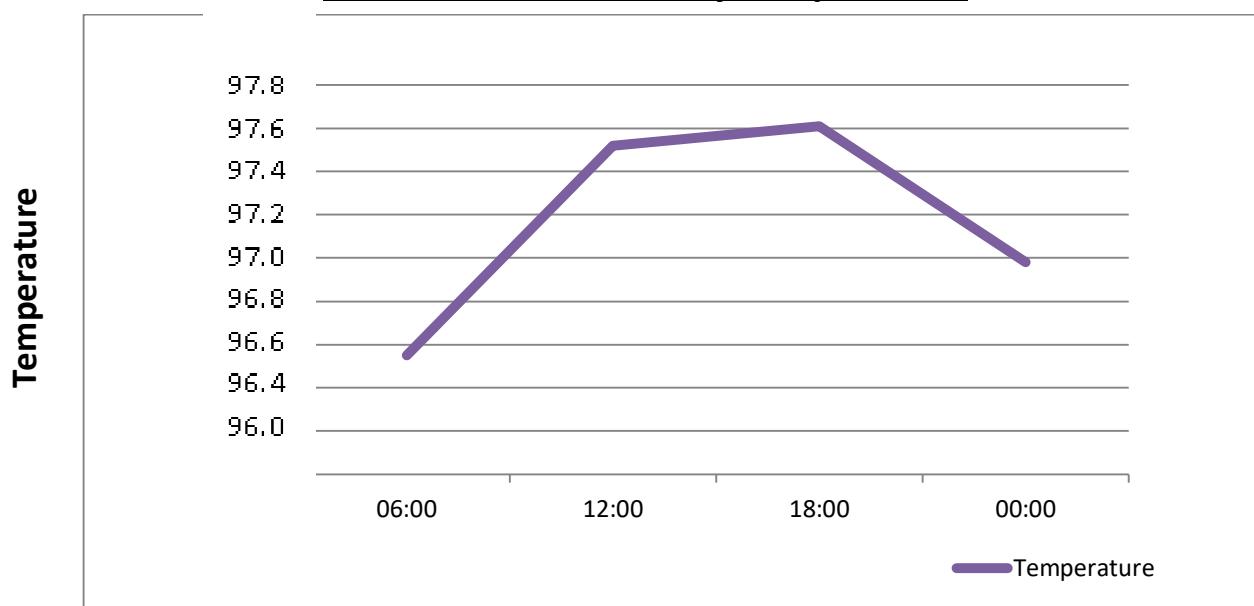
- i) Thermometer
- ii) Clock
- iii) Pen
- iv) Notebook

PROCEDURE:

- Surface body temperature is measured at 6am, 12noon, 6pm and 12 midnight using a Thermometer.
- Thermometer is placed under the arm, with the tip gently pressed against the center of the armpit.
- Put the arm down, close against the body so the thermometer stayed in place.
- It took about a minute to take its reading.
- And then the thermometer is removed from the armpit and read the temperature.
- Record the temperature for 14 consecutive days and make a graph.

OBSERVATION:

DAY	6AM	12PM	6PM	12AM
1	96°F	97.9°F	97°F	96.5°F
2	96.8°F	98.1°F	97.1°F	97.8°F
3	96.6°F	97.6°F	98.2°F	97.2°F
4	96.2°F	96.8°F	97.5°F	96.7°F
5	96.1°F	97.3°F	98°F	97.4°F
6	97°F	97.8°F	98°F	97.4°F
7	96.4°F	97.7°F	97.6°F	96.8°F
8	96.8°F	97.5°F	97.4°F	96.5°F
9	96.3°F	97.6°F	97.8°F	97.2°F
10	96.8°F	97.3°F	97.7°F	96.8°F
11	96.5°F	97.4°F	97.5°F	96.6°F
12	97°F	97.7°F	97.6°F	97°F
13	96.9°F	96.9°F	97.4°F	96.7°F
14	96.3°F	97.8°F	97.8°F	97.2°F

Pattern of human body temperature

RESULTS : The body temperature is low at 6am morning that is 96.5°F, increased 12 noon that is 97.5°F, remains constant still the evening with a very little fluctuations. From the evening temperature falls off and becomes least at midnight that is 96.9°F.

COMMENTS : The body temperature data shows circadian rhythmicity corresponding to the dark and light condition. The result can be interpreted as the effect of circadian rhythmicity of Melatonin. Melatonin is a hormone, which is affected by darkness and light. This important hormone is produced by the pineal gland in the brain, retina, lens, and the gastrointestinal system. Melatonin decreases at day time and as a result temperature rises. Light inhibits melatonin synthesis as the activity of NAT (N-acetyltransferase) and HIOMT (Hydroxyindole-O-methyltransferase) is less at day light. Also the melatonin is low, cortisol level in human is high so perhaps, the rhythmicity of the melatonin regulates the rhythmicity of the body temperature through cortisol concentration. Cortisol is one of the hormones produced by the adrenal cortex. In night, during darkness melatonin reaches pick at midnight, reducing body temperature by reducing cortisol.

STUDY OF SLEEP - WAKE CYCLE

INTRODUCTION :

Circadian rhythm cycles become active every day with a regularity between sleepiness and alertness that is known as the sleep-wake cycle.

Sleep-wake cycle refers to our 24 hour daily sleep pattern which consists of approximately 16 hours of daytime wakefulness and 8 hours of night-time sleep. The complex process of the sleep-wake cycle is controlled by the body's circadian rhythm and sleep homeostasis (the amount of accumulated sleep need that builds during time spent awake).

Every cell in the body contains its own biological clock, which is synchronized by the suprachiasmatic nucleus (SCN), located in the brain. Certain genes produce proteins that increase overnight and fade during the day. These changes activate feelings of wakefulness and sleepiness, which can affect when you sleep and how alert you are when awake.

MATERIALS REQUIRED:

- i) Clock
- ii) Pen
- iii) Notebook

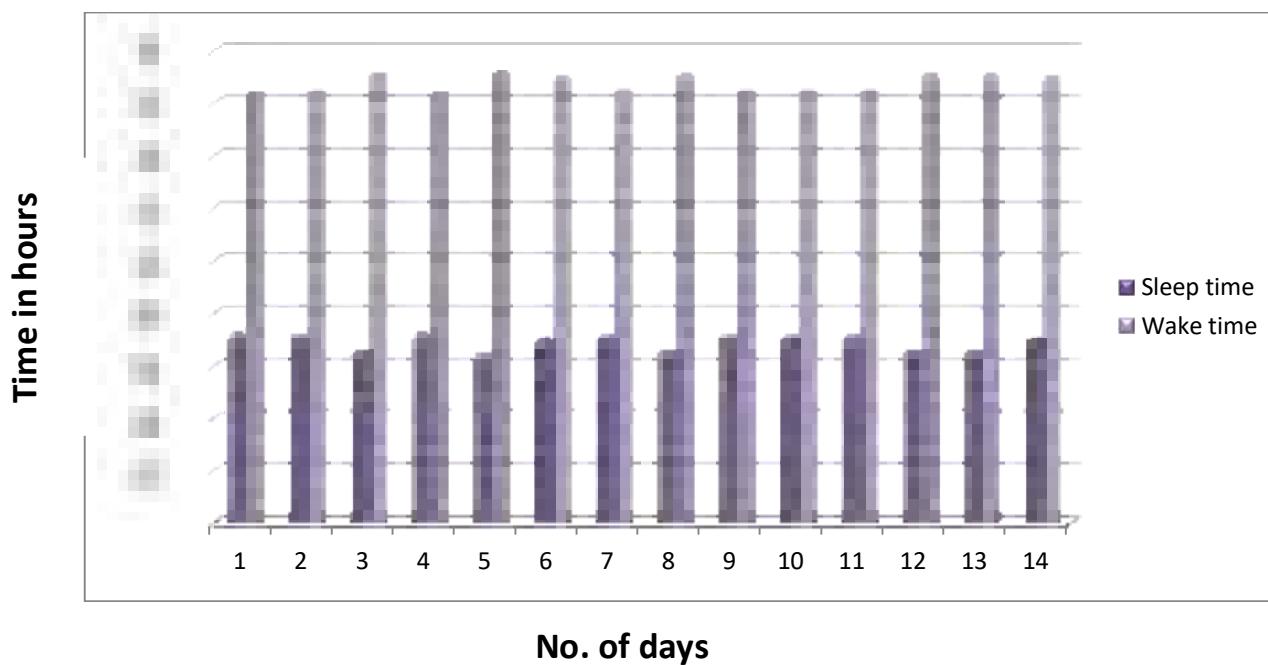
PROCEDURE:

- For this experiment, we have to monitor your daily sleeping and waking time using a 12-hour clock.
- Keep a record of the time when we sleep at night and the time when we wake up in morning.
- Record the timings for 14 consecutive days.
- Make a table and build a bar graph out of the collected data.
- No external stimulus like alarm clock is involved in this study.

OBSERVATION

DAY	TIME TO GO TO BED	TIME TO COME OUT FROM BED	SLEEPING TIME	WAKE TIME	FREE RUNNING PERIOD FOR SLEEPING TIME
1	11:30 pm	6:50 am	7 hours 20 min	16 hours 40 min	+5 min
2	11:20 pm	6:35 am	7 hours 15 min	16 hours 45 min	+15 min
3	11:40 pm	6:30 am	6 hours 50 min	17 hours 10 min	-5 min
4	11:30 pm	6:50 am	7 hours 20 min	16 hours 40 min	+5 min
5	11:35 pm	6:20 am	6 hours 45 min	17 hours 15 min	0 min
6	11:40 pm	6:40 am	7 hours	17 hours	-5 min
7	11:40 pm	6:50 am	7 hours 10 min	16 hours 50 min	-5 min
8	11:35 pm	6:30 am	6 hours 55 min	17 hours 5 min	0 min
9	11:20 am	6:35 am	7 hours 15 min	16 hours 45 min	+15 min
10	11:40 am	6:50 am	7 hours 10 min	16 hours 50 min	-5 min
11	11:45 am	6:55 am	7 hours 10 min	16 hours 50 min	-15 min
12	11:35 am	6:30 am	6 hours 55 min	17 hours 5 min	0 min
13	11:25 am	6:20 am	6 hours 55 min	17 hours 5 min	+10 min
14	11:30 am	6:30 am	7 hours	17 hours	+5 min

Sleep-Wake cycle



RESULT : The sleep-wake cycle follows a daily rhythm where 17 hours 15 minutes is the maximum daytime wakefulness and 7 hours 20 minutes is the maximum night-time sleep. The sleep pattern that is not adjusted to the 24-hour cycle in nature is called free running period that is 15 minutes (average).

COMMENTS : Sleep-wake cycle is a circadian rhythm which is regulated by pineal gland hormone Melatonin. During day time the light inhibits melatonin synthesis as the NAT (N-acetyltransferase) and HIOMT (Hydroxyindole-O-methyltransferase) is less. When eyes receive light from the sun, the pineal gland's production of melatonin is inhibited and keep the human awake. When the eyes do not receive light, melatonin is produced in the pineal gland and the human becomes tired. As a result serotonin level is high and serotonin is responsible for the wakefulness through out the day . From the evening 6pm onwards the NAT and HIOMT gradually increase which is pick at 12 midnight and melatonin is synthesised causing sleepiness as a serotonin is low in a person is not able to remain awaken.

STUDY OF CIRCADIAN RHYTHMICITY IN DAILY EATING

INTRODUCTION

The circadian rhythm has been shown to have a profound impact on feelings of hunger. Hunger and cravings are two different sensations. Our stomach hunger cycle, in a nutshell, begins with a hormone called ghrelin. When our bodies have burned up the food in our stomachs and our blood sugar and insulin levels begin to drop, ghrelin communicates with the hypothalamus in the brain. Leptin and ghrelin are two hormones that have been recognized to have a major influence on energy balance. Leptin is a mediator of long-term regulation of energy balance, suppressing food intake and thereby inducing weight loss. Ghrelin on the other hand is a fast-acting hormone, seemingly playing a role in meal initiation.

Ghrelin, the appetite increaser, is released primarily in the stomach and is thought to signal hunger to the brain. Leptin is a hormone, made by fat cells, that decreases your appetite.

MATERIALS REQUIRED:

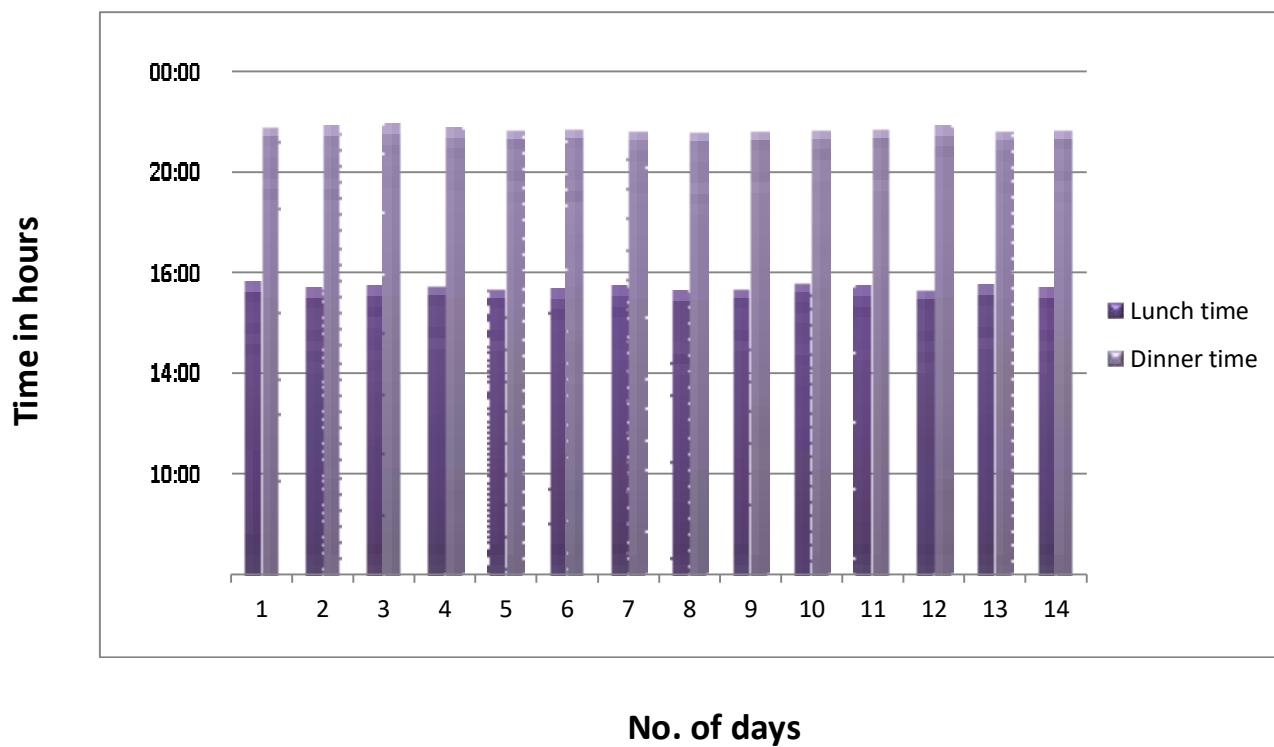
- i) Clock
- ii) Pen
- iii) Notebook

PROCEDURE:

- Here I have to record the time when I get hungry for lunch and dinner.
- Record the timing for 14 consecutive days.
- Make a table.

OBSERVATION:

DAY	LUNCH TIME	DINNER TIME
1	02:50 PM	10:20 PM
2	02:20 PM	10:25 PM
3	02:25 PM	10:30 PM
4	02:30 PM	10:15 PM
5	02:20 PM	10:10 PM
6	02:15 PM	10:15 PM
7	02:25 PM	10:05 PM
8	02:05 PM	10:00 PM
9	02:20 PM	10:05 PM
10	02:50 PM	10:10 PM
11	02:25 PM	10:15 PM
12	02:15 PM	10:20 PM
13	02:30 PM	10:05 PM
14	02:20 PM	10:10 PM

Circadian rhythm in daily eating

RESULT: A particular rhythmicity is observed in daily eating cycle.

COMMENT : Hunger hormones (ghrelin) in our blood and an empty stomach signal the brain when we are hungry. When our stomach is empty, the hormone ghrelin, which is produced mainly in the stomach, signals our brain that we need to take in food. Our body produces more ghrelin during fasting (such as between meals) in order to stimulate hunger, and it produces less after food is consumed. Another hormone, Leptin is a hormone released by your fat cells that tells your brain when our body has had enough fuel and can start burning fat to create energy.

Here rhythmicity is found which indicates a conserved rhythmicity schedule of brain.

CONCLUSION:

Human circadian rhythm is identical for everyone as unique as possible, it is a biological process of an individual that can be explained as a synchronised 24-hour internal clock that comes from back of a person's brain. Circadian rhythm cycles become active every day with a regularity between sleepiness and alertness that is known as the sleep-wake cycle. Mainly, the sleep-wake cycle regulates the circadian rhythm. As circadian rhythm is a biological clock built in our brain throughout the functionality of everyone's day and night processes within a 24-hour clock frame, it devises our body to function in a healthy way of daily routines. Thus, the circadian rhythm becomes a self-control system of human body to regulate our eating habits, activities and body functionality. In this context, our 24-hour daily functionality should have concern over food, physical environment including lightings, exercises, work habits, sleeping and other activities concern. All in consideration, a mind clock in performing even a simple task should be perfectly set with routinised daily functionality. Circadian rhythms affect your sleep patterns as well as other ways your body works, like your hormones, body temperature, and eating habits. The circadian rhythm regulation plays a crucial role in people's healthy lives affected by factors consisting of cosmic events related to the universe and earth, environmental factors (light, night and day duration, seasons) and lifestyles. These factors changes lead to disturbance of circadian rhythm and it causes increasing the incidence of mental diseases like depression and physiological problems like cancers, cardiovascular disease and diabetes. Disruption of a circadian rhythm can become a main source for the severity of possible diseases within human body. It is therefore important for everyone to keep up and maintain a better circadian rhythm to overcome such irregularities in our day to day life.

ACKNOWLEDGEMENT

I hereby wish to express my gratitude for all those who provided help, support and assistance in diverse forms. It is not possible to mention names of all those people. However, it will not be possible to go ahead without mentioning few names of those individuals whose contribution was critical in completion of this study. Firstly, I would like to express my special thanks of gratitude to our principal mam **Dr. Debjani Dutta**, who gave me the golden opportunity to do this wonderful project. It helped me in doing a lot of research and I came to know about so many new things. I am obliged and grateful to our senior teachers. I also wish to acknowledge and thanks our **Zoology teachers Dr. Barnali Bera, Dr. Papia Das, Dr. Partha Pratim Chaudhury , and our lab assiatant Mr. Tapas Shaw** for their continuous help and guidance during the entire project work. Any attempts at any level cannot be satisfactorily completed without the support and guidance of my parents and friends, who helped me a lot in gathering different information, collecting data and guiding me from time to time in making this project successful.

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UNIVERSITY OF CALCUTTA

**SEMESTER VI HONOURS PRACTICAL
EXAMINATION (UNDER CBCS)**

2023

DSE(A)-6-2 PRACTICAL (ZOOA)

**A Project Report On Animal Cloning, Its
Application And Ethical Issues**



Registration No. - 561-1211-0357-20

Roll No. - 203561-11-0004

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• Introduction To Animal Biotechnology

Animal biotechnology is a branch of biotechnology in which molecular biology techniques are used to genetically engineer (i.e. modify the genome of) animals in order to improve their suitability for pharmaceutical, agricultural or industrial applications. Animal biotechnology has been used to produce genetically modified animals that synthesize therapeutic proteins, have improved growth rates or are resistant to disease. It deals with monitoring the nutrition, health and reproduction of animals. The field has been influential in producing genetically altered animals that synthesize therapeutic proteins, have improved growth rates.

• Animal Biotechnology In Animal Cloning

- Cloning is the most recent evolution of selective assisted breeding in animal husbandry. Cloning animals is a reliable way of reproducing superior livestock genetics and ensuring herds are maintained at the highest quality possible. It's important to remember that cloning does not manipulate the animal's genetic makeup nor change an animal's DNA. It is simply another form of assisted reproduction. Cloning allows livestock breeders to create an exact genetic copy of an existing animal, essentially an identical twin. Clones are superior breeding animals used to produce healthier offspring. Animals can be cloned by embryo splitting or nuclear transfer.
- Embryo Splitting involves bisecting the multi cellular embryo at an early stage of development to generate "twins". This type of cloning occurs naturally and has also been performed in the laboratory with a number of animal species. Embryo splitting or embryo twinning refers to the formation of twins or multiple embryos in vitro to split an embryo in 2-, 4-, or 8-cell stages. The blastomeres can be still totipotent at the initial stage of embryogenesis. The ability has been considered for the in vitro production of a full organism. In many studies, it has been reported that splitting the 6- to the 8-cell embryo can be developmentally more efficient than the 2- to 5-cell-stage embryos. Embryo splitting is the same as the natural process of creating identical twins. Numerous advantages have been found for embryo splitting in research and reproduction programs. The benefit of an embryo splitting is the in vitro production of tissues or organs. In other words, if the offspring needs tissue or organ transplant, the other embryo, protected in the reproductive biological laboratory, can be used to produce the tissue or organ.

• Introduction To Animal Cloning

Cloning is the process of creating genetically identical copies of biological matter. This may include genes, cells, tissues or entire organisms. Animal cloning is a technique for the production of genetically indistinguishable copies of the desired animal. So far, adult animals such as cattle, pigs, rabbits, sheep, and goats have been cloned.

➤ **Types of Cloning**

When we speak of cloning, we typically think of organism cloning, but there are actually three different types of cloning.

- **Molecular Cloning:** Molecular cloning focuses on making identical copies of DNA molecules in chromosomes. This type of cloning is also called gene cloning.
- **Organism Cloning:** Organism cloning involves making an identical copy of an entire organism. This type of cloning is also called reproductive cloning.
- **Therapeutic Cloning:** Therapeutic cloning involves the cloning of human embryos for the production of stem cells. These cells could be used to treat disease. The embryos are eventually destroyed in this process.

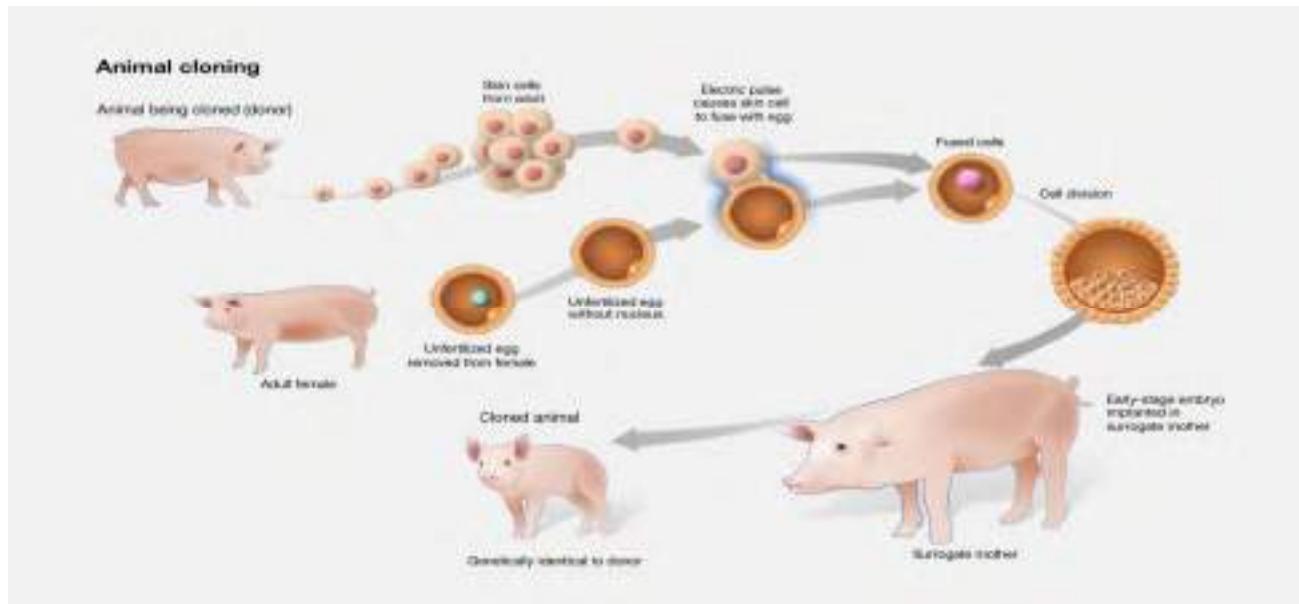
Reproductive Cloning Techniques

Cloning techniques are laboratory processes used to produce offspring that are genetically identical to the donor parent. Clones of adult animals are created by a process called somatic cell nuclear transfer. In this process, the nucleus from a somatic cell is removed and placed into an egg cell that has had its nucleus removed. A somatic cell is any type of body cell other than a sex cell.

- **Cloning animals refers to the production of genetically identical individuals, mainly through somatic cell nuclear transfer (SCNT), by transferring nuclei from in vivo- or in vitro-derived somatic cells into recipient enucleated oocytes. The “zygote” is activated to divide and is later implanted in a surrogate mother. Dolly the sheep was the first animal to be cloned via the transfer of nuclei derived from mammary gland cells. Since then, more than 20 animal species have been cloned, including goats.**

• Method In Animal Cloning

1. In reproductive cloning, researchers remove a mature somatic cell, such as a skin cell, from an animal that they wish to copy. They then transfer the DNA of the donor animal's somatic cell into an egg cell, or oocyte, that has had its own DNA-containing nucleus removed.
2. Researchers can add the DNA from the somatic cell to the empty egg in two different ways. In the first method, they remove the DNA-containing nucleus of the somatic cell with a needle and inject it into the empty egg. In the second approach, they use an electrical current to fuse the entire somatic cell with the empty egg.
3. In both processes, the egg is allowed to develop into an early-stage embryo in the test-tube and then is implanted into the womb of an adult female animal.
4. Ultimately, the adult female gives birth to an animal that has the same genetic makeup as the animal that donated the somatic cell. This young animal is referred to as a clone. Reproductive cloning may require the use of a surrogate mother to allow development of the cloned embryo.



Animal Cloning

• **Animal Cloning- Dolly And Polly**

- **Bioethics** is both a field of study and professional practice, in ethical issues related to health (primarily focused on the human, but also increasingly includes animal ethics), including those emerging from advances in biology, medicine, and technologies. Bioethics is concerned with the ethical questions that arise in the relationships among life sciences, biotechnology and medicine. It includes the study of values relating to ethical education in science, animal, and environmental ethics, and public health.

The term *Bioethics* (Greek bios, "life"; ethos, "moral nature, behavior") was coined in **1927** by Fritz Jahr in an article about a "bioethical imperative" regarding the use of animals and plants in scientific research. In **1970**, the American biochemist, and oncologist Van Rensselaer Potter used the term to describe the relationship between the biosphere and a growing human population. Potter's work laid the foundation for global ethics, a discipline centered on the link between biology, ecology, medicine, and human values.

- **History Of The Cloned Animal**

During the winter of **1995–96**, **Wilmut** was involved in three pivotal cloning experiments conducted at **Roslin**. In the first, Wilmut and his team of scientists performed embryonic cell nuclear transfer by using cultured embryonic cells that were nine days old. However, the experiment involved a different sheep breed; the cells used for nuclear transfer came from a **Poll Dorset sheep**. This first experiment resulted in the birth in **1996** of four Poll Dorset clones: **Cedric, Cecil, Cyril, and Tuppence**. In the second experiment, the team used fetal fibroblasts isolated from sheep fetuses after 26 days of development; these cells served as nucleus donors for transfer into an enucleated egg. This experiment resulted in the birth of two clones, **Taffy and Tweed**. In the third experiment, the scientists isolated adult cells (in this case, mammary gland cells) from a six-year-old ewe and used these cells as nucleus donors for transfer into egg cells; this technique inspired the later development of a procedure called somatic cell nuclear transfer (SCNT). Wilmut and his team constructed **277 embryos** containing adult cell nuclei that were implanted into **13 surrogate mothers**, only one of which became pregnant. This pregnancy was carried to term successfully. The **Finn Dorset lamb**, born on **July 5, 1996**, was **Dolly**. Dolly, cloned animal.

In **1997**, following the publication in the **journal Nature** of a summary of their research leading to Dolly, **Wilmut, Campbell, and The Roslin Institute** instantly became known for having opened the door to a new era of controversial cloning research.

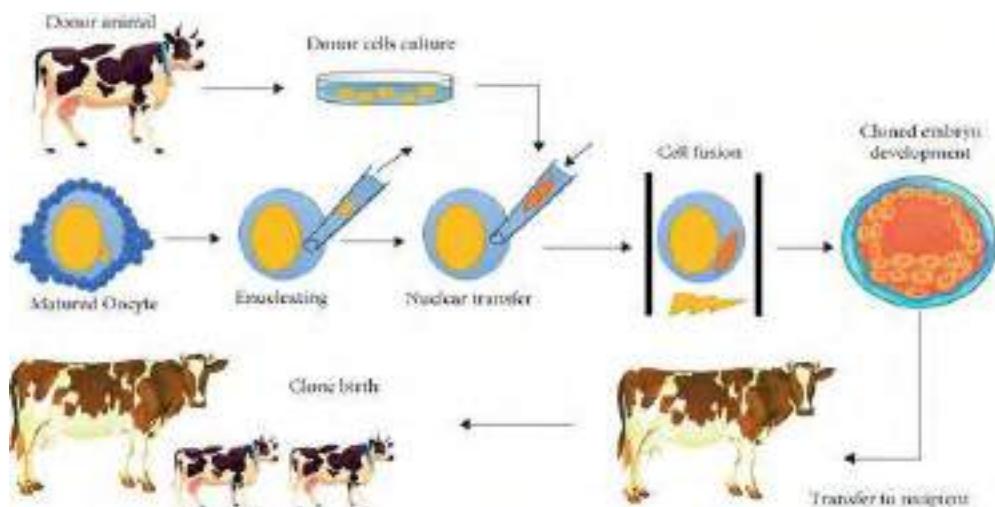
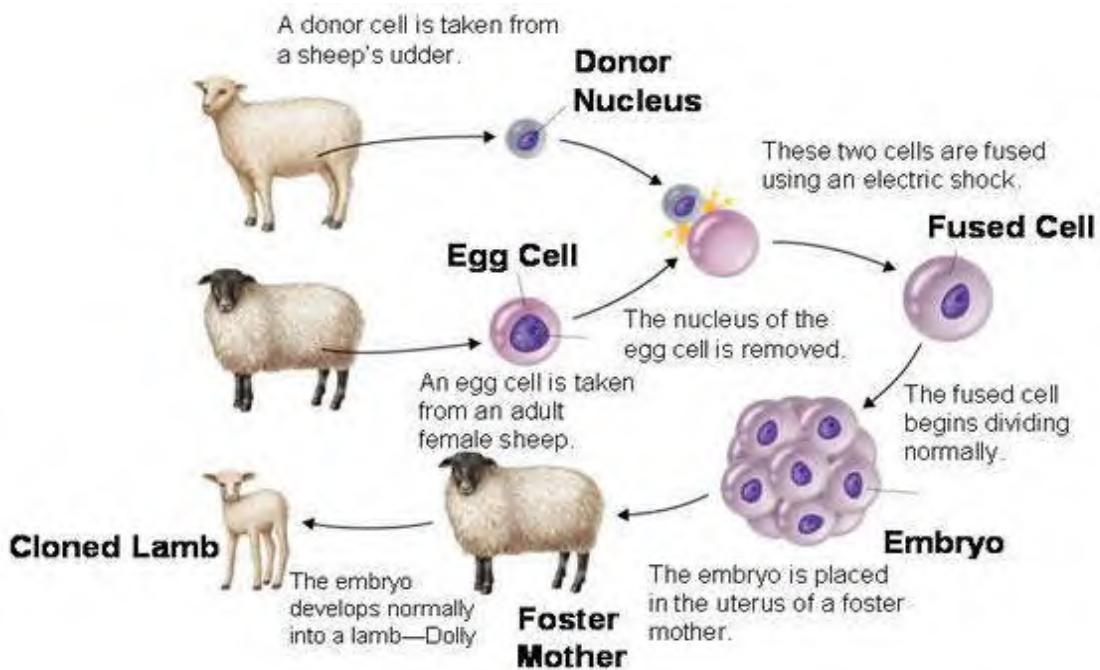
• Process Of The Animal Cloning- Dolly And Polly

- Dolly was cloned from a mammary gland cell taken from an **adult Finn Dorset ewe**.
- **Wilmut** and his team of researchers at **Roslin** created her by using electrical pulses to fuse the mammary cell with an **unfertilized egg cell**, the nucleus of which had been removed.
- The fusion process resulted in the transfer of the mammary cell nucleus into the egg cell, which then began to divide. In order for the mammary cell nucleus to be accepted and functional within the host egg, the cell first had to be induced to abandon the normal cycle of growth and division and enter a quiescent stage.
- Researchers deliberately withheld nutrients from the cells. Nevertheless, starting with a collection of **mammary cell nuclei** and **host egg cytoplasm** derived from **Scottish Blackface ewes**, a number of fused couplets successfully formed embryos.
- The reconstructed embryos were transferred to **surrogate Scottish Blackface ewes**. Of **13 recipient ewes**, one became pregnant, and **148 days later**, which is essentially normal gestation for a sheep, Dolly was born.

In Gist-

1. Scientists took **udder cells**(somatic) from Dolly's DNA mother. They let the cells multiply and then they stopped the process when they had divided enough.
2. They took an **egg cell** from a different sheep and removed the nucleus.
3. They put one **udder cell**(somatic) next to the egg cell **without a nucleus** and joined them. The egg cell now contained all the **udder cell's DNA**.
4. The egg cell divided until it developed into an embryo. An embryo is the early stage of an animal before it has been born or hatched. This embryo was placed inside a third sheep. Five months later, this sheep gave birth to Dolly.

Dolly remained alive and well long after her birth, with a functional heart, liver, brain, and other organs, all derived genetically from the nuclear DNA of an adult mammary gland cell. The technique used to produce her later became known **as somatic cell nuclear transfer (SCNT)**. SCNT has since been used to generate a wide variety of mammalian clones, from different types of adult cells.



● Process of Animal Cloning- Dolly and Polly

● Embryo Splitting Process



- Dolly and her surrogate
- Scottish embryologist, Ian Wilmut with his clone sheep Dolly
- Dolly and Polly with their scientists

• **Reproductive Cloning**

Reproductive cloning involves the implantation of a cloned embryo into a real or an artificial uterus. The embryo develops into a fetus that is then carried to term. Reproductive cloning experiments were performed for more than 40 years through the process of embryo splitting, in which a single early-stage two-cell embryo is manually divided into two individual cells and then grows as two identical embryos. Reproductive cloning techniques underwent significant change in the 1990s, following the birth of Dolly, who was generated through the process of SCNT. This process entails the removal of the entire nucleus from a somatic (body) cell of an organism, followed by insertion of the nucleus into an egg cell that has had its own nucleus removed (enucleating). Once the somatic nucleus is inside the egg, the egg is stimulated with a mild electrical current and begins dividing. Thus, a cloned embryo, essentially an embryo of an identical twin of the original organism, is created. The **SCNT** process has undergone significant refinement since the 1990s, and procedures have been developed to prevent damage to eggs during nuclear extraction and somatic cell nuclear insertion. For example, the use of polarized light to visualize an egg cell's nucleus facilitates the extraction of the nucleus from the egg, resulting in a healthy, viable egg and thereby increasing the success rate of **SCNT**.

• **Result**

On February 14, 2003, Dolly was euthanized by veterinarians after being found to suffer from progressive lung disease. After her death The **Roslin Institute** donated Dolly's body to the **National Museum of Scotland in Edinburgh**, where she has become one of the museum's most popular exhibits. Dolly is back on display in the museum after an extensive gallery refurbishment, alongside an interactive exhibit on the ethics of creating transgenic animals featuring current research from **The Roslin Institute**.

Uses Of Animal Cloning

- Cloning allows farmers and ranchers to accelerate the reproduction of their most productive livestock in order to better produce safe and healthy food.
- Cloning reproduces the healthiest animals, thus minimizing the use of antibiotics, growth hormones and other chemicals.
- Consumers can benefit from cloning because meat and milk will be more healthful, consistent, and safe. Most of the foods from cloning will be from the offspring of clones that are not clones themselves, but sexually reproduced animals.
- Cloning can be used to protect endangered species.
- In biomedical research- animal as drug producer, xenotransplantation.
- In livestock breeding and agriculture- transgenic clones, changes to agriculture structures.

• **Ethical Issues Related To Animal Cloning**

Problems associated with cloning include:

1. Pre-Natal Failures: Only a small percentage of cloned pregnancies result in live births. A 2007 study found that animal cloning failure rates remain as high as 90 percent.
2. Surrogate (Host) suffering: "Host mothers" face grave suffering, much of which is caused by inordinately high rates of spontaneous abortions. Cloning often leads to a condition known as "large-offspring syndrome," whereby cloned offspring grow abnormally large, causing early-term and stressful caesarian deliveries. In one cattle cloning project, 3 out of 12 surrogate mothers died during pregnancy.
3. Post-Natal Animal Health: Most cloned animals born on a farm, outside a veterinary hospital, have little chance of surviving. Those animals that manage to survive until birth are likely to suffer a wide range of health defects and deformities including: enlarged tongues; squashed faces; intestinal blockages; immune deficiencies; diabetes; high rates of heart and lung damage; kidney failure; and brain abnormalities.

• **Application Of Animal Cloning**

- **Xenotransplantation-** Genetically modified pigs can also be used as a source of cells, tissues, and organs for transplantation into human recipients. Xenotransplantation is any procedure involving the transplantation, implantation, or infusion of cells, tissues or animal donor organs, and also body fluids, cells, tissues, and human organs (or their fragments), which had ex vivo contact with animal cells, tissues, or organs into a human recipient. Organ xenotransplantation would give us an unlimited and predictable source of organs and enable careful planning of the surgery and preoperative drug treatment of the donor. The animal that best meets the criteria for xenotransplantation is the domestic pig (*Sus scrofa domestica*). Pig and human organs show great anatomical and physiological similarities. Advances in genetic engineering have brought scientists closer to obtaining modified animals that would be useful for pig to human transplants.
- **Recombinant DNA Technology (Transgenic Animal)-** The most important outcome of the application of transgenic biotechnology has been the production of recombinant proteins from bacteria.

The first successes involved the production of recombinant growth hormone and insulin for human replacement therapy. The ability to produce offspring from cultured cells opens up relatively easy way to make genetically modified or transgenic animals. Such animals are important for research and can produce medically valuable human proteins.

By introducing key human genes into mammals, biologists can induce dairy animals to produce therapeutic proteins in the milk. The genetic engineer first constructs a trans-gene containing the gene of interest plus some of extra DNA, which correctly controls the function of the gene in the new animal. This trans-gene has then to be inserted into the new animal. Several transgenic techniques have been optimized to obtain transgenic animals, with different levels of efficiency in function of the species in which they had been employed. Principal techniques are now available in order to modify an organism as a whole and subsequently to obtain a germ line transgenic animal.

• **Conclusion**

Studies into animal cloning have diversified and have been extended into various fields, with major breakthroughs being reported in the biotechnology, pharmaceutical and agricultural fields. Through cloning, transgenic animals have been created that have the potential to produce novel human therapeutic molecules, thus helping in treating some diseases that previously were incurable. Animal cloning promises to revolutionize food production, with the potential of producing cattle, sheep, pigs, and other animals with superior quality and more resistant to diseases. This is bound to increase food availability.

Animal cloning proponents are of the opinion that cloning of animals will see an increase in food production globally. Moreover, the quality of food produced will increase and novel cures for diseases will result from pursuance of animal cloning. This is meant to prolong human life. Further, animal cloning is considered as significant in enhancing the comprehension of human beings and nature. It is evident that animal cloning will lead to the realization of animals that can mature earlier and those with qualities that are preferred by farmers. This supplements the traditional sexual reproduction methods that are slower and do not meet the population demands.

• **Acknowledgement**

I would like to convey my heartfelt gratitude to our professor **HOD Dr. Partha Pratim Chaudhuri** for his support and assistance in the completion of my project. I would also like to thank our Principal **Dr. Debjani Dutta**, for providing me with this wonderful opportunity to work on a project with the topic **Animal Cloning**. The completion of the project would not have been possible without his help and insights. I would like to express my special thanks to our lab attendant **Mr. Tapas Shaw** for his time and efforts he provided for doing the project. His useful advice and suggestions were really helpful to me during the project's completion. In all these following aspect, I am eternally grateful to him.

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B.Sc. Botany General

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UNIVERSITY OF CALCUTTA

SYLLABUS

FOR

THREE-YEAR B.Sc. PROGRAMME IN

BOTANY (GENERAL COURSE)

UNDER CHOICE BASED CREDIT SYSTEM



BOTANY

Syllabus for three-year B.Sc. Botany Programme

(With effect from 2018-2019)

CORE COURSES (4)

Each theoretical course of 4 credits and practical of 2 credits.

1. Plant diversity I (Phycology, Mycology, Phytopathology, Bryophytes and Anatomy) –
a) Theoretical- BOT-G-CC-1-1-TH b) Practical- BOT-G-CC-1-1-P (... ... GE-1-1-TH & P)
2. Plant diversity II (Pteridophytes, Gymnosperms, Palaeobotany, Morphology and Taxonomy) – a) Theoretical- BOT-G-CC-2-2-TH b) Practical- BOT-G-CC-2-2-P (... ... GE-2-2-TH & P)
3. Cell biology, Genetics and Microbiology – a) Theoretical- BOT-G-CC-3-3-TH b)
Practical- BOT-G-CC-3-3-P (... ... GE-3-3-TH & P)
4. Plant physiology and metabolism – a) Theoretical- BOT-G-CC-4-4-TH b) Practical-
BOT-G-CC-4-4-P (... ... GE-4-4-TH & P)

N.B.: The above said four core courses (CC) may be considered as GE 1, 2, 3 & 4 respectively for the honours students of other allied disciplines opting Botany as one of the general courses.

Skill enhancement courses (SEC, four courses to be selected strictly on 2 subjects out of 3 subjects opted taking 2 courses from each subject. Each general subject shall have 2 groups (A & B) of SEC papers. One paper from Group A from each of the 2 subjects to be chosen in the 3rd and 5th Semester, one paper from Group B of each of the 2 subjects to be chosen in the 4th and 6th Semesters. Each paper of 2 credits and theoretical only)

SEC A

1. Plant breeding and biometry (BOT-G-SEC-A-3/5-1)
2. Biofertilizers (BOT-G-SEC-A-3/5-2)

SEC B

1. Plant biotechnology (BOT-G-SEC-B-4/6-3)
2. Mushroom culture technology (BOT-G-SEC-B-4/6-4)

Discipline specific elective courses (DSE, two courses to be selected from the list taking one each from Group A in 5th semester and one from Group B in 6th Semester. Each course comprises of theoretical component of 4 credits and practical ones of 2 credits)

DSE A

1. Phytochemistry and medicinal botany- a) Theoretical- BOT-G-DSE-A-5-1-TH b) Practical- BOT-G-DSE-A-5-1-P
2. Natural resource management- a) Theoretical- BOT-G-DSE-A-5-2-TH, b) Practical- BOT-G-DSE-A-5-2-P

DSE B

3. Economic botany- a) Theoretical- BOT-G-DSE-B-6-3-TH, b) Practical- BOT-G-DSE-B-6-3-P
4. Horticultural practices and post harvest technology - a) Theoretical- BOT-G-DSE-B-6-4-TH, b)
Practical- BOT-G-DSE-B-6-4-P

SEMESTER	CORE COURSES (CC-1-4)	ABILITY ENHANCEMENT COMPULSORY COURSE (AEC-1&2)	SKILL ENHANCEMENT COURSE (SEC-1-4)	DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE-1&2)
I	PLANT DIVERSITY I (PHYCOLOGY, MYCOLOGY, PHYTOPATHOLOGY, BRYOPHYTES AND ANATOMY) BOT-G-CC-1-1-TH	AECC-1 ENGLISH COMMUNICATION		
	PRACTICALS BOT-G-CC-1-1-P			
	OTHER DISCIPLINES (2)			
II	PLANT DIVERSITY II (PTERIDOPHYTES, GYMNOSPERMS, PALAEOBOTANY, MORPHOLOGY AND TAXONOMY) BOT-G-CC-2-2-TH	AECC-2 ENVIRONMENTAL SCIENCE		
	PRACTICALS BOT-G-CC-2-2-P			
	OTHER DISCIPLINES (2)			
III	CELL BIOLOGY, GENETICS AND MICROBIOLOGY BOT-G-CC-3-3-TH		SEC-A	
	PRACTICALS BOT-G-CC-3-3-P			
	OTHER DISCIPLINES (2)			
IV	PLANT PHYSIOLOGY AND METABOLISM BOT-G-CC-4-4-TH		SEC-B	
	PRACTICALS BOT-G-CC-4-4-P			
	OTHER DISCIPLINES (2)			
V			SEC-A	DSE-A (any one from GROUP A) THEORY & PRACTICAL
				OTHER DISCIPLINES (2)
VI			SEC-B	DSE-B (any one from GROUP B) THEORY & PRACTICAL
				OTHER DISCIPLINES (2)

DSE A (Group A)
PHYTOCHEMISTRY AND MEDICINAL BOTANY (BOT-G-DSE-A-5-1-TH)
THEORETICAL
(Credit 4, Lectures 60)

1. **Medicinal botany**- History, scope and importance of medicinal plants, a brief idea about Indigenous medicinal sciences- Ayurveda, Siddha and Unani. Polyherbal formulations.
.....14 lectures
2. **Pharmacognosy**- 2.1 Scope and its importance, 2.2 Primary metabolites, 2.3 Secondary metabolites- alkaloids, terpenoids, phenolics and their functions.
.....10 lectures
3. **Organoleptic evaluation of crude drugs.**
.....10 lectures
4. **Pharmacologically active constituents**: Source plants (one example), parts used and uses of: 4.1 Steroids (Diosgenin, Digitoxin), 4.2 Tannin (Catechin), 4.3 Resins (Gingerol, Curcuminoids), 4.4 Alkaloids (Strychnine, Reserpine, Vinblastine), 4.5 Phenols (Capsaicin).
.....6 lectures
5. **Ethnobotany and folk medicine**: 5.1 Brief idea, 5.2 Applications of ethnobotany, 5.3 Application of natural product to certain diseases- Jaundice, Cardiac and Diabetics.
.....20 lectures

PRACTICAL- PHYTOCHEMISTRY AND MEDICINAL BOTANY (BOT-G-DSE-A-5-1-P)
(Credit 2)

1. Preparations of solution and buffers
2. Acquaintance with laboratory instruments- Autoclave, Incubator, Clinical centrifuge, Analytical balance, pH meter, Colorimeter, Water bath, Distillation plant, Laminar air flow.
3. Qualitative test for proteins and carbohydrates, reducing and non reducing sugar (glucose, fructose and sucrose)
4. Tests (chemical) for tannin and alkaloid
5. Identification of medicinal plants (list to be provided)
6. Field study (local) and listing of medicinal plants. Records to be substantiated with photographs and description.

Budge Budge College
Academic Session: 2022-23

Department of Botany

1.3.2 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

List of students undertaking project work/field work/internship

Semester	Name of the course	Course code	Title of the project work	Sl. No.	Name of the Student	Registration No.	CU Roll No.	Name of the Supervisor
V	Phytochemistry and Medicinal Botany	BOT-G-DSE-A-5-1-P	Identification of Local medicinal plants	1.	Anindita Mondal	561-1211-1193-20	203561-12-0001	Dr. Samiran Panday and Mrs. Piyali Das
				2.	Dishari Ghosh	561-1211-1196-20	203561-12-0002	
				3.	Swaralipi Adhikary	561-1214-1211-20	203561-12-0009	
				4.	Soumi Das	561-1211-1279-20	203561-12-0010	
				5.	Asma Khatun	561-1215-1291-20	203561-12-0012	
				6.	Amit Ojha	561-1111-1192-20	203561-22-0002	
				7.	Ankan Pramanick	561-1111-1194-20	203561-22-0003	
				8.	Saptadip Khan	561-1111-1202-20	203561-22-0005	
				9.	Sudipta Maity	561-1112-1209-20	203561-22-0010	
				10.	Swapan Naskar	561-1112-1210-20	203561-22-0013	

- Objectives and outcomes of this project work:**

Semester	Name of the course	Course Code	Title of the Project work	Objectives	Outcomes
V	Phytochemistry and Medicinal Botany	BOT-G-DSE-A-5-1-P	Identification of Local medicinal plants	To impart students discipline specific knowledge of local medicinal plants and their Phytochemistry because 40% therapeutics primarily originate from natural plants.	Students practically are now aware of field oriented and practical training on the medicinal plants and their biochemical properties. Students' learning on the medicinal plants' role in human welfare.

TO WHOM IT MAY CONCERN

This is to certify that Shri/Ms. *Swaralipi Adhikary*..... bearing
Roll no. **203561-12-0009**. and Registration no. **561-1214-1214-20**
of 5th Semester Botany General Course (paper DSE A1) of Budge Budge College
has successfully completed Field Project on Medicinal Plants during the academic
session 2022 – 2023.

Signature of the Teacher:

Pomday
22/12/22

TO WHOM IT MAY CONCERN

This is to certify that Shri/Ms. *Ankan Paramanick* bearing
Roll no. *203561-22-0003*, and Registration no. *561-1111-1194-20*
of 5th Semester Botany General Course (paper DSE A1) of Budge Budge College
has successfully completed Field Project on Medicinal Plants during the academic
session 2022 – 2023.

Signature of the Teacher: *[Signature]*
22/12/22

TO WHOM IT MAY CONCERN

This is to certify that Shri/Ms. *Swaralipi Adhikary*..... bearing
Roll no. **203561-12-0009**, and Registration no. **561-1214-1211-20**
of 5th Semester Botany General Course (paper DSE A1) of Budge Budge College
has successfully completed Field Project on Medicinal Plants during the academic
session 2022 – 2023.

Signature of the Teacher:

Pomday
22/12/22



Field excursion with the 5th Semester Botany General students at Footghar, Akra

ফিল্ড স্টেডিও নথী পর্যবেক্ষণ করা ভেঙ্গজ উন্নিদ সমূহের তালিকা

খন : ৭৩০৫৮

তারিখ : ১৬/৩/২২

ক্রমিক সংখ্যা	হিনীয় নাম	বিজ্ঞানিক নাম	গোষ্ঠী	বর্ণনা	সংক্ষিপ্ত বর্ণনা	ব্যবহৃত অল্প	ভেঙ্গজ ব্যবহার	আলোকচিত্র
1.	বাঁচা কানাই	<u>Stenoclea foetida</u>	<u>Stenocleaceae</u>	২৩৫-				
2.	শুলা প্রিমিনি	<u>Inga dulcis</u>	<u>Mimosaceae</u>	২৩৫-				
3.	পিঙ্গু চান্দ	<u>Albizia lebbeck</u>	<u>Mimosaceae</u>	২৩৫-	বিশেষজ্ঞ	২৩৫-		
4.	পেটুর সান্দ	<u>Stenblus asper</u>	<u>Moneaceae</u>	(পেটুর)- গুড়				
5.	লেবি পেরেন	<u>Leucaena leucocephala</u>	<u>Mimosaceae</u>	(পেটুর)- গুড়				
6.	জামিন চান্দ	<u>Melia azedarach</u>	<u>Meliaceae</u>	২৩৫, ২৩৬- ২৩৭-				
7.	কেলা চান্দ	<u>Cephaelandra indica</u>	<u>Cuanabitaceae</u>	২৩৫-				
8.	আদেবুল	<u>Openicia turpethum</u>	<u>Convolvulaceae</u>	২৩৫-	বিশেষজ্ঞ	২৩৫-		
9.	পাতুলিমাটা	<u>Eichhornia crassipes</u>	<u>Pontederiaceae</u>	২৩৫-২৩৬- ২৩৭-২৩৮-				
10.	কেলুর	<u>Tamarindus indica</u>	<u>Caesalpiniaceae</u>	২৩৫-২৩৬- ২৩৭-২৩৮-				
11.		<u>Cassia siamea</u>	<u>Caesalpiniaceae</u>					

List of medicinal plants observed during field study

Location:

Date: 15/11/15

Sl. No.	Local Name	Scientific Name	Family	Habit	Brief description	Parts used	Medicinal uses	Photograph
12.	কল্পতুল চানু	<u>Solanum torvum</u>	<u>Solanaceae</u>	পুরুষ গুলি কুমাৰ গুলি				
13.		<u>Pasiphilum Poeticaria</u>	<u>Passifloraceae</u>					
14.		<u>Aerva lanata</u>	<u>Amaranthaceae</u>	বেগুনী গুলি				
15.	শুধুমাত্র শান্তি	<u>Mikania scandens</u>	<u>Asteraceae</u>	গুড়ী গুড়ী পোক গুড়ী পোক				
16.	বলকানি	<u>Fernlea aquatica</u>	<u>Convolvulaceae</u>	ফিল ফিল ফিল				
17.	পাতাৰ দুৰ্বল	<u>Abutilon indicum</u>	<u>Malvaceae</u>	পাতা				
18.		<u>Panthemium hysterophorus</u>	<u>Astereaceae</u>	পান্থে পান্থে				
19.		<u>Pantura camonea</u>	<u>Verbenaceae</u>	পান্থে				
20.		<u>Triumfetta Thunbergia</u>	<u>Tiliaceae</u>	পান্থে পান্থে				

رقم	نام	گروہ	گل						
21.	کھنڈیہ سیدھا	فونیکی	کھنڈیہ سیدھا						
22.	کھنڈیہ	فونیکی	کھنڈیہ						
23.	کھنڈیہ	فونیکی	کھنڈیہ						
24.	پھنڈیہ	پھنڈیہ	پھنڈیہ	پھنڈیہ	پھنڈیہ	پھنڈیہ	پھنڈیہ	پھنڈیہ	پھنڈیہ
25.	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ
26.	نیلی پوکو	نیلی پوکو	نیلی پوکو	نیلی پوکو	نیلی پوکو	نیلی پوکو	نیلی پوکو	نیلی پوکو	نیلی پوکو
27.	کاسیہ	کاسیہ	کاسیہ	کاسیہ	کاسیہ	کاسیہ	کاسیہ	کاسیہ	کاسیہ
28.	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ	تارہ
29.	سیپریٹہ	سیپریٹہ	سیپریٹہ	سیپریٹہ	سیپریٹہ	سیپریٹہ	سیپریٹہ	سیپریٹہ	سیپریٹہ
30.	ریٹلیہ	ریٹلیہ	ریٹلیہ	ریٹلیہ	ریٹلیہ	ریٹلیہ	ریٹلیہ	ریٹلیہ	ریٹلیہ

କ୍ରମିକ ଅନୁଯାୟୀ	ବ୍ୟାକିଲ୍ପି ନାମ	ଫାଇନ୍‌ରେଟ୍‌ର ନାମ	ଶର୍ମ୍ଭାବ	ଫୁଲ
31.	ଧରମପାତା	<u>Butea monosperma</u>	Papilionaceae	ଦିନରାତ୍ରି ଜୁଗାଜୁଗିବା
32.	ଚାତି	<u>Ricinus Communis</u>	Euphorbiaceae	ଚାତି ପାତା
33.		<u>Urera lobata</u>	Malvaceae	କୁଳାଳ କାଣ୍ଡିଆ
34.	ହଜାରି	<u>Achyranthes aspera</u>	Amaranthaceae	ହଜାରିଖାଲିକ ହଜାରି
35.	ନିର୍ମଳି	<u>Clerodendrum indicum</u>	Vitaceae	ନିର୍ମଳିଖାଲିକ ନିର୍ମଳି
36.		<u>Hyptis Beccariana</u>	Lamiaceae	ପାତା ପାତିଆ
37.		<u>Desmodium gangeticum</u>	Papilionaceae	କୁଳାଳ କାଣ୍ଡିଆ
38.		<u>Glycosmis Pentaphylla</u>	Rutaceae	ଫୁଲ ଫୁଲାକାଳି
39.		<u>Sida cordifolia</u>	Malvaceae	କୁଳାଳ କୁଳାଳ କାଣ୍ଡିଆ
40.		<u>Caesalpinia bonduc</u>	Caesalpiniaceae	କାଣ୍ଡିଆ ଖୁଲୁ ଖୁଲୁକାଳି
41.		<u>Anisomeles indica</u>	Lamiaceae	ହଜାରିଖାଲିକ ହଜାରି କାଣ୍ଡିଆ କାଣ୍ଡିଆ
42.	କାନ୍ଦିଆ	<u>Calotropis gigantea</u>	Asclepiadaceae	କାଣ୍ଡିଆ କାଣ୍ଡିଆ
43.	ବରମଙ୍ଗଲ	<u>Andrographis Paniculata</u>	Acanthaceae	ଫିଲିଫିଲି ଫିଲିଫିଲି

ଶବ୍ଦିକ ଅନୁଷ୍ଠାନ	ବିଭାଗକୁଟିର ନାମ	ଫେଲ୍	ବ୍ୟାକ
44. କାନ୍ଧାଖାତୀ	<u>Cassia sophera</u>	Caesalpiniaceae	କାନ୍ଧାଖାତୀ
45.	<u>Cleome viscosa</u>	Capparaceae	କାନ୍ଧାଖାତୀ
46. କାନ୍ଧାଖାତୀ	<u>Solanum reniforme</u>	Solanaceae	କାନ୍ଧାଖାତୀ
47. ପିଣ୍ଡାଖାତୀ	<u>Sonneratia alba</u>	Sonneratiaceae	ପିଣ୍ଡାଖାତୀ
48.	<u>Acanthus illicifolius</u>	Acanthaceae	କାନ୍ଧାଖାତୀ
49.	<u>Smilax Zeylanica</u>	Smilacaceae	କାନ୍ଧାଖାତୀ
50.	<u>Sida acuta</u>	Malvaceae	କାନ୍ଧାଖାତୀ

(Punjab)
07/11/22

ରୋଗ ଉତ୍ତିଷ୍ଠାନ ଜାଗାଧାରଣ

(Identification of Medicinal Plants)



1. Terminalia arjuna (Roxb. ex DC) Weight & Aron.

ଶ୍ରୀମତୀ ନାନୀ - କଣ୍ଠିମା

ଜ୍ଞାନ - Combretaceae

ଅନ୍ତିମ ବର୍ଣନ :

ଅନ୍ତିମ ପରିଚୟ ହାତ :

ବଳ୍ପ : ଲାଗିଥିବା କାଣ୍ଡା, ଦୁଇପାଇଁ ବର୍ଣନ ଧାରା ଅଣ୍ଟି ମୁକ୍ତ ;

ପାତା : ବିଶ୍ଵିତ ଜିମକପନ୍ଥ, ଅଶ୍ଵାଳ, ଉପରାଙ୍ଗାବଳ୍ଲ, ଖର୍ଜୁ, ଡାମାନାମହିମା;

ଫୁଲ : ଯାହିଁକି ମୁଣ୍ଡ ବିଲ୍‌ଗ୍ରେ ଅନ୍ତିମ, ମୁଣ୍ଡ, ଉତ୍ତାମିଶ୍ର, କଟପଣ୍ଡ;

ରିଷ୍ଟାର୍ : ବୃଦ୍ଧିକାଳୀନ ରିଷ୍ଟା, ମୁକ୍ତମୁକ୍ତି; ନୂରାମାଳ ରିଷ୍ଟା, ମୁକ୍ତମାଳ ;
ପୁରୁଷମାଳ ରିଷ୍ଟା, ଦୁଇ ଆବଶ୍ୟକ ଅନ୍ତିମ ; ତାରକାଳିକ ରିଷ୍ଟା, ଡିଲ୍‌ମାଳ
ରେହିଜାର୍, ଶୁଣ୍ଡକାଳାଳି, ଏକମୈତ୍ରାନ୍ତମୁକ୍ତ, କର୍ଣ୍ଣିକ ରିଷ୍ଟା, ଲାହୁ,

ଫୁଲ : ବାଂଗାରା ମୁକ୍ତ ଲାଟ, କୋଣାର୍କା ପରାମା, ୨-୬ ମୀ. ମି ଲାହୁ;

ବୀଜ : ଅନ୍ତର୍ବିଦ୍ୟ, ଜୀବିତ ;

ଅନ୍ତିମ୍ବେ ଅନ୍ତର୍ବିଦ୍ୟ (ବେଳିବିଦ୍ୟ) :

ବ୍ୟବସ୍ଥା ଅନ୍ତର୍ବିଦ୍ୟ

ଡେକ୍‌ଜାର୍ବା / ଶ୍ରୀମାନ୍

୧. ବର୍ଣନ

(୧) ବର୍ଣନ ନିର୍ଧାରିତ :

- ଜୀବିତମୋଦ୍ଦୟ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- ଲିଏର୍-ଜିହ୍ଵାର୍ଦ୍ଦିତ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- କୁର୍ଯ୍ୟାଲି ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- ବଳମାଳକ ଦ୍ୱାରା, ଶ୍ରୀମାନ୍ ବ୍ୟବସ୍ଥା ;
- କ୍ରୋଣିକାର୍ଯ୍ୟ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- ରିକ୍ରୁଚିପ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- ଆମାର୍ଦ୍ଦିତକ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- କର୍ଣ୍ଣିକାମାଳ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ରାଶି ;

(୨) ବର୍ଣନାର୍ଥ ଛାତ୍ର :

- ଶାକ୍-ପ୍ରାଣିକାର୍ଯ୍ୟ ଦ୍ୱାରା ପ୍ରତିକିର୍ଣ୍ଣିତ ;
- ଜାଗା ଧାରା ସାମାଜିକ ମୁକ୍ତମାନ ଉପରାଧି ;



2. *Centella asiatica* (L.) Urban

ଯୋଗ୍ୟାଲିକ ନାମ — ଆମରୁଗଳି

ଫୋଟ୍ — Apiaceae (Umbelliferae)

ଡେହିଜୁଣ୍ଡ ବଳନ୍ତ

ଧୂଳିରୀପ : ବର୍ଷାରୀବି, ବୀଚୁଙ୍କ, ଅଖ୍ୟାତ;

ଛୁଳି : ରେଡାନିକ, ଏବଂ ଶୈଖାତୁ ଉଦ୍‌ଦେଶ୍ୟ;

ବଳନ୍ତ : ପ୍ରେରାଧ୍ୟାବିହୀନ, ବୃକ୍ଷବୀକଣ, ଅନ୍ତର୍ବେଳାନିକ ନିଶ୍ଚିତ, ଅବୁଦ୍ଧ;

ପାତା : ବାଲୁବୈଲିକ ପ୍ରାଚ୍ୟଳ ଝୁକ୍ତ, ଦୀର୍ଘ ପ୍ରାଚ୍ୟଳ ଝୁକ୍ତ, ପ୍ରାଚ୍ୟଳ-ଚାର୍କା,

ଝୁଲି : ବର୍ଷାରୀବି, ଧୂଳିଲାବି, ଦୀର୍ଘଲାବି, ବର୍ଷାରୀବି-ଧୂଳିଲାବିଗୁରୁ କିନ୍ତୁ ବିଳାପିତା;

ଇନ୍ଦ୍ରାବାଦ ପୁରୁଷବିଳାବି ଅଶ୍ରୁତ, ଅଶ୍ରୁତ, ଉଦ୍ଦୟମିତା, ଚାର୍କାବିଳାବି;

ଜୋଟ; ବୃତ୍ତାନ୍ତ ଚାର୍କାବିଳାବି; ଦୀର୍ଘ ଚାର୍କାବିଳାବି; ପ୍ରାଚ୍ୟଳ ଚାର୍କାବିଳାବି; ପ୍ରାଚ୍ୟଳ ଚାର୍କାବିଳାବି; ପ୍ରାଚ୍ୟଳ ଚାର୍କାବିଳାବି; ପ୍ରାଚ୍ୟଳ ଚାର୍କାବିଳାବି; ପ୍ରାଚ୍ୟଳ ଚାର୍କାବିଳାବି; ପ୍ରାଚ୍ୟଳ ଚାର୍କାବିଳାବି;

ଖଳ : କିନ୍ତୁରାବଳୀ
ଡେହିଜୁଣ୍ଡ କ୍ରେଷଟ ବିଳିପିଟି:

ବୃକ୍ଷତ ଅଭିନାଶ କ୍ରେଷଟ ଝୁଲି / ବୃକ୍ଷତ

1. ବାଲୁ ଓ ପାତା

③ ବାଲୁ ଓ ପାତା ଲିମାଇ-

- ଆମାକେବଳ ତେ ପ୍ରେଟର ଅଶ୍ରୁତ ଅର୍ଥାତ୍ ବାଲୁଲିମାଇ ପ୍ରାଚ୍ୟଳ ରାଶି ବୃକ୍ଷତ;
- ଲୁଣ୍ଡ (Lepidoptery) କ୍ରେଷଟ ଅମେରିକାବ୍ରତ ବୃକ୍ଷତ;
- ଚମର୍ଦ୍ରୋକ୍ତ ବୃକ୍ଷତ ଏକାଡ଼ିଆ, ପ୍ରୋଟିଯେ-ଡିଆ, ଲୁଣ୍ଡାଇ-ଇଞ୍ଜାନି କ୍ରେଷଟ ଉପଭାଗରରାଗୀ;
- ସମ୍ପର୍କତା ଲିମିକ ରାଶି ବୃକ୍ଷତ;
- ଏମ୍ବାଲିଟିକ ରିପାର ବୃକ୍ଷତ; ପାଇଁ କ୍ରେଷଟ, ଅଭୁତିକ୍ରେଷଟ ରୁଶିର ଲାମାନାରୀ ପ୍ରାଚ୍ୟଳ ବୃକ୍ଷତ ୨୨;
- ଅନ୍ତିର୍ଦ୍ଦୂତ ତ୍ରୁଟ୍ (ମୋଟିକାଳା) ବୃକ୍ଷ, ଚାର୍କାବିଳାବି ଅଭୁତିକ୍ରେଷଟ ରୁଶିର ଲାମାନାରୀ ପାଇଁ ବୃକ୍ଷତ ୨୨;

2. ଝୁଲି :

ଧୂଳିରୀପ ବୃକ୍ଷ କାରାବଳୀ,



3. Saraca asoca (Roxb.) Willd.

ଶାଖାଲିଙ୍କ ନାମ — ପେଣ୍ଟାକ

ଫ୍ଲୋର — Leguminosae, Sub-family Caesalpiniodeae

ଡିଗ୍ରିଜ୍ୱାର ସଂଖ୍ୟା :

ୟଥିରେ : ବନ୍ଦୁକମୁଦିରୀ ଚିତ୍ତଅଳ୍ପବୁନ୍ଧ;

ବନ୍ଦୁକ : କାନ୍ଦିଲ, ମାନ୍ଦିଲ ବନ୍ଦୁକମୁଦିରୀ;

ପାତା : ପିଲାତ୍ତିକା, ଡାର୍ତ୍ତିକା, ଅନ୍ତିମ ପାତା ମିଳାଇ, ଲୋକ
୪.୨୫ ଟ୍ରେ.ମି ଲାଙ୍ଘ ଉପରେ ଉପରେ ଉପରେ, କିମ୍ବରେ ଅନ୍ତିମ,
ଦୁଇତମ୍ଭ;

ଲିମ୍ବାରୁଣ୍ୟ — ବିଳାପ୍ର ଅନ୍ତିମ, ଡାର୍ତ୍ତିକା ଉପରେ ଉପରେ,
ଆମାଦୀ, କଟ୍ଟିଲା ବନ୍ଦଳୀ ସମେତ; ବନ୍ଦୁକ ଏବଂ ପାତା;
କାନ୍ଦିଲ ଏବଂ; ରୁଷାକାର ୩-୮, ମୁଲେବନ୍ଦିକା
ବନ୍ଦୁକ, ଡାର୍ତ୍ତିକା — ଏବଂ, ଅନ୍ତିମ, ପାତାର ଦେଇ;
ଆମାଦୀ ଅନ୍ତର୍ବାବିନ୍ଦିଯା;

କିମ୍ବରେ;

୪-୮ ଟିଲାଙ୍ଘ

ଡିଗ୍ରିଜ୍ୱାର କ୍ଷେତ୍ର ଛାନ୍ତି :

ଶ୍ରୀବନ୍ଦୁତ ଅବ୍ୟାକାଶ କ୍ଷେତ୍ର ଛାନ୍ତି / ଶ୍ରୀବନ୍ଦୁତ

୧. ବାନ୍ଦି:

ବାବନ୍ଦିକା କ୍ଷେତ୍ର —

- ଶ୍ରୀବନ୍ଦୁତ ବ୍ରାହ୍ମି ପ୍ରାଚୀ ମିଳାଇ ଶ୍ରୀବନ୍ଦୁତ ହୁଏ,
- ପ୍ରାଚୀକା ପାରିଷିଳ ରାମ୍ଯ,
- ଶ୍ରୀ ଅନ୍ତିମ,

2. ମୁଣ୍ଡ :

ମୁଣ୍ଡର ପେଟ୍ରି —

- ଆମାଦୀ ଲାଙ୍ଘନୀ
- ପ୍ରାଚୀକା

3. ଶିର୍ଜି: ଶିର୍ଜି କ୍ଷେତ୍ର ପ୍ରାଚୀକାକା,



4. Justicia adhatoda L. syn. Adhatoda vasica Nees

ଶ୍ରୀମତୀ ନାନା — ବାଦଳ

ଫଳ — Acanthaceae

ଉଦ୍‌ଦେଶ୍ୟ:

ପ୍ରକାଶ: ବୁଦ୍ଧିମୂଳିକ ବିଜେମ ଚାଲାନ୍ତିକ ଫୁଲ;

ବଳ୍ପ: ବଳ୍ପାଣ୍ଡିତ, ନିର୍ବିଟ, ପରିଷିତ, ଗାସୁଡ଼;

ପରିଚୟ: ଅନିଯୁମ ତିମିରାମଙ୍ଗଳ, ଅନାନ୍ଦିଶ, ଅନ୍ତର୍ଗୁଳ, ମହାବିଲି, ଅନାନ୍ଦିଶ, ଅନ୍ତର୍ଗୁଳ, ମହାବିଲି,

ପ୍ରକାଶ: ପରିଷିତ ପୁରୁଷିଳାଙ୍ଗ ଅନ୍ତର୍ଗୁଳ, ଏକାଟିକାନ୍ତର୍ଗୁଳ,
 ପ୍ରାଣୀ ଓ ଅନ୍ତର୍ଗୁଳିକାନ୍ତର୍ଗୁଳ, ଅନ୍ତର୍ଗୁଳ ଅନାନ୍ଦିଶ, ଉଦ୍‌ଦେଶ୍ୟ,
 ପ୍ରକାଶ, ଆଶ; ଇନ୍ଦ୍ରାଜିତ ପ୍ରାଣୀ, ମୁକୁତିଶିଖ; ପ୍ରାଣୀ
 ପ୍ରାଣୀ, ମୁକୁତିଶିଖ, ଉଦ୍‌ଦେଶ୍ୟ; ପ୍ରାଣୀକାନ୍ତର୍ଗୁଳ ପ୍ରାଣୀ ପ୍ରାଣୀ,
 ଅନ୍ତର୍ଗୁଳ ପ୍ରାଣୀ ପ୍ରାଣୀ, ଡିକାନ୍ତର୍ଗୁଳ ପ୍ରାଣୀ,
 ପ୍ରାଣୀକାନ୍ତର୍ଗୁଳ;

ବଳ୍ପ: ବୁଦ୍ଧିମୂଳ;

ପରିଚୟ: ଅନାନ୍ଦିଶ;

ଉଦ୍‌ଦେଶ୍ୟ କ୍ରେମଟିକ୍:

ବୁଦ୍ଧିମୂଳ ଅନାନ୍ଦ

1. ପାତା

କ୍ରେମଟିକ୍ | ଶ୍ରୀମତୀ

ପାତାର ଲିମ୍ପିଜ ପାତାର ପାତାର ଅନ୍ତର୍ଗୁଳ ପାତାର ହିହ୍ର —

- ପ୍ରାଣୀକାନ୍ତର୍ଗୁଳ ଅନ୍ତର୍ଗୁଳ ବଣ୍ଣ;
- ଉଦ୍‌ଦେଶ୍ୟ ପ୍ରାଣୀ ଅନ୍ତର୍ଗୁଳ ଉଦ୍‌ଦେଶ୍ୟ;
- ମହା ପ୍ରାଣୀ ପ୍ରାଣୀ ଅନ୍ତର୍ଗୁଳ ପାତାର ହିହ୍ର;
- ଉଦ୍‌ଦେଶ୍ୟ ପ୍ରାଣୀ ଅନ୍ତର୍ଗୁଳ ପାତାର ହିହ୍ର;

2. ବଳ୍ପ: ବଳ୍ପାଣ୍ଡି ଅନ୍ତର୍ଗୁଳ ପାତାର ବଣ୍ଣ;

3. ଛୁଲ ଛୁଲାଙ୍ଗ ଲିମ୍ପିଜ ପୁରୁଷ ପାତାର ପାତାର ହିହ୍ର;

ଲିମ୍ପିଜ ବଣ୍ଣ;

4. ଫୁଲ ଫୁଲବାଟି — ମହିମାନ୍ତର ପାତାର ପାତାର;

5. Andrographis Paniculata (Brum.f.) Nees

ଶୋଷଣିକ ନାମ — ସମ୍ମାନଜ୍ୟ-

~~Gymn~~ — Acanthaceae

$$-\frac{1}{2}$$

—ପୁଅନ୍ତଃ କର୍ମଶୀଳ ବିଦ୍ୟା;

वर्ण : चार्यपाल, एवं प्रशिक्षक थे;

error : ଶ୍ରୀ କରୁତୁ, ଉପାୟ, ଅନେକମାତ୍ର, ଅନେକମାତ୍ର;

ଦୂର : ଅନନ୍ତରୀଳେ ହୋଇବ, କୁଞ୍ଜ ପ୍ରାଣୀ;

କୁମାର: ପରିଷାର ଏକାଶମନ;

বীজ : প্রতিশায়োমুক, ২ প্লাট সামুদ্রি;

ପ୍ରକାଶନ କେନ୍ଦ୍ର ମୁଦ୍ରଣ :

ଶ୍ରୀବନ୍ଧୁତ ଅଧ୍ୟାତ୍ମିକ

ଶ୍ରୀକର୍ଣ୍ଣାନ୍ଦୁ

1. অসম পুলিশ

—ଅନ୍ତର୍ବାଦିଶ୍ରୀ ମହାତ୍ମା—

- ① ମୁହଁତରୁନିତି ଅନ୍ଧାରୀ କ୍ଷାଣୀ,
ଫୁଲଟ ବୁଝୁଥିବ ଦେଖାଲିବାକାଳୀନୀ;
କୁଣ୍ଡିଲୁରୁଣ୍ଡିଲୁରୁ ଶୁଣି କୁଣ୍ଡିଲୁରୁ
ରଖିବା;
 - ② କିମ୍ବାରୁଣ୍ଡିଲୁରୁ ପାରିବାରିଲିରୁ ଶୁଣି କୁଣ୍ଡିଲୁରୁ
ରଖିବା;
 - ③ କୁଣ୍ଡିଲୁରୁରୁ କିମ୍ବାରୁଣ୍ଡିଲୁରୁ ରେ ଅଥ ନିବାରିବା
କୁଣ୍ଡିଲୁରୁ;

২. পাত্র ৬ : কলাচারিয়ার এ প্রত্যেক দলিল আম ব্যবহৃত।
নথি রাখ্য:

6. Aloe vera (L.) Burm.f. Syn. *Aloe barbadensis* Mill.

ଆମ୍ବଲିକ ପାତା — ଶୁଦ୍ଧାଳୀ

ଫେଣ୍ଡ — Xanthorrhoeaceae

ବନ୍ଦା:

ଫୁଲୋବ : ରାତ୍ରିକାଳୀନ, ରାତ୍ରିଲାଲ, ଅଳ୍ପମୁ;

ବଳ୍ପ : ହୋଟି;

ପାତା : ମୂଳତ, ରହ୍ୟ, ଅନ୍ତରିକ୍ଷରାଜୀଳ, ଚାପ୍ଟି, କିନ୍ତାର ଗୁର୍ଜାଳ,

ଫୋଲ : କ୍ରୋନିକ, ଇଲ୍ଲାଦ୍ୟାତାଳ, ଅନ୍ତରିକ୍ଷର, ସାର୍କିଳ ପୁରୁଷୁଚ
ଢାଟ, କୁଟି ଆବର୍ତ୍ତ ଚାକ୍ରିତ; ଖୁଲ୍ଲାପାତ୍ର ଓ ଛୁଟ; କାର୍ଯ୍ୟକାର
ତ ଛୁଟ ଚାକ୍ରିତ,

ବ୍ୟବସ୍ଥାତ ପ୍ରୟୋଗ

୧ ପାତା

ବ୍ୟବସ୍ଥା

ପାତାର ପିଣ୍ଡ —

● କ୍ରୋନିକାଟିମ୍), ମାନ୍ଦ୍ରାଧିପାନ ବୃକ୍ଷିତ ମହୀୟକି ଉତ୍ସାହଶ୍ଵର
ଇହା;

● ସାତ ଓ ଭାରାଯଙ୍କଳି ଗ୍ରୁହିତ କ୍ରୋନ ନିଯାମନ ଏତ୍ତ, ଏହାଜା
ସୁରଗିତେ ବିଳା; ଭାରାଯଙ୍କଳିକା କ୍ରୋନ ଉତ୍ସାହଶ୍ଵରି;

ପାତାର ପିଣ୍ଡମାତ୍ର) —

- ଘୁରୁତ ଓ ପୀହାଫ୍ରାନିତ ଗୋଚ ନିଯାମନ ଏତ୍ତ;
- ଅନ୍ତର ପିଣ୍ଡମାତ୍ର) ଏହାକୁ ପ୍ରାତି ପାତା ଆରିଫ୍ଲେଲମ୍;
- ଅନ୍ତିର, ଲିଙ୍ଗମଧୁ କର୍ମକୁ ପ୍ରାତିମନନ୍ତ;
- ପାତାର କ୍ରୋନ ସାମିତ୍ରିତ ପେନ୍ଡିକ୍ରୋନ ଏବଂ ପାତାର
କୁଳବଳାନ ଉତ୍ସାହଶ୍ଵର ପିଣ୍ଡମାତ୍ର);

W) standard cult. with 1.000 QD green 30%

-Pongamia - 1000 mm height
various different root - 100%
Inf.

100% (myrra, thym, E + P + P +



7. *Hypnophila auriculata* (Schumach.) Heine. *Asteracantha*
longifolia Nees

ଓৰোচ্চলিঙ্গ পাই — হৃষিকেশীয়া

ক্ষেত্ৰ — Acanthaceae

উপিদেশ বনমা:

বৃক্ষস : বহুবৰ্ষীয় শূলোঁ;

বনান্ত : চাতুরণা, বেগুনীকুকুলু, ধৰুণী, লাল বৰ্ণোঁ;

পাই : অৱৰ্ত প্ৰস্থিলোঁ অঙ্গু, প্ৰস্থিলোঁ তাৰুণ্য, প্ৰস্থিলোঁ
 প্ৰস্থিলোঁ, কিম্বৰ—অংগু, সুমুড়ি, দুৰি অৱৰ্তুণ্য;

বুল : কামিলু, কিম্বৰ পুলোবিলু অঙ্গু; পুলোবিলু পুলু, অংগুণ,
 অৱৰ্তুণ্য, উতুলুলু, কুলুলু, অলুলু (পুলু বৰ্ণোঁ); উতুৰুণ্য
 অংগু, সুমুড়ি; পুলুলুলু পুলু, পুলুলু, পুলুলুলু, পুলুলুলু
 বৰ্ণোঁ; পুলুলুলু পুলু পুলুলুলু, সুতুলুলু পুলু, পুলুলুলু
 পুলুলুলু অঙ্গুলু, কিম্বৰপুলুলু, পতিপুলুলু, পুলুলুলু, পুলুলুলু

বনান্ত : পিঙ্গুলু লুপুলুলু;

বীজ : পুনৰুৎপন্নুলু;

উপিদেশ জোশুৰুণ :

বৃক্ষসূত্র অৱৰ্তুণ্য

1. ফুল

কেশচূল / অৱৰ্তুণ্য

পুলুলুলু লিম্বু

অৰুণ ফুল উপৰুক্তাবী;

অৰুণালালুভিত হিমাণ বৃক্ষসূত্র;

অৰুণালালু;

অৰুণালালু উপৰুক্তাবী;

অৰুণ লিম্বু —

বৃক্ষসূত্র পুলু

বৃক্ষসূত্র পুলু উপৰুক্তাবী

বৃক্ষসূত্র পুলু

বৃক্ষসূত্র পুলু

2. আতু

অৰুণ লিম্বু —

বৃক্ষসূত্র পুলু উপৰুক্তাবী

বৃক্ষসূত্র পুলু

বৃক্ষসূত্র পুলু

3. বাণু

অৰুণ লিম্বু —

বৃক্ষসূত্র পুলু উপৰুক্তাবী

বৃক্ষসূত্র পুলু

4. বীজ বীজ



Rauvolfia Serpentina (L.) Benth. ex Kunze

ବ୍ୟାପକ ନାମ — ଅର୍ଦ୍ଧଶିଖା

ଫେଣ୍ଡି — Apocynaceae

ଶାସ୍ତ୍ରୀୟ ସମ୍ପର୍କ :

ପ୍ରକାର : ସମ୍ମର୍ଜିନୀରୀ — ଶାଖା ଫୁଲ;

ଶ୍ରୀମଦ୍ : ପରିମଳା, ଆବିଷ୍ଵାନ;

ରାଶି : ଦ୍ରାଙ୍ଗାନ୍ଦି, ଡ୍ରାଙ୍ଗି, କାମ୍ବିରା - ଆଶାର ଫୁଲ ଫୁଲ;

ପରା : ଆର୍ଦ୍ଧ ପ୍ରାଚୀଯିତା, ଅର୍ଦ୍ଧଶିଖା ଅଳାହା, ପାତାଲି,

କାର୍ବନ୍; ବ୍ୟାପକ - ୫, ଫୁଲବୁଢ଼ି; ଗାନ୍ଧାରାଦୂ
ଫୁଲ, ପୁରୀରୁଚି ଫୁଲ ପ୍ରାଚୀଯିତା, ସାଦା;

ଶ୍ରୀମଳାନ୍ - ୫୩, ଫୁଲବୁଢ଼ି, ପିକ୍ରାନ୍ତିରୁଚି
ଫୁଲ; ଅର୍ଦ୍ଧଶିଖା ଆଶ୍ରମାବାଦ;

୨୩, ପ୍ରାଚୀଯିତା ଫୁଲ ଆଶ୍ରମ ଫୁଲ;

ଫୁଲ, କ୍ରାନ୍ତିରୁଚି;

ଅଣ୍ଡିରୁ ଫେଣ୍ଡିଶାର :

କୁରୁତ ଅଣ୍ଡିର ଫେଣ୍ଡିଶାର / କୁରୁତ

1. ଶୁଳ ଘୋର ଲିମାନ୍ (ରାବାରିନ୍ (Rauvolfia))
ଅଣ୍ଡିର ପିଲାନୀ - ରାତ୍ରି ଆଳ, ଆଛି ଶୁଳ ଲିମାନ୍
ଲାଲ ଫୁଲ ଫୁଲବୁଢ଼ି

• ଫୁଲବୁଢ଼ି ରାତ୍ରି ରାତ୍ରି ରାତ୍ରି;

• ଲିମାନ୍ ରାତ୍ରି ରାତ୍ରି;

• ଆଶାରିଲ ରାତ୍ରି ରାତ୍ରି;

• ବିଶାର୍ଦ୍ଦ କାଲେତରୁକୁ ରାତ୍ରି ରାତ୍ରି ରାତ୍ରି;

2. ଲାଜ ପାତାଲ ଫୁଲ ଫୁଲ ଫୁଲ ଫୁଲ ଫୁଲ ଫୁଲ
ଫୁଲ,



9. *Bacopa monnieri* (L.) Wetst. syn. *Herpestis monnieria* (L.) Rothm.

ଓঁজপিলি নাম — তাঙ্গী

গোলা — Plantaginaceae

উচ্চিলয় বর্ণনা:

ফুল: কর্ণফীলি, বিশুণ, কুমাৰী;

শূল: অঞ্চলিক, এবং ইহুড়ে উৎপন্ন;

বাকি: ফুলালুক, মড়ান;

পাতা:

অন্ধকার, অনুসৃত, চাষাণীক, কিম্বু-মড়ান, পুঁজি;

মুখ: কানিকলা-কোম; অনুসৃত, অনামাস, অন্ধকার, পুঁজি-মুকুটুটি; দুগ্ধের পুঁজি, মুকুটুটি, আগুনীক অন্ধকার মুখ, পুঁজি-কোমলী; পুঁজি-কোমলী, দুগ্ধের মুকুটুটি, হাতকোমলী-২, মুকুটুটোমুকুটুটি, পিয়ুকোমুকুটুটি-অন্ধকার, মুকুটুটোমুকুটুটি;

উচ্চিলয় ডেবেজ শূল:

ক্রান্তি অংশ — ক্রান্তি শূল / ক্রান্তি-

1. অন্ধকার-উচ্চিলয় — অন্ধকার উচ্চিলয় লিমিট / লাতার লিমিট.

- ইন্দিলুক অক্ষয়া ইন্দিলুক উচ্চিলয় প্রকৃত,
- অন্ধকার ও চাষাণীক কোম উপর অবস্থানী,
- অন্ধকার কোমলীকা,

2. পাতা

ক্রান্তি অন্ধকার-উচ্চিলয়ের,

- ক্রান্তি অন্ধকার উচ্চিলয়ের,
- ক্রান্তি অন্ধকার অন্ধকার,
- প্রাণক্রান্তি ক্রান্তি উচ্চিলয়ের,

TO WHOM IT MAY CONCERN

This is to certify that Shri/Ms. *Ankan Paramanick* bearing
Roll no. *203561-22-003* and Registration no. *561-1111-1194-20*
of 5th Semester Botany General Course (paper DSE A1) of Budge Budge College
has successfully completed Field Project on Medicinal Plants during the academic
session 2022 – 2023.

Signature of the Teacher: *Founds
22/12/22*



Field excursion with the 5th Semester Botany General students at Footghar, Akra

ফিল্ড স্টেডিওর সময় পর্যবেক্ষণ করা ভেজজ উক্তি সমূহের তালিকা

স্থান : ঘৃতচূড়া

ক্রমিক সংখ্যা	আনীয় নাম	বিজ্ঞানসম্মত নাম	গোবি	বৰ্ভাৰ	সংক্ষিপ্ত বৰ্ণনা	ব্যবহৃত অংশ	ভেজজ ব্যবহৃত আঙুলিচিঠি
১.	<u>Stereulia</u> <u>foetida</u>						
২.	বাঢ়বান	<u>Stereulia</u> <u>foetida</u>					
৩.	গুধুন কুলিনি	<u>Inga</u> <u>duleis</u>					
৪.	পুষ্পি সাগু	<u>Albizia</u> <u>lebbeck</u>					
৫.	লাঙাচা সাগু	<u>Sternbus</u> <u>asper</u>					
৬.	লীলা চেঁচুর	<u>Leucana</u> <u>Leucolephal</u> <u>da</u>					
	বেগুনী	<u>Melia</u> <u>azederach</u>					

List of medicinal plants observed during field study

Location:

Sl. No.	Local Name	Scientific Name	Family	Habit	Brief description	Parts used	Medicinal uses	Date:	Photograph
7.	কেলাকুড়া	<u>Cephaelandra indica</u>	<u>Eucumbidaeae</u>	প্রস্তরী বিলাত					
8.		<u>Oxyechidna convolvuli</u>	<u>Convolvulaceae</u>	প্রস্তরী বিলাত পুর্ণিমা					
9.	গুড়িবনা	<u>Ficchoria Pontederioides</u>	<u>Pontederiaceae</u>	প্রস্তরী বিলাত পুর্ণিমা কুমকুল					
10.	গোঁজ	<u>Tammarindus indica</u>	<u>Caesalpiniaceae</u>	প্রস্তরী পুর্ণিমা কুমকুল					
11.		<u>Cussia siamea</u>	<u>Caesalpiniaceae</u>						
12.	বনবেগুন	<u>Solanum torvum</u>	<u>Solanaceae</u>	প্রস্তরী বিলাত কুমকুল					

ନିମ୍ନକ କଣ୍ଠରୀ	ବାଲୋଚିତ ନାମ	ବିଭାଗଜନିତ ନାମ	ଫାଇଲ	ପ୍ରାଚୀଯ				
13		<u>Passiflora</u> <u>foetida</u>	Passifloraceae					
14		<u>Aerva lanata</u>	Amarantaceae	ଆର୍ଵା-ଶ୍ରୀ ଆର୍ଵା ଶି- ଲିଷି ହୁର୍ମ ଜୁଲିମ ଶି- ଟା ଲୋର				
15	ଖାରାଳିପାତା	<u>Mikania</u> <u>seundens</u>	Asteraceae	ଏସ୍ଟର- ଶ୍ରୀଦି ଶି- ରଙ୍ଗଜାମି ପିଟିନ				
16	ଏନ ବଳାନ୍ତି	<u>Ipomoea</u> <u>aquatica</u>	Convolvulaceae	ବିଲୁପ୍ତି- ଶ୍ରୀନିଃଶ୍ଵର- ଶଳା ଶାରୀ ଫୁ				
17	ଧୂରମର୍ଦ୍ଦି	<u>Abutilon</u> <u>indicum</u>	Malvaceae	ଶୀଘ୍ର ଶ୍ରୀନିଃ ଶାରୀନାଥ				

ଅନ୍ତରିକ୍ଷମାଳା ଦ୍ୱାରା ପାଇ	ଫାର୍ମାଚୀଟିକ ନାମ	ଶାଖା	ଫୁଲାର୍ଥା
18. ଗାନ୍ଧାର ମହା	<i>Partenium hysterophorus</i>	Asteraceae	ମାଡ଼ା, ମାଝ ଗୁରୁତବିହାର ମାଳ
19.	<i>Lantana camara</i>	Verbenaceae	ଗୁରୁତବିହାର ମାଝ ପିଣ୍ଡା
20.	<i>Triumfetta phemboi-deu</i>	Tiliaceae	ବର୍ଣ୍ଣ ଗୋଟିଏ ଫୁଲ- ପିଣ୍ଡା
21. ମାଝାର ମହା	<i>Allophylus cobbe</i>	Sapindaceae	ଗୁରୁତବିହାର ପିଣ୍ଡା
22. ପୁଣ୍ଡା	<i>Ficus hispida</i>	Moraceae	ବିଜନାର ଫୁଲ ପିଣ୍ଡା
23. <i>Sagittaria sagittifolia</i>	<i>Sagittaria sagittifolia</i>	Alymataceae	ବିରାଜ ଫୁଲା
24. ଫୁଲକୁଣ୍ଡି	<i>Cuscuta reflexa</i>	Cuscutaceae	
25. ଉତ୍ତରୀଆ ପାତାକାଳୀ ଫିଲ୍ମା	<i>Trema orientalis</i>	Ulmaceae	ଫୁଲିଯିବୁଲା
26.	<i>Vitis pedata</i>	Vitaceae	ଗୁରୁତବିହାରିଣୀ- ଫୁଲା
27.	<i>Cassia alata</i>	Caesalpiniaceae	କୋଣକୁଣ୍ଡା ଫୁଲ- ଗୋଟିଏ ଫିଲ୍ମା
28. ଗୋଟିଏ	<i>Amnona reticulata</i>	Ammoniacae	ବାଟମୁଣ୍ଡା ଫୁଲ ଗୋଟିଏ ଫିଲ୍ମା
29.	<i>Synchetalia nodiflora</i>	Asteraceae	ଗୁରୁତବିହାର ଫେରା ଫିଲ୍ମା
30. ମାଲମାଟ୍ଟିମି	<i>Ruellia tuberosa</i>	Acanthaceae	ମାର୍ଗିନ ଫୁଲ- ଗୋଟିଏ ଫିଲ୍ମା
31. ପାତାକାଳୀ ମହା	<i>Butea monosperma</i>	Papilionaceae	ପାତାକାଳୀ ଫୁଲ- ଗୋଟିଏ ମାଳ
32. ରୋଡ଼ି	<i>Ricinus communis</i>	Euphorbiaceae	ଗୁରୁତବିହାର ମାଳ
33.	<i>Uraria lobata</i>	Malvaceae	ଗୁରୁତବିହାର ମାଳ

അന്തിക്ക അടിസ്ഥാന	മലബാറിലെ നാമ	ശാസ്ത്രീയ നാമ	ക്രമം	ഭൂഗർഭം
34	പുൽ മുള	<u>Achyranthes aspera</u>	Amaranthaceae	മുളാംഡി മുള അമരം ശിഖി
35	കാലുക	<u>Clerodendrum in- dicum</u>	Verbenaceae	കുർക്കിലേറി മുഖം കാലുക ശിഖി
36		<u>Hypolexis suaveolens</u>	Lamiaceae	മുഖം വാഴി ശിഖി
37		<u>Deshmodium gange- icum</u>	Papilionace- ae	മുഖം വാഴി ശിഖി
38		<u>Oxybaphus penta- phylla</u>	Rubiaceae	മുഖം മുള അമരം ശിഖി
39		<u>Sida cordifolia</u>	Malvaceae	മുഖം മുള മുഖം വാഴി ശിഖി
40		<u>Gesu Caesalpinia bonduc</u>	Caesalpini- aceae	മുഖം മുള മുഖം വാഴി ശിഖി
41		<u>Anisomeles indica</u>	Lamiaceae	മുഖം മുള അമരം ശിഖി
42	തിരുവാള	<u>Eulotropis gigantea</u>	Asclepiada- ceae	മുഖം മുള മുഖം വാഴി ശിഖി
43	എന്തോൾ	<u>Andrographis pan- iculata</u>	Acanthaceae	മുഖം വാഴി മാടാ
44	എഞ്ചാളി	<u>Cussia sophera</u>	Caesalpiniace- ae	മുഖം മുള മുഖം വാഴി ശിഖി
45		<u>Cleome viscosa</u>	Capparaceae	മുഖം മുള മുഖം വാഴി ശിഖി
46	എന്തോൾ	<u>Solanum Verbascifolium</u>	Solanaceae	മുഖം മുള മുഖം വാഴി ശിഖി
47	ഉമ്പിരം ശിഖി	<u>Sommereria alba</u>	Compositae	മുഖം മുള മുഖം വാഴി ശിഖി
48		<u>Acanthus illicifoli- us</u>	Acanthaceae	മുഖം മുള മുഖം വാഴി ശിഖി
49		<u>Smilax zeylanica</u>	Smilacaceae	മുഖം മുള മുഖം വാഴി ശിഖി
50		<u>Sida acuta</u>	Malvaceae	മുഖം മുള മുഖം വാഴി

ରୋଗୀ ଜୀବିତ ବ୍ୟାପକ
(Identification of Medicinal Plants)



1. Terminalia arjuna (Roxb. ex DC) Wight and Arn.

- ଶାସ୍ତ୍ରୀୟ ନାମ - ଅର୍ଜୁନ
- ଗୋପ - Combretaceae

ଭିତ୍ତିଦିନ ସଂଖ୍ୟା:

- ଫୁଲ : ପରିମଳୀ ହୁଏ
- ଶାଖା : କବିତା ଆମ୍ବା କାର୍ମିଳ, ବ୍ରିଜର ବର୍ଣ୍ଣ ପାତା ଡାକ୍ତାର୍ମ୍ବାର;
- ପାତା : ବିଷକ୍ରିତ ତିମିରାମାଧ୍ୱାନ, ଅବଳ, ପ୍ରମୁଖାବାନ, ଘର୍ଯ୍ୟ, ଗାଁ ଥିଲାମାନ;
- ଶୁଲ : ଶ୍ଵାସତ ଦ୍ୱାରା ବିଲାପ ହାତ୍ତିର, ଛୁଟ, ଉଚ୍ଚମିଳି, ପଞ୍ଚମ; ହାତ୍ତିର; ଶୁଲାର୍ମିଳି; ଶୁଲାର୍ମିଳି; ଦାଳାର୍ମିଳି; ଶୁଲାମାନ; ଶୁଲାକାଳ ର୍ତ୍ତି, ଶୁଲ ପାଦର ହାତ୍ତିର; ପଞ୍ଚମିଳି, ତିମିରାମାଧ୍ୱାନ, ଅବଳ, ପ୍ରମୁଖାବାନ, ଘର୍ଯ୍ୟ, ଗାଁ ଥିଲାମାନ;
- ଶଳ : ପାତାକାଳ ଶୁଲାର୍ମିଳି, ବୋଲାଶୁଲି ପଳାନ, 2-3 ମୀ ଲମ୍ବା;
- ବୈଜ୍ଞାନିକ : Arjuna, M3, Chemb;

ଭିତ୍ତିଦିନ ଚେଷ୍ଟା ବୈଶିଷ୍ଟ୍ୟ:

ଏତେ କୁଠ କାହାରେ

1. ବ୍ୟାକ

ଜେମର ଗୁର୍ବା / ଏତେ କାହାରେ

a) ବ୍ୟାକର ଲିର୍ମାର୍ଜି:

- ଉଚ୍ଚମିଳିରେ ଦୁଇରେବା ପ୍ରତିଶର୍ତ୍ତି;
- ଲିର୍ମାର୍ଜି-ଲିର୍ମାର୍ଜି ରୋଗ ପ୍ରତିଶର୍ତ୍ତି;
- ମଜୁନ୍ଦିର୍ମି ନିଯାମକ;
- ବଲମାର୍ଜି ଭିତିକ ପ୍ରିମାରେ ଏତେ କୁଠ;
- ବୋଲାଶୁଲିକାଳ ନିଯାମକ;
- ଶୁଲାର୍ମିଳି ନିଯାମକ;
- ଡାମାର୍ମିଳି ବୋଲାର ପ୍ରିମାର୍ଜି ନିଯାମକ;
- ଉଚ୍ଚମାର୍ମିଳି ବୋଲାର ପ୍ରିମାର୍ଜି ନିଯାମକ;

b) ବ୍ୟାକର ରୁକ୍ଷି:

- ଶୁଲାର୍ମିଳି ଗୁର୍ବା ବିର୍ଟିନ୍ ରେ ପ୍ରତିଶର୍ତ୍ତି।
- ଡିଲେ ପାତାର ରୁକ୍ଷ ବାଟେ ମନ୍ଦିରାମ ଉଚ୍ଚମାର୍ମିଳି।



2. *Centella asiatica* (L.) Urban

- ଗୋଟିଏ ଲାଭ - ଆଶ୍ରମ
 - ଗୋଟିଏ - Apiaceae (Umbelliferae)

ଶ୍ରୀ ପାତ୍ର ପଟ୍ଟନାଁ :

- **ଶ୍ରୀମଦ୍:** ଏକାଳୀମ୍, ବୀଜୁତ, ଲାପାନ;
 - **ଚନ୍ଦ:** ଅଧ୍ୟାତ୍ମିକ, ଅଥ ଯୋଗ ଉତ୍ସବରେ
 - **ଶର୍ମ:** ଅଟିବାସ୍ୟବୀମ୍, ବର୍ଣ୍ଣାତିଥି, ହର୍ଷ ଦେଖିଲାଲାଙ୍କ ନିର୍ଭେଟ, ହର୍ଷତ;
 - **ପାତା:** ପାତୁ ବୋର୍ଡିକ ବ୍ୟାଚଳ ମୁଖୀ, ପିଂଚ ପାତୁକୁମୁଖୀ, ବର୍ଣ୍ଣାତିଥି-ହର୍ଷମ, ଶୁଦ୍ଧାବାନ୍. ଏଥିରେ ମାତ୍ରାଲା ଦାଁତାଲେ, ବ୍ୟାଚଳ କ୍ରୂଲିକାବାବର ଲିଙ୍ଗାବିନିରାଜମ;
 - **ମୁଳ:** ବ୍ୟାବାନ ପୁରୁଷମାନଙ୍କ ବର୍ଣ୍ଣିତ, ହର୍ଷମ, ଉତ୍ସବିଧୀତ, ଅଂକୀମ୍, ଡୋଟ, ଶୁଦ୍ଧାବାନ ଉପିକ୍ଷିତ ରୀତି; ଦାଳାଳ ରୀତି, ମୃଜାଳାଳ; ପ୍ରାକୋଳକ ରୀତି; ଗାଉକଳକ ରୀତି, ମୁହୂ-କ୍ଷାର୍ତ୍ତବୀ, ତିଜ୍ଞାନୀୟ ମାତ୍ରାତ, ବିପ୍ରବୋଧିତ୍ୟଜୀ, ଗାଉଦୟ ରୀତି, ଶିଖିଲାଲେଖିତମାନମୁଖୀ, ଗାତ୍ରକୁଟ ରୀତି।
 - **ମଳ:** ପ୍ରାଚୀରାମାଣ୍ଡି

■ ପିଲ୍ଲାରେ ଡେମାନ୍ଡ ବିଲାସିତା :

ବଡ଼ମୁଢ଼ ଗୋଟିଏ

1. ପାତ୍ର ଓ ପାତା

ଚେମତ୍କୁରୁଣ / ଏକବର୍ଷାନ

a) 3 पाला॒ त्रिमास्क-॑

- ପୋଷାଳମ ଓ ଲେପ୍ରୋଟାନ୍‌ମୁଦ୍ରା ଡିଫ୍ଯୁମନ୍‌ମୋହାର୍ଗ ସ୍କୁଲ୍ ପ୍ରାଚିଲିଟିଆର୍
ଶୂଷ୍ମା ବର୍ଣ୍ଣନା;
 - ଲେପ୍ରୋଟାନ୍ (Leprosy) ବୋଧର ପ୍ରିମିଟ ହିନ୍ଦାରେ ଏତଙ୍କୁଠ ହୁଏ।
 - ଉଚ୍ଚକାରୀ ବିଳେମ ଏବଂ ପ୍ରାଣଜିନୀ, କେନ୍ଦ୍ରିତାନ୍ତିର, ଭୁମାନ (Mu-
pus) ଉତ୍ତରାନ୍ତିର ବୋଧର ଉପକାରୀତାକୁ
 - ବଳକାରକ ଟିନିକ ହିନ୍ଦାରେ ଏତଙ୍କୁଠ;
 - ଶ୍ଵାସ୍ୱରିତିକ ହିନ୍ଦାରେ ଏତଙ୍କୁଠ; ଅଳାଡ଼ ଶ୍ଵାସ, ଶ୍ଵାସିତିର ଶ୍ଵାସ
ପାରାପାରୀ ଉପର୍ଯ୍ୟନ୍ତ ଏତଙ୍କୁଠ ହୁଏ;
 - ଉପିନ୍ଦାରୀତ ପ୍ରାଣ ଗୋଟୁକୋଳା (Goutuk Kolâ) ଶ୍ଵାସ, ଭୁଲ୍, ପ୍ରାଣିକ
ଶ୍ଵାସରେ ଶ୍ଵାସିତ ହୁଏକିମର ଶୂଷ୍ମା ବର୍ଣ୍ଣନା ଏତଙ୍କୁଠ ହୁଏ;

2. ମାତ୍ରା

ମୁଦ୍ରଣ ବ୍ୟାକ ଏଲବାସିକା।



3. Saraca asacea (Roxb.) Willd.

- ଶାସ୍ତ୍ରୀୟ ନାମ: କାଳେକ
- ପାଦ: Leguminosae, Sub-family Caesalpinioideae

ଫୁଲର ବିଚାର:

- ଫୁଲାବ: ବୁଦ୍ଧାଗିରି ଉପରେ ଦେଖାଯାଇଥାଏ;
- ପାତା: କାଳେକ, କାଳେକ ବ୍ୟାକାମ୍ଭୀଆ;
- ପାତା: ପ୍ରକାଳି, ଅନୁକାଳ, କ୍ଷେତ୍ର ପାତା କୋଣାର୍କ, ଉଚ୍ଚତା 8.25 ମୀଟିମ୍ ପରେ ଉଚ୍ଚତା, ବିନା ଲକ୍ଷ୍ୟ, ଅନ୍ଧାରା;
- ଫୁଲ: ଲିଙ୍ଗତ ପୃଷ୍ଠାବିନ୍ଦୀରେ ନାହିଁ, ନକ୍ରିତ ଉପରେକୁ ଉଚ୍ଚତାରେ, କାଳେକ, କାଳେକ ବିଚାର; କ୍ଷେତ୍ରକାଳ ଦ୍ୱାରା; ପାତାର ଦ୍ୱାରା; ପୂର୍ବକ୍ଷେତ୍ର ୩-୪ ଟି, ଫୁଲର ସାର୍କର ଲେବିଟି ପାଇଁ, ପାତକାଳି - ୧ ଟି, କାଳେକ, ରାଜପ୍ରଦେଶୀଆ, ପ୍ରାଚୀଆ ଓ କାଳେକାମ୍ଭୀଆ;
- ଫୁଲ: କିମ୍ବା;
- ପାତା: ୫-ଟାଇଲିଫୋର୍ମ୍;

ଫୁଲର ପେନ୍ଡାଗ୍ରୂପ:

ଏକମୂଳ ଫୋଲ୍

1. ପାତା:

ପେନ୍ଡାଗ୍ରୂପ / ଏକମୂଳ

ଏକମୂଳ ଫୋଲ୍

- ଉଚ୍ଚତା ମୋଟାରେ ପ୍ରମାଣିତ ହେବାକୁ ଏକମୂଳ ଫୋଲ୍।
- ପ୍ରମାଦରେ ଲାବିଧାର ଏକମୂଳ,
- ଉଚ୍ଚ ପାତାରେ

2. ଫୁଲ:

ଫୁଲର ପେନ୍ଡାଗ୍ରୂପ

- କାଳେକ ପାତାରେ
- କିମ୍ବା କୋଣାର୍କ

3. ପାତା:

ପାତାରେ ପେନ୍ଡାଗ୍ରୂପ ପ୍ରମାଦରେ



4. *Justicia adhatoda* L. syn.

Adhatoda vasica Nees

- ଶାସ୍ତ୍ରୀୟ ନାମ - ଅଧତୋ
- ଗୋଚର - Acanthaceae

■ ପିଣ୍ଡିକଣା :

- ଶିଖାଶ : ଏହାରେ ବିଳମ୍ବ ଗ୍ରାଫିକ୍ ଫୁଲ;
- ଶାଖା : ଆଶାନକୁଣ୍ଡ, ଶିଖାଶ, ସଂକ୍ଷିପ୍ତ, ଲକ୍ଷ୍ମୀଶ;
- ପାତା : ଅଛିକୁଣ୍ଡ ଲିମ୍ବାନାଥର୍, ଅନୁଭାବିକ, ଲକ୍ଷ୍ମୀଶ, ପ୍ରକଳ୍ପ, କ୍ଲାନ୍ଦାର୍, ବିଳମ୍ବ-କ୍ଲାନ୍ଦାର୍, ଲୁଣମ୍ବାର୍;
- ଝୁଲା : ଅଛିକୁଣ୍ଡ କ୍ଲାନ୍ଦାର୍ ଫଲକୁଣ୍ଡ; ଏବଂ ଏହାରେ ଲକ୍ଷ୍ମୀଶ ମୁଦ୍ରା, ଲାଞ୍ଚମ୍ ଅନନ୍ତମ୍, ଉତ୍ସମିକ୍ଷା, ଗାଢ଼ିବାନ୍, ଲାଦା; ଶୁତ୍ରାଂଶ୍ 5ଟି, ମୁଦ୍ରାକୁଣ୍ଡ; ଦଳାଂଶ୍ 5ଟି, ମୁଦ୍ରାକୁଣ୍ଡ, ଉତ୍ସମିକ୍ଷାକୁଣ୍ଡ; ପ୍ରାକ୍ରିମାନ୍ ଏବଂ ଲାଲମ୍ବାର୍; ଗାଢ଼ିବାନ୍ 2 ମୁଦ୍ରାକୁଣ୍ଡ ଏବଂ, ଡିଙ୍ଗାମ୍ବାର୍, କିନ୍ତୁ ମୁଦ୍ରାକୁଣ୍ଡ;

■ ଫିଲ୍‌ଫିଲ୍‌ଫିଲ୍ ହେମଜୁଗୁନ :

— ଏକମୁଠ ଫଳାଳ —

1. ପାତା

2. ଶାଖା

3. ଲକ୍ଷ୍ମୀଶ

4. ଝୁଲା

ଫେମିନ୍‌ଗ୍ରେନ୍ | ଏକମୁଠ

- ପାତାରେ ନିର୍ମାଣ କରିଲାଇଲା ନାହିଁ ଫେମିନ୍‌ଗ୍ରେନ୍ ହେଲାଯାଇଲାମ୍ ବ୍ୟାକ୍-
- ପ୍ରାକ୍ରିମାନ୍ କ୍ଲାନ୍ଦାର୍ ଏକମୁଠ ହର୍ବର୍;
 - ଲାଦା କାଳିକ ପ୍ରାକ୍ରିମାନ୍ ଉତ୍ସମିକ୍ଷା ଓ ମଧ୍ୟ କ୍ଲାନ୍ଦାର୍ ଭାବରେ;
 - ପ୍ରାକ୍ରିମାନ୍ କ୍ଲାନ୍ଦାର୍ ଏକମୁଠ ହର୍ବର୍;
 - ଲକ୍ଷ୍ମୀଶ କ୍ଲାନ୍ଦାର୍ ଏକମୁଠ ହର୍ବର୍;
 - ଶାଖାରେ ନିର୍ମାଣ କରିଲାଇଲା କାଳିକ ଓ ମଧ୍ୟ କ୍ଲାନ୍ଦାର୍ ନିର୍ମାଣ ହର୍ବର୍;
 - ଝୁଲାରେ ନିର୍ମାଣ କରିଲାଇଲା କାଳିକ ଓ ମଧ୍ୟ କ୍ଲାନ୍ଦାର୍ ନିର୍ମାଣ ହର୍ବର୍;

5. Andrographis paniculata (Brum.f.) Nees

- ଭୌଦ୍ଧିକ ନାମ — ଗାନ୍ଧାରୀ
- ଗୋଡ଼ — Acanthaceae

ପ୍ରିତ୍ୟକର ସଂଖ୍ୟା :

- ଲେଖାବ୍ଦ : କାର୍ତ୍ତିକୀ ମିଥୁଃ
- ଶାସ୍ତ୍ରୀୟ : ଭାରତୀୟ, ଆମାରାମା ମୁଣ୍ଡା;
- ପାଳା : ଗ୍ରୀ ମୁଣ୍ଡା, ମୁଣ୍ଡା, ଡିହିନ୍ଦା, କଲୁଗାମା;
- ମୁଣ୍ଡା : ପାଳାକୁଟାଳି ଜୀବିନ୍, ଚିତ୍ତର ଗୋଡ଼ି;
- ମାଳ : ଲାହାରୀ ଏତାମୁଣ୍ଡା;
- ଶୀଘ୍ର : ରୁଦ୍ରାଧର, ରୁଦ୍ରାଧର ମାଳି;

ପ୍ରିତ୍ୟକର ଜ୍ୟୋତି ଗୁର୍ବି :

ପ୍ରିତ୍ୟକର ଅଧିକାରୀ

1. ମାନ୍ଦା-ପିତ୍ତୁ

ଜ୍ୟୋତି ଗୁର୍ବି / ପାତାରୁ

ମାନ୍ଦା-ପିତ୍ତୁକୁ କିମ୍ବା —

- a) ପଦ୍ମତର୍ପିଣିତ ଉଦ୍‌ଦେଶ୍ୟରେ, କ୍ଷୁଭାରୋ 3 ବ୍ୟୁଜିତ ରୋଗ ଗିରାଇନ୍ଦ୍ରିୟ ବିକରି;
 - b) କିମ୍ବା ମାନ୍ଦାକୁ ବ୍ୟାଧି ପିଳାନ୍ତିର ବିକରି;
 - c) ରତ୍ନବିଳୁପ୍ତିକର୍ତ୍ତା 3 ବ୍ୟୁଜିତ ଗିରାଇନ୍ଦ୍ରିୟ ବିକରି;
- ମାନ୍ଦାକୁ ଏବଂ ପିତ୍ତୁକୁ ନାହିଁ ନକରୁଥାଏ ।

2. ପାଣ ଓ ନବନ ଶାସ୍ତ୍ରୀୟ :

6. Aloe vera (L.) Burm.f. syn. Aloe barbadensis Mill.

- ପଦ୍ମଫଲିକ ନାମ: ମୁଳସୁରୁଣୀ
- ଗୋଚର: Xanthorrhoeaceae

ଛିଟିଲେଖ ସଂରକ୍ଷଣ:

- ପ୍ରତିଶୀଳ: ବୃକ୍ଷ-ବାସ୍ତିବୀ, ବାଢ଼ା, ଗୁରୁତ୍ବ
- ଶାକ: ହେଠି;
- ପାତା: ଲୁହାରୁ, କୁରୁକୁ କାଣାଳା, ଚାର୍ଚା, ବିଳାରା ହାତାଳୀ;
- ମୂଳ: ଲୁହାରୁ, ମୁହାରୁ ଲାଳ, ଡିମ୍ବଲିଙ୍କୁ-ଗାହା, ପୁଷ୍ପଚାନ୍ଦି-ଟି, ପୁରୀ ଜମତ ଗୁଡ଼;
- ପୁରୀ କେନ୍ଦ୍ର-୬ ହୁଣ୍ଡୁ; ପାତକେନ୍ଦ୍ର-୩, ମୁହାରୁଟିଲୀ।

ଛିଟିଲେଖ ଜେଷ୍ଠ ବୈଜ୍ଞାନିକ:

ଏକଥିଲୁ କାହାର

1. ପାତା

ଜେଷ୍ଠ ଗୁରୁ / ଏକଥିଲୁ

ପାତର ଗିରିରା

- ବୋମିକାପିକ୍ରିଯା, ମୋଟ ପରିଧାକା ବୁଝିତା ନାହିଁ ପାଇଁ ବୁଝିବା ଦେବ୍ୟାତ୍ମକ ହୁଏ ।
- ବାତ ଓ ବାରାନ୍ଦିଲି ଅଣିତ କୋଟ ଗିରିରାମ ଏହି, ଛାଇଲା ନ ଶୁଣି କୋଟିକା; ଜେମାରେଇ ବୋମିକାପିକ୍ରିଯା କାହାର ଜିନିମିଲେଇ-
- ପକୁତ ଓ ଲୀଲା କୁଣିତ କୋଟ ଗିରିରାମ ଏହି;
- ତାରୀ ମିଳିଦିଲେଇ ଚାରେତ କୋଟ କୋଟ ଖାଲିଦିଲ ଦେଇ;
- ଉତ୍ତିନ, ଗିରିରାମ ଏହି ଓ ପୁଷ୍ପଚାନ୍ଦି;
- ପାତର ଗୁଡ଼ୀ ସାମିକ୍ଷକ ଅନୁଷ୍ଠାନିକ ବା ମନ୍ଦିର, କୁଳ-
ଶାନ୍ତି ଉତ୍ସାହ ପ୍ରଦାନ ଏହି;



7. *Hygrophila cicutaria* (Sehumaek.) Heine

- ପ୍ରାଚୀନ ନାମ - ଶୁଦ୍ଧିକାରୀ
- ଗୋଚ - Acanthaceae

ଛିପିଦଳ ସଂରକ୍ଷଣ :

- ଫୁଲ : ବ୍ୟାକରଣିକ ଫୁଲ;
- ପାତା : ଚାରଚାନୀ, ଲାବକାର୍ଯ୍ୟାଙ୍କ, ପକ୍ଷିଶିଖ, ଲାଲ ଏହି;
- ପଦ୍ମ : ଉପରିବିନିଯାମ ଫୁଲିର, ଜାନ୍ମପରୀକ ଫୁଲିର, ପ୍ରକଳ୍ପ, ପାଲକ-କ୍ଲାନ୍ଡା, ବିଲାମ୍ବ
ଫୁଲ, କାମାର୍ଦ୍ଦୀ, ପ୍ରଥମ ଅନ୍ଧା;
- ଫୁଲ : ବାଲିକ, ନିମିତ୍ତ ପୁଷ୍ଟିକାମ ଫୁଲ, ବାଲିକ ପୁଷ୍ଟିକାମ ଫୁଲ, ନିଷ୍ଠାର, ପାଲକ-
କ୍ଲାନ୍ଦା, ପାଲକ ପ୍ରେରୀ ଏହି; ଫୁଲକାଳ 5 ଟି, ମୁଖ୍ୟାଙ୍କ 5 ଟି, ମୁଖ୍ୟଦଳ 5 ଟି, ପରିପରାପର
ପାଲକ ପ୍ରେରୀ ଏହି; ପ୍ରାକ୍ରିଯାନ୍ତି 4 ଟି ଫୁଲକାଳ, ନିଷ୍ଠାର; ପାଲକ-କ୍ଲାନ୍ଦା-
କାମାର୍ଦ୍ଦୀ, ପାଲକ-କ୍ଲାନ୍ଦା-ଫୁଲ, ପାଲକ-କ୍ଲାନ୍ଦା-ଫୁଲ, ପାଲକ-କ୍ଲାନ୍ଦା-
କାମାର୍ଦ୍ଦୀ, ପାଲକ-କ୍ଲାନ୍ଦା-ଫୁଲ, ପାଲକ-କ୍ଲାନ୍ଦା-ଫୁଲ, ପାଲକ-କ୍ଲାନ୍ଦା-ଫୁଲ, ପାଲକ-କ୍ଲାନ୍ଦା-
କାମାର୍ଦ୍ଦୀ;
- ଫୁଲ : କିଞ୍ଚାରୁତ ଫୁଲକ;
- ପାତା : ଉପରିବିନିଯାମ;

ଛିପିଦଳ ଲେଖାଗ୍ରହଣ :

ସଂରକ୍ଷଣ ପାଇଁ

1. ଲୁହା

ଲେଖାଗ୍ରହଣ / ସଂରକ୍ଷଣ

ଲୁହା ନିର୍ମାଣ :

- ପର୍ଯ୍ୟାନ୍ତ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ;
- ଲାବକାର୍ଯ୍ୟାଙ୍କ ବୋଲ ସଂରକ୍ଷଣ;
- ପର୍ଯ୍ୟାନ୍ତ ବୋଲ;
- ଲାବକାର୍ଯ୍ୟାଙ୍କ ବୋଲ;

ଲାଲ ନିର୍ମାଣ :

- ବିଲାମ୍ବ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ;
- ପାଲକ-କାମାର୍ଦ୍ଦୀ ବୋଲ ସଂରକ୍ଷଣ ଏହି;
- ପର୍ଯ୍ୟାନ୍ତ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ;
- ଲାବକାର୍ଯ୍ୟାଙ୍କ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ;
- ମୁଖ୍ୟାଙ୍କ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ;

ବାନ୍ଦୁ ନିର୍ମାଣ :

- କିଞ୍ଚାରୁତ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ;
- ବାନ୍ଦୁକାମ ସଂରକ୍ଷଣ ଏହି;

ବାନ୍ଦୁ-କାମ ଗଲେବିଦ୍ରୀ ବୋଲ ପାଲକ-କାମାର୍ଦ୍ଦୀ।

3. ପାତା

4. ପାତା



8. *Rauvolfia serpentina* (L.) Benth. ex Kurz

- ଓର୍କିଲିକ ଫଳ - ମହାନ୍ତିକ
 - ଗୋଡ଼ - Apocynaceae

ପ୍ରାଚୀନ କଲଳ :

- श्रीमायः वद्युत्यस्तर्गीयी वापिस्ति गृह्णामः;
 - भूमः प्रसिद्ध भूमः, विविधाकारः;
 - गान्धीः बैलगामः, लग्नामः, आद्या-प्रजातामामृताम्, नामा;
 - गाराः आद्या वृक्षविलासम्, भृष्टुं वापायुक्त, विविधायुक्त, गाहामा, शुक्राम-5, शुक्राम-5; द्विविध
5, शुक्राम-5, शुक्राम-5 वृक्षविलासम्, नामा; शुक्राम-5, वृक्षविलासम् नामे शुक्राम; शुक्राम-
अन्त-2, शुक्र-गर्वयी, जिज्ञास्य शुक्रं शुक्राम; अर्द्धांशु, शुक्री डायेट्रियोट्रियो;
 - भूतः शृंगी, शुक्रांशु भूता शुक्रांशु-तिभूता शुक्रांशु;
 - शीतूः शृंगी, गोलाबामः;

■ ପିଲ୍ଲାରୀ ଜେମ୍‌କ୍ଲାଫ୍ :

ବିଜ୍ଞାନ ପରୀକ୍ଷା

1. କାନ୍ତି

ମେଲାଗୁଡ଼ / ଏକବର୍ଷାନ୍ତ

କ୍ରୂମିନ ନିର୍ମାଣ ରେସେପ୍ଶନ (Reserpine) ଓ ଅଗ୍ରାଗ ଫ୍ରାନ୍କାରୀ ଏବଂ
ଆହୁ, ତେଣୁ କ୍ରୂମିନ ନିର୍ମାଣ ରେସେପ୍ଶନ ଉପରେ ବାଧୀ -

- ବ୍ୟାକାର ବାଜାରେ ମୁଖ୍ୟମୁକ୍ତ ଏକାକ୍ଷୁଟର;
 - ଲିପ୍‌ଆର୍ଡିନଟା ନାହିଁ ଏହିର;
 - ଜୀବିତକା ମୋହ ଉପର୍ଯ୍ୟାନବଳୀ;
 - ସିମ୍ବାଙ୍ଗ ରୀତିଅଧ୍ୟେତ୍ର ବାଜାର ଥିବାକେ ନାହିଁ ଏହିର।

2. પાણી



9. *Baeopa monnierii*(L.) Wetst. syn. *Henpesdis monnieria*(L.) Rothm.

- ଅନ୍ତର୍ଦ୍ଵୟାଳୀକ ଫ୍ଲାମ୍ — ପ୍ଲାଂଟାଜିନେ
 - ଫ୍ଲାମ୍ — Plantaginaceae

■ ପିନ୍ଧିଅଳ୍ପ ସତରା :

- शायावः: एम्बलीवी, विसूट, ग्रेजली;
 - नूनः: अस्फुलिका, एवं उष्ट्रिते चिकित्सा;
 - वारुः: गोलायादि वर्ष्णनः;
 - लालः: लवचन्त्रव, लत्रल, भास्त्रभास्त्र, विलाप्ता-लत्रां, लक्ष्मीग्री;
 - खूनः: एक्टिक्युलर; लक्ष्मी, लोक्युल, लक्ष्मी; युज्याल-5, युज्याल-3; लक्ष्मील-5, युज्याल-
लैंगिका लोक्युल, विषुद्ध लोक्युल; युज्याल-4, लक्ष्मी, लक्ष्मी; युज्याल-2, युज्याल-
लौंगी, जिम्माल-लौंगी, युज्याल-लौंगी;
 - अलः: एक्टिक्युल।

ପିଲ୍ଲାର ଜେମ୍‌ଟୁଗ୍ରାନ୍:

ପ୍ରକାଶକ ଗୋଟିଏ

1. କର୍ମଚାରୀ ପରିବହନ

- କେମିଟ୍ୟୁଗ୍ରଣ / ଏତବଧାର

ନାନ୍ଦନ୍ତୁ ଚିତ୍ରିତ କମାର୍ପ / ବାତାର କମାର୍ପ ୨

- ଶୁଣିଲ୍କେର ହବଳତା ପ୍ରଧାନମର୍ଯ୍ୟାନିକ ବିଜ୍ଞାନ ଏକାଡ୍ୟୁଟ୍,
 - ପ୍ରାଚୀୟ ଓ ଜୀବିତକାରୀ ବୋଲ୍ ପ୍ରକଳ୍ପମଧ୍ୟରେ,
 - ହରତିଳିଙ୍ଗ ସର୍ବକ୍ଷଳିତ।

2. ~~अन्तः~~:

- ପ୍ରମୁଖ ପ୍ରତିଷ୍ଠାନ,
 - ଅନେକ ପରିବାର,
 - ଶ୍ରୀମଦ୍ଭଗବତ,
 - ବ୍ୟାଜାର୍ଥୀ ଲୋକ.

B.A. / B.Sc. / B.Com AECC: Environmental Studies

Sl. No.	Content	Page No.
1.	Syllabus Extract indicating project work	2 – 4
2.	List of students along with the details of title, place of work, duration etc. for the latest academic year (2022-23)	5 - 22
3.	Sample report of the Project work 1	23 - 30
4.	Sample report of the Project work 2	31 – 39
5.	Sample report of the Project work 1	40 - 47



UNIVERSITY OF CALCUTTA

Notification No. CSR/ 12 /18

It is notified for information of all concerned that the Syndicate in its meeting held on 28.05.2018 (vide Item No.14) approved the Syllabi of different subjects in Undergraduate Honours / General / Major courses of studies (CBCS) under this University, as laid down in the accompanying pamphlet:

List of the subjects

<u>Sl. No.</u>	<u>Subject</u>	<u>Sl. No.</u>	<u>Subject</u>
1	Anthropology (Honours / General)	29	Mathematics (Honours / General)
2	Arabic (Honours / General)	30	Microbiology (Honours / General)
3	Persian (Honours / General)	31	Mol. Biology (General)
4	Bengali (Honours / General /LCC2 /AECCI)	32	Philosophy (Honours / General)
5	Bio-Chemistry (Honours / General)	33	Physical Education (General)
6	Botany (Honours / General)	34	Physics (Honours / General)
7	Chemistry (Honours / General)	35	Physiology (Honours / General)
8	Computer Science (Honours / General)	36	Political Science (Honours / General)
9	Defence Studies (General)	37	Psychology (Honours / General)
10	Economics (Honours / General)	38	Sanskrit (Honours / General)
11	Education (Honours / General)	39	Social Science (General)
12	Electronics (Honours / General)	40	Sociology (Honours / General)
13	English ((Honours / General/ LCCI/ LCC2/AECCI))	41	Statistics (Honours / General)
14	Environmental Science (Honours / General)	42	Urdu (Honours / General /LCC2 /AECCI)
15	Environmental Studies (AECC2)	43	Women Studies (General)
16	Film Studies (General)	44	Zoology (Honours / General)
17	Food Nutrition (Honours / General)	45	Industrial Fish and Fisheries – IFFV (Major)
18	French (General)	46	Sericulture – SRTV (Major)
19	Geography (Honours / General)	47	Computer Applications – CMAV (Major)
20	Geology (Honours / General)	48	Tourism and Travel Management – TTMV (Major)
21	Hindi (Honours / General /LCC2 /AECCI)	49	Advertising Sales Promotion and Sales Management –ASPV (Major)
22	History (Honours / General)	50	Communicative English –CMEV (Major)
23	Islamic History Culture (Honours / General)	51	Clinical Nutrition and Dietetics CNDV (Major)
24	Home Science Extension Education (General)	52	Bachelor of Business Administration (BBA) (Honours)
25	House Hold Art (General)	53	Bachelor of Fashion and Apparel Design – (B.F.A.D.) (Honours)
26	Human Development (Honours / General)	54	Bachelor of Fine Art (B.F.A.) (Honours)
27	Human Rights (General)	55	B. Music (Honours / General) and Music (General)
28	Journalism and Mass Communication (Honours / General)		

The above shall be effective from the academic session 2018-2019.

University of Calcutta

Under Graduate Curriculum under Choice Based Credit System (CBCS)

Syllabus for Ability Enhancement Compulsory Course-2 (AECC-2) in
Environmental Studies

Semester-2

Total Marks-100(Credit -2)

(50 Theory-MCQ type + **30 Project** + 10 Internal Assessment + 10 Attendance)

[Marks obtained in this course will be taken to calculate SGPA & CGPA]

Theory

Unit 1	Introduction to environmental studies	2 lectures
	<ul style="list-style-type: none">• Multidisciplinary nature of environmental studies;• Scope and importance; Concept of sustainability and sustainable development.	
Unit 2	Ecology and Ecosystems	6 lectures
	<ul style="list-style-type: none">• Concept of ecology and ecosystem, Structure and function of ecosystem; Energy flow in an ecosystem; food chains, food webs; Basic concept of population and community ecology; ecological succession.• Characteristic features of the following:<ol style="list-style-type: none">a) Forest ecosystemb) Grassland ecosystemc) Desert ecosystemd) Aquatic ecosystems (ponds, streams, lakes, wetlands, rivers, oceans, estuaries)	
Unit 3	Natural Resources	8 lectures
	<ul style="list-style-type: none">• Concept of Renewable and Non-renewable resources• Land resources and landuse change; Land degradation, soil erosion and desertification.• Deforestation: Causes, consequences and remedial measures• Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).• Energy resources: Environmental impacts of energy generation, use of alternative and nonconventional energy sources, growing energy needs.	
Unit 4	Biodiversity and Conservation	8 lectures
	<ul style="list-style-type: none">• Levels of biological diversity: genetic, species and ecosystem diversity;• Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots• India as a mega-biodiversity nation; Endangered and endemic species of India• Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions;• Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.• Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.	
Unit 5	Environmental Pollution	8 lectures
	<ul style="list-style-type: none">• Environmental pollution: concepts and types,• Air, water, soil, noise and marine pollution- causes, effects and controls• Concept of hazards waste and human health risks• Solid waste management: Control measures of Municipal, biomedical and e-waste.	

Unit 6 Environmental Policies and Practices	7 lectures
<ul style="list-style-type: none"> • Climate change, global warming, ozone layer depletion, acid rain and their impacts on human communities and agriculture • Environment Laws: Wildlife Protection Act; Forest Conservation Act. Water (Prevention and control of Pollution) Act; Air (Prevention & Control of Pollution) Act; Environment Protection Act; Biodiversity Act. • International agreements: Montreal Protocol, Kyoto protocol and climate negotiations; Convention on Biological Diversity (CBD). • Protected area network, tribal populations and rights, and human wildlife conflicts in Indian context. 	
Unit 7 Human Communities and the Environment	6 lectures
<ul style="list-style-type: none"> • Human population growth: Impacts on environment, human health and welfare. • Case studies on Resettlement and rehabilitation. • Environmental Disaster: Natural Disasters-floods, earthquake, cyclones, tsunami and landslides; Manmade Disaster- Bhopal and Chernobyl. • Environmental movements: Bishnois, Chipko, Silent valley, Big dam movements. • Environmental ethics: Role of gender and cultures in environmental conservation. • Environmental education and public awareness 	
Project/ Field work	Equal to 5 lectures
<ul style="list-style-type: none"> • Visit to an area to document environmental assets: Natural resources/flora/fauna, etc. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, fish, birds, mammals and basic principles of identification. • Study of ecosystems-pond, river, wetland, forest, estuary and agro ecosystem. 	
Total	50 Lectures

Suggested Reading:

- Asthana, D. K. (2006). *Text Book of Environmental Studies*. S. Chand Publishing.
- Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
- Basu, R. N., (Ed.) (2000). *Environment*. University of Calcutta, Kolkata
- Bharucha, E. (2013). *Textbook of Environmental Studies for Undergraduate Courses*. Universities Press.
- De, A.K., (2006). *Environmental Chemistry*, 6th Edition, New Age International, New Delhi.
- Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). *Environment Reader for Universities*, Centre for Science and Environment, New Delhi.
- Masters, G. M., & Ela, W. P. (1991). *Introduction to environmental engineering and science*. Englewood Cliffs, NJ: Prentice Hall.
- Odum, E. P., Odum, H. T., & Andrews, J. (1971). *Fundamentals of ecology*. Philadelphia: Saunders.
- Sharma, P. D., & Sharma, P. D. (2005). *Ecology and environment*. Rastogi Publications.

BUDGE BUDGE COLLEGE
Academic Session: 2022-2023

List of students undertaking field / project work follows:

B.A. / B.Sc. / B.Com. Honours and General Semester-II, 2023
Environmental Studies (ENVS) - AECC - 2 Project, CBCS system
Topic: Pond Ecosystem
Supervisor: Dr. Uttariya Roy

Serial Number	Roll Number	Registration Number	Name	Stream
1	221561-11-0022	561-1211-0426-22	Almida Khatun	B.Com (Honours)
2	221561-11-0015	561-1211-0400-22	Atashi Bag	B.Com (Honours)
3	221561-11-0013	561-1211-0395-22	Brishti Mondal	B.Com (Honours)
4	221561-11-0011	561-1211-0384-22	Diya Das	B.Com (Honours)
5	221561-11-0007	561-1211-0370-22	Isika Das	B.Com (Honours)
6	221561-11-0036	561-1215-0379-22	Jasminea Khatun	B.Com (Honours)
7	221561-11-0004	561-1211-0355-22	Jyoti Shaw	B.Com (Honours)
8	221561-11-0009	561-1211-0381-22	Madhumita Das	B.Com (Honours)
9	221561-11-0035	561-1215-0371-22	Nayna Khatun	B.Com (Honours)
10	221561-11-0028	561-1212-0385-22	Payel Das	B.Com (Honours)
11	221561-11-0037	561-1241-0433-22	Piyali Ghanta	B.Com (Honours)
12	221561-11-0002	561-1211-0348-22	Puja Mondal	B.Com (Honours)
13	221561-11-0030	561-1212-0404-22	Rajashree Hazra	B.Com (Honours)
14	221561-11-0006	561-1211-0367-22	Reshma Khatun	B.Com (Honours)
15	221561-11-0027	561-1211-0438-22	Ria Bej	B.Com (Honours)
16	221561-11-0024	561-1211-0435-22	Ritashree Naskar	B.Com (Honours)
17	221561-11-0034	561-1215-0365-22	Salina Khatun	B.Com (Honours)
18	221561-11-0010	561-1211-0383-22	Salini Kumari Jaiswal	B.Com (Honours)
19	221561-11-0003	561-1211-0350-22	Sangita Nath	B.Com (Honours)
20	221561-11-0021	561-1211-0423-22	Sangita Paul	B.Com (Honours)
21	221561-11-0023	561-1211-0429-22	Sathi Mukherjee	B.Com (Honours)
22	221561-11-0005	561-1211-0364-22	Shreya Nath	B.Com (Honours)
23	221561-11-0001	561-1211-0334-22	Shrimanti Bose	B.Com (Honours)
24	221561-11-0017	561-1211-0411-22	Snigdha Ghosh	B.Com (Honours)
25	221561-11-0008	561-1211-0377-22	Snigdha Payra	B.Com (Honours)
26	221561-11-0014	561-1211-0399-22	Sohana Parvin	B.Com (Honours)
27	221561-11-0016	561-1211-0408-22	Soumili Das	B.Com (Honours)
28	221561-11-0025	561-1211-0436-22	Sreema Dutta	B.Com (Honours)
29	221561-11-0019	561-1211-0416-22	Sreha Mondal	B.Com (Honours)
30	221561-11-0033	561-1215-0337-22	Subana Khatun	B.Com (Honours)
31	221561-11-0029	561-1212-0401-22	Sumona Mondal	B.Com (Honours)
32	221561-11-0026	561-1211-0437-22	Susmita Baitha	B.Com (Honours)
33	221561-11-0020	561-1211-0421-22	Susmita Mukherjee	B.Com (Honours)
34	221561-11-0031	561-1212-0410-22	Swarnali Mondal	B.Com (Honours)
35	221561-11-0032	561-1212-0420-22	Swyankita Mondal	B.Com (Honours)
36	221561-21-0032	561-1111-0402-22	Amal Nath	B.Com (Honours)
37	221561-21-0006	561-1111-0346-22	Amit Kumar Dutta	B.Com (Honours)
38	221561-21-0047	561-1111-0430-22	Anish Porey	B.Com (Honours)
39	221561-21-0062	561-1112-0393-22	Ankan Naskar	B.Com (Honours)
40	221561-21-0015	561-1111-0361-22	Ankan Shee	B.Com (Honours)
41	221561-21-0044	561-1111-0425-22	Ankit Bag	B.Com (Honours)

Serial Number	Roll Number	Registration Number	Name	Stream
42	221561-21-0002	561-1111-0339-22	Ansh Chetri	B.Com (Honours)
43	221561-21-0021	561-1111-0375-22	Arghadeep Saha	B.Com (Honours)
44	221561-21-0012	561-1111-0358-22	Arijit Adhikary	B.Com (Honours)
45	221561-21-0034	561-1111-0405-22	Ariyan Rahaman Mufti	B.Com (Honours)
46	221561-21-0036	561-1111-0409-22	Arpan Adhikary	B.Com (Honours)
47	221561-21-0064	561-1114-0335-22	Ayan Ghosh	B.Com (Honours)
48	221561-21-0053	561-1112-0340-22	Banshidhar Sarder	B.Com (Honours)
49	221561-21-0019	561-1111-0373-22	Bibek Shaw	B.Com (Honours)
50	221561-21-0040	561-1111-0417-22	Debrup Nayak	B.Com (Honours)
51	221561-21-0057	561-1112-0357-22	Dhrubajyoti Mondal	B.Com (Honours)
52	221561-21-0043	561-1111-0422-22	Heet Chakraborty	B.Com (Honours)
53	221561-21-0056	561-1112-0356-22	Indrajit Naskar	B.Com (Honours)
54	221561-21-0067	561-1114-0407-22	Koushik Ghosh	B.Com (Honours)
55	221561-21-0005	561-1111-0345-22	Kushal Khan	B.Com (Honours)
56	221561-21-0038	561-1111-0413-22	Md Maruyar Hossain	B.Com (Honours)
57	221561-21-0059	561-1112-0369-22	Nilotpal Chowdhury	B.Com (Honours)
58	221561-21-0061	561-1112-0389-22	Partha Kumar Mondal	B.Com (Honours)
59	221561-21-0004	561-1111-0342-22	Pitam Maity	B.Com (Honours)
60	221561-21-0055	561-1112-0344-22	Prasad Mondal	B.Com (Honours)
61	221561-21-0027	561-1111-0390-22	Pratim Bhowmick	B.Com (Honours)
62	221561-21-0037	561-1111-0412-22	Pritam Kumar Mistry	B.Com (Honours)
63	221561-21-0045	561-1111-0427-22	Prithiviraj Mitra	B.Com (Honours)
64	221561-21-0010	561-1111-0352-22	Rahul Chowhan	B.Com (Honours)
65	221561-21-0049	561-1111-0434-22	Rajdip Shil	B.Com (Honours)
66	221561-21-0031	561-1111-0398-22	Rajib Rao	B.Com (Honours)
67	221561-21-0014	561-1111-0360-22	Ranit Ghosh	B.Com (Honours)
68	221561-21-0016	561-1111-0363-22	Ranjit Jana	B.Com (Honours)
69	221561-21-0054	561-1112-0343-22	Rohit Mondal	B.Com (Honours)
70	221561-21-0026	561-1111-0388-22	Ronit Bera	B.Com (Honours)
71	221561-21-0046	561-1111-0428-22	Saabarna Das	B.Com (Honours)
72	221561-21-0011	561-1111-0353-22	Saptaswa Khamaru	B.Com (Honours)
73	221561-21-0009	561-1111-0351-22	Sayondeep Mukherjee	B.Com (Honours)
74	221561-21-0018	561-1111-0368-22	Shatadru Das	B.Com (Honours)
75	221561-21-0030	561-1111-0397-22	Shivam Shaw	B.Com (Honours)
76	221561-21-0069	561-1115-0372-22	Sk Imtajul	B.Com (Honours)
77	221561-21-0041	561-1111-0418-22	Sk Irfan	B.Com (Honours)
78	221561-21-0042	561-1111-0419-22	Sk Kaif	B.Com (Honours)
79	221561-21-0070	561-1115-0382-22	Sk Toufique	B.Com (Honours)
80	221561-21-0022	561-1111-0376-22	Soham Das	B.Com (Honours)
81	221561-21-0028	561-1111-0391-22	Sohel Aktar Mondal	B.Com (Honours)
82	221561-21-0007	561-1111-0347-22	Sohom Samanta	B.Com (Honours)
83	221561-21-0050	561-1111-0439-22	Sombit Dawan	B.Com (Honours)
84	221561-21-0023	561-1111-0378-22	Souptick Chaudhuri	B.Com (Honours)
85	221561-21-0020	561-1111-0374-22	Sourav Baidya	B.Com (Honours)
86	221561-21-0052	561-1112-0336-22	Souvik Ghanti	B.Com (Honours)
87	221561-21-0029	561-1111-0396-22	Souvik Samanta	B.Com (Honours)
88	221561-21-0017	561-1111-0366-22	Subojit Khanra	B.Com (Honours)
89	221561-21-0065	561-1114-0354-22	Sudip Santra	B.Com (Honours)
90	221561-21-0013	561-1111-0359-22	Suman Das	B.Com (Honours)
91	221561-21-0063	561-1112-0431-22	Sumit Kumar Baidya	B.Com (Honours)
92	221561-21-0060	561-1112-0380-22	Surajit Pramanik	B.Com (Honours)
93	221561-21-0058	561-1112-0362-22	Swarup Halder	B.Com (Honours)

Serial Number	Roll Number	Registration Number	Name	Stream
94	221561-21-0051	561-1111-1154-22	Swastik Chakraborty	B.Com (Honours)
95	221561-21-0039	561-1111-0414-22	Tanmoy Majee	B.Com (Honours)
96	221561-21-0035	561-1111-0406-22	Tonmoy Das	B.Com (Honours)
97	221561-21-0033	561-1111-0403-22	Tuhin Hazra	B.Com (Honours)
98	221561-21-0003	561-1111-0341-22	Tushar Bose	B.Com (Honours)
99	221561-21-0066	561-1114-0392-22	Tushar Das	B.Com (Honours)
100	221561-22-0025	561-1112-1141-22	Abir Baidya	B.Com (General)
101	221561-22-0014	561-1111-1147-22	Apurbo Das	B.Com (General)
102	221561-22-0015	561-1111-1148-22	Arghyadeep Datta	B.Com (General)
103	221561-22-0001	561-1111-1124-22	Asmit Ghosh	B.Com (General)
104	221561-22-0020	561-1111-1153-22	Bisal Maji	B.Com (General)
105	221561-22-0008	561-1111-1138-22	Bishal Das	B.Com (General)
106	221561-22-0004	561-1111-1131-22	Deepayan Das	B.Com (General)
107	221561-22-0013	561-1111-1145-22	Gorachand Paul	B.Com (General)
108	221561-22-0029	561-1115-1146-22	Mohiuddin	B.Com (General)
109	221561-22-0022	561-1112-1127-22	Monoj Mondal	B.Com (General)
110	221561-22-0006	561-1111-1135-22	Pritam Das	B.Com (General)
111	221561-22-0018	561-1111-1151-22	Rajarshi Ray	B.Com (General)
112	221561-22-0028	561-1115-1136-22	Rohan Mollah	B.Com (General)
113	221561-22-0010	561-1111-1140-22	Rohit Jha	B.Com (General)
114	221561-22-0026	561-1112-1142-22	Shouvik Biswas	B.Com (General)
115	221561-22-0003	561-1111-1129-22	Subhadeep Adhikary	B.Com (General)
116	221561-22-0023	561-1112-1128-22	Sudipta Sardar	B.Com (General)
117	221561-22-0017	561-1111-1150-22	Suman Nath	B.Com (General)
118	221561-22-0005	561-1111-1134-22	Suman Mondal	B.Com (General)
119	221561-22-0024	561-1112-1133-22	Supriyo Roy	B.Com (General)
120	221561-22-0011	561-1111-1143-22	Sushovan Baidya	B.Com (General)
121	221561-22-0016	561-1111-1149-22	Suvash Mondal	B.Com (General)
122	221561-22-0019	561-1111-1152-22	Tanay Porel	B.Com (General)
123	221561-22-0002	561-1111-1126-22	Tanoy Manna	B.Com (General)
124	211561-12-0002	561-1211-1134-21	Neha Khanra	B.Com (General)
125	221561-12-0002	561-1212-1123-22	Manisha Naskar	B.Com (General)
126	222561-11-0059	561-1211-0103-22	Afia Zahin	ENGA
127	222561-11-0043	561-1211-0076-22	Afroza Khatun	EDCA
128	222561-11-0102	561-1211-0210-22	Afsana Khatun	PLSA
129	222561-11-0184	561-1215-0048-22	Afsari Khatun	BNGA
130	222561-11-0067	561-1211-0125-22	Aleya Khatun	GEOA
131	222561-11-0195	561-1215-0218-22	Aleya Khatun	PLSA
132	222561-11-0033	561-1211-0061-22	Amina Khatun	EDCA
133	222561-11-0093	561-1211-0194-22	Ananya Samanta	PHIA
134	222561-11-0045	561-1211-0080-22	Ananya Gharui	EDCA
135	222561-11-0031	561-1211-0057-22	Anindita Dutta	EDCA
136	222561-11-0191	561-1215-0160-22	Anisa Khatun	HISA
137	222561-11-0189	561-1215-0131-22	Anisa Khatun	GEOA
138	222561-11-0113	561-1211-0229-22	Anisa Khatun	PLSA
139	222561-11-0068	561-1211-0129-22	Anisha Parvin	GEOA
140	222561-11-0099	561-1211-0202-22	Anjali Bera	PLSA
141	222561-11-0052	561-1211-0091-22	Anjana Kandi	EDCA
142	222561-11-0026	561-1211-0047-22	Ankita Chakraborty	BNGA
143	222561-11-0012	561-1211-0025-22	Anusree Das	BNGA
144	222561-11-0150	561-1212-0085-22	Arpita Bedanta	EDCA
145	222561-11-0106	561-1211-0215-22	Arpita Chakraborty	PLSA
146	222561-11-0049	561-1211-0087-22	Arpita Maji	EDCA

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147	222561-11-0020	561-1211-0039-22	Arpita Mondal	BNGA
148	222561-11-0163	561-1212-0203-22	Asha Mondal	PLSA
149	222561-11-0112	561-1211-0228-22	Aspia Khatun	PLSA
150	222561-11-0100	561-1211-0206-22	Ayesa Khatun	PLSA
151	222561-11-0082	561-1211-0166-22	Baishakhi Manna	HISA
152	222561-11-0171	561-1214-0036-22	Barsha Das	BNGA
153	222561-11-0003	561-1211-0006-22	Bidisha Adhikary	EDCA
154	222561-11-0123	561-1211-0246-22	Bilkis Khatun	PLSA
155	222561-11-0111	561-1211-0227-22	Bipasa Khatun	PLSA
156	222561-11-0149	561-1212-0083-22	Bristhi Sardar	EDCA
157	222561-11-0069	561-1211-0130-22	Debashmita Das	GEOA
158	222561-11-0167	561-1212-0225-22	Dipa Mondal	PLSA
159	222561-11-0090	561-1211-0188-22	Dipannita Adak	HISA
160	222561-11-0170	561-1214-0024-22	Disha Paul	BNGA
161	222561-11-0094	561-1211-0195-22	Disha Saha	PHIA
162	222561-11-0122	561-1211-0244-22	Diya Samanta	PLSA
163	222561-11-0072	561-1211-0140-22	Esha Paul	HISA
164	222561-11-0127	561-1211-0251-22	Eshani Naskar	PLSA
165	222561-11-0130	561-1211-1155-22	Fiza Khatun	EDCA
166	222561-11-0190	561-1215-0146-22	Habiba Khatun	HISA
167	222561-11-0041	561-1211-0071-22	Habiba Parvin	EDCA
168	222561-11-0114	561-1211-0232-22	Hema Khatun	PLSA
169	222561-11-0101	561-1211-0207-22	Ishika Khatun	PLSA
170	222561-11-0038	561-1211-0068-22	Itika Parvin	EDCA
171	222561-11-0071	561-1211-0134-22	Jamima Parvin	GEOA
172	222561-11-0008	561-1211-0016-22	Jasmin Khatun	HISA
173	222561-11-0136	561-1212-0023-22	Jayeta Biswas	BNGA
174	222561-11-0061	561-1211-0105-22	Juyairiya Khatun	ENGA
175	222561-11-0036	561-1211-0065-22	Kabita Adhikary	EDCA
176	222561-11-0196	561-1221-0109-22	Kasturi Halder	ENGA
177	222561-11-0174	561-1214-0116-22	Khushi Paramanick	ENGA
178	222561-11-0084	561-1211-0170-22	Koyel Karmakar	HISA
179	222561-11-0017	561-1211-0033-22	Koyel Sardar	BNGA
180	222561-11-0019	561-1211-0038-22	Krishna Chatterjee	BNGA
181	222561-11-0083	561-1211-0169-22	Kuyaosa Kunhal	HISA
182	222561-11-0095	561-1211-0197-22	Lipsa Khanra	PLSA
183	222561-11-0030	561-1211-0053-22	Lipta Das	BNGA
184	222561-11-0054	561-1211-0093-22	Lisha Das	EDCA
185	222561-11-0154	561-1212-0133-22	Madhusri Shikari	GEOA
186	222561-11-0010	561-1211-0021-22	Mallika Ranjit	BNGA
187	222561-11-0011	561-1211-0022-22	Meghna Das	BNGA
188	222561-11-0181	561-1214-0257-22	Minakshi Das	PLSA
189	222561-11-0182	561-1215-0007-22	Mohamina Parvin	EDCA
190	222561-11-0141	561-1212-0052-22	Moly Karmakar	BNGA
191	222561-11-0183	561-1215-0027-22	Monalisa Parvin	BNGA
192	222561-11-0165	561-1212-0217-22	Moumita Patla	PLSA
193	222561-11-0119	561-1211-0240-22	Moumita Patra	PLSA
194	222561-11-0029	561-1211-0051-22	Moupriya Dutta	BNGA
195	222561-11-0147	561-1212-0066-22	Mousumi Bag	EDCA
196	222561-11-0152	561-1212-0117-22	Mukti Rajak	GEOA
197	222561-11-0096	561-1211-0198-22	Muskan Mallick	PLSA
198	222561-11-0051	561-1211-0089-22	Nafisa Sareng	EDCA
199	222561-11-0176	561-1214-0149-22	Nasrin Parveen	HISA

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200	222561-11-0124	561-1211-0247-22	Nawrin Khatun	PLSA
201	222561-11-0177	561-1214-0178-22	Nazrin Parveen	HISA
202	222561-11-0126	561-1211-0250-22	Neha Khatun	PLSA
203	222561-11-0148	561-1212-0079-22	Neha Mondal	EDCA
204	222561-11-0009	561-1211-0020-22	Neha Paul	BNGA
205	222561-11-0138	561-1212-0030-22	Nisha Kayal	BNGA
206	222561-11-0032	561-1211-0060-22	Nisha Dey	EDCA
207	222561-11-0125	561-1211-0248-22	Papia Koley	PLSA
208	222561-11-0110	561-1211-0226-22	Papiya Das	PLSA
209	222561-11-0160	561-1212-0173-22	Papu Kayal	HISA
210	222561-11-0145	561-1212-0059-22	Payel Shankhari	EDCA
211	222561-11-0153	561-1212-0126-22	Payel Naskar	GEOA
212	222561-11-0157	561-1212-0158-22	Payel Sardar	HISA
213	222561-11-0070	561-1211-0132-22	Pinki Khatun	GEOA
214	222561-11-0185	561-1215-0082-22	Pinky Khatun	EDCA
215	222561-11-0047	561-1211-0084-22	Piya Das	EDCA
216	222561-11-0103	561-1211-0212-22	Prity Adhikary	PLSA
217	222561-11-0013	561-1211-0028-22	Prity Halder	BNGA
218	222561-11-0168	561-1212-0253-22	Prity Naskar	PLSA
219	222561-11-0178	561-1214-0209-22	Priya Bhor	PLSA
220	222561-11-0077	561-1211-0151-22	Priya Roy	HISA
221	222561-11-0023	561-1211-0043-22	Priyanka Bera	BNGA
222	222561-11-0151	561-1212-0115-22	Priyanka Das	ENGA
223	222561-11-0016	561-1211-0032-22	Priyanka Hazra	BNGA
224	222561-11-0161	561-1212-0184-22	Priyanka Mondal	HISA
225	222561-11-0056	561-1211-0095-22	Puja Doyari	ENGA
226	222561-11-0024	561-1211-0045-22	Puja Sarkar	BNGA
227	222561-11-0086	561-1211-0179-22	Purba Mondal	HISA
228	222561-11-0040	561-1211-0070-22	Rachana Das	EDCA
229	222561-11-0022	561-1211-0042-22	Rajashree Halder	BNGA
230	222561-11-0027	561-1211-0049-22	Rajiya Khatun	BNGA
231	222561-11-0063	561-1211-0113-22	Rakiya Khatun	ENGA
232	222561-11-0074	561-1211-0145-22	Renu Khatun	HISA
233	222561-11-0143	561-1212-0056-22	Rimpa Singh	EDCA
234	222561-11-0172	561-1214-0040-22	Rimpa Sipui	BNGA
235	222561-11-0155	561-1212-0135-22	Rittwika Sardar	GEOA
236	222561-11-0075	561-1211-0144-22	Ritu Adhikary	HISA
237	222561-11-0134	561-1212-0013-22	Ritu Mondal	BNGA
238	222561-11-0018	561-1211-0037-22	Riya Bag	BNGA
239	222561-11-0085	561-1211-0175-22	Riya Chakraborty	HISA
240	222561-11-0079	561-1211-0153-22	Riya Das	HISA
241	222561-11-0159	561-1212-0171-22	Riya Das	HISA
242	222561-11-0080	561-1211-0154-22	Riya Mete	HISA
243	222561-11-0014	561-1211-0029-22	Riyanka Das	BNGA
244	222561-11-0198	561-1214-1163-22	Rohini Das	BNGA
245	222561-11-0104	561-1211-0213-22	Rubina Khatun	PLSA
246	222561-11-0194	561-1215-0205-22	Ruhina Khatun	PLSA
247	222561-11-0193	561-1215-0193-22	Ruksar Parvin	HISA
248	222561-11-0192	561-1215-0165-22	Ruksha Khatun	HISA
249	222561-11-0129	561-1211-0259-22	Rupali Sau	PLSA
250	222561-11-0116	561-1211-0235-22	Rupsha Chakraborty	PLSA
251	222561-11-0108	561-1211-0222-22	Sabnam Parvin	PLSA
252	222561-11-0135	561-1212-0019-22	Saheli Naskar	BNGA

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253	222561-11-0139	561-1212-0034-22	Sahely Roy	BNGA
254	222561-11-0053	561-1211-0092-22	Saiba Parvin	EDCA
255	222561-11-0002	561-1211-0004-22	Sakshi Porey	PLSA
256	222561-11-0109	561-1211-0223-22	Sanchita Bag	PLSA
257	222561-11-0166	561-1212-0219-22	Sangeeta Mondal	PLSA
258	222561-11-0169	561-1212-0256-22	Sangita Ghorui	PLSA
259	222561-11-0187	561-1215-0107-22	Sarmina Khatoon	ENGA
260	222561-11-0025	561-1211-0046-22	Sathi Adhikary	BNGA
261	222561-11-0064	561-1211-0118-22	Sayani Patra	GEOA
262	222561-11-0132	561-1212-0009-22	Sewali Hazra	EDCA
263	222561-11-0081	561-1211-0159-22	Shayantani Santra	HISA
264	222561-11-0118	561-1211-0238-22	Shilpi Ghosh	PLSA
265	222561-11-0107	561-1211-0216-22	Shrabani Acharya	PLSA
266	222561-11-0039	561-1211-0069-22	Shraboni Mondal	EDCA
267	222561-11-0105	561-1211-0214-22	Shreya Roy	PLSA
268	222561-11-0065	561-1211-0119-22	Simraan Muskaan	GEOA
269	222561-11-0046	561-1211-0081-22	Sk Sahana Parvin	EDCA
270	222561-11-0035	561-1211-0064-22	Sneha Das	EDCA
271	222561-11-0173	561-1214-0106-22	Sneha Hazra	ENGA
272	222561-11-0062	561-1211-0108-22	Soha Sarmin Khatun	ENGA
273	222561-11-0001	561-1211-0003-22	Sohana Khatun	PLSA
274	222561-11-0005	561-1211-0012-22	Sohini Paramanick	HISA
275	222561-11-0186	561-1215-0096-22	Somaiya Khatoon	ENGA
276	222561-11-0004	561-1211-0010-22	Somali Malik	BNGA
277	222561-11-0007	561-1211-0015-22	Soniya Sardar	PHIA
278	222561-11-0073	561-1211-0141-22	Soumi Banerjee	HISA
279	222561-11-0058	561-1211-0102-22	Suchandra Sau	ENGA
280	222561-11-0158	561-1212-0168-22	Sumana Kayal	HISA
281	222561-11-0140	561-1212-0035-22	Sumona Kayal	BNGA
282	222561-11-0179	561-1214-0230-22	Susmita Ghosh	PLSA
283	222561-11-0137	561-1212-0026-22	Suvamita Naskar	BNGA
284	222561-11-0115	561-1211-0234-22	Suvechya Paul	PLSA
285	222561-11-0162	561-1212-0185-22	Swarnasree Bar	HISA
286	222561-11-0076	561-1211-0148-22	Tamanna Khatun	HISA
287	222561-11-0037	561-1211-0067-22	Tamanna Rahaman	EDCA
288	222561-11-0117	561-1211-0236-22	Tandra Pramanick	PLSA
289	222561-11-0078	561-1211-0152-22	Tania Khatun	HISA
290	222561-11-0142	561-1212-0055-22	Tania Mondal	EDCA
291	222561-11-0088	561-1211-0183-22	Taniya Khatun	HISA
292	222561-11-0091	561-1211-0189-22	Tina Ghosh	HISA
293	222561-11-0087	561-1211-0181-22	Tista Biswas	HISA
294	222561-11-0044	561-1211-0077-22	Tiyasha Das	EDCA
295	222561-11-0128	561-1211-0252-22	Tulika Adhikary	PLSA
296	222561-11-0120	561-1211-0241-22	Turaifa Parvin	PLSA
297	222561-11-0180	561-1214-0254-22	Usha Shaw	PLSA
298	222561-21-0047	561-1112-0124-22	Apurba Mondal	GEOA
299	222561-21-0046	561-1112-0123-22	Arijit Makhal	GEOA
300	222561-21-0038	561-1111-0245-22	Arpan Kumar Santra	PLSA
301	222561-21-0019	561-1111-0150-22	Ayan Banerjee	HISA
302	222561-21-0022	561-1111-0157-22	Ayan Maity	HISA
303	222561-21-0045	561-1112-0120-22	Bedhi Ranjan Samaddar	GEOA
304	222561-21-0005	561-1111-0054-22	Bidhan Chandra Ghosh	EDCA
305	222561-21-0050	561-1112-0163-22	Biswajit Dalui	HISA

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306	222561-21-0028	561-1111-0180-22	Biswajit Hazra	HISA
307	222561-21-0024	561-1111-0164-22	Dabopriya Adak	HISA
308	222561-21-0030	561-1111-0186-22	Debopriya Adak	HISA
309	222561-21-0029	561-1111-0182-22	Hamidul Molla	HISA
310	222561-21-0056	561-1112-0249-22	Harish Ch Bag	PLSA
311	222561-21-0016	561-1111-0139-22	Indrajit Malick	HISA
312	222561-21-0064	561-1114-0255-22	Irfan Ali Khan	PLSA
313	222561-21-0040	561-1112-0002-22	Kaushik Kumar Khan	PLSA
314	222561-21-0066	561-1115-0097-22	Khursid Alam Mistry	ENGA
315	222561-21-0057	561-1112-0258-22	Manish Polley	PLSA
316	222561-21-0010	561-1111-0101-22	Md Javed Akter Kazi	ENGA
317	222561-21-0004	561-1111-0018-22	Nasibuddin Laskar	BNGA
318	222561-21-0068	561-1115-0239-22	Nasim Mallick	PLSA
319	222561-21-0023	561-1111-0161-22	Nilufa Khatun	HISA
320	222561-21-0036	561-1111-0233-22	Rajjak Kayal	PLSA
321	222561-21-0001	561-1111-0005-22	Rangan Mondal	BNGA
322	222561-21-0007	561-1111-0074-22	Riku Das	EDCA
323	222561-21-0021	561-1111-0156-22	Ritesh Bhowmick	HISA
324	222561-21-0013	561-1111-0122-22	Rohit Nuniya	GEOA
325	222561-21-0058	561-1112-0260-22	Rupam Das	PLSA
326	222561-21-0063	561-1114-0204-22	Sagar Pal	PLSA
327	222561-21-0065	561-1115-0001-22	Samiul Molla	HISA
328	222561-21-0020	561-1111-0155-22	Sandip Mallick	HISA
329	222561-21-0051	561-1112-0177-22	Sandip Purkait	HISA
330	222561-21-0054	561-1112-0199-22	Saswata Kanji	PLSA
331	222561-21-0043	561-1112-0100-22	Sayan Sapui	ENGA
332	222561-21-0012	561-1111-0112-22	Seharon Piada	ENGA
333	222561-21-0067	561-1115-0221-22	Sekh Sohail	PLSA
334	222561-21-0053	561-1112-0196-22	Shakshi Barman	PLSA
335	222561-21-0003	561-1111-0017-22	Shankhajit Bag	BNGA
336	222561-21-0025	561-1111-0167-22	Sk Anish Mohammad	HISA
337	222561-21-0039	561-1111-0261-22	Sk Arbaz	PLSA
338	222561-21-0034	561-1111-0224-22	Sk Nasir	PLSA
339	222561-21-0017	561-1111-0142-22	Sk Rahul	HISA
340	222561-21-0033	561-1111-0220-22	Sk Sariul	PLSA
341	222561-21-0002	561-1111-0008-22	Somnath Bera	HISA
342	222561-21-0037	561-1111-0237-22	Soumya Sau	PLSA
343	222561-21-0042	561-1112-0098-22	Soumya Das	ENGA
344	222561-21-0031	561-1111-0192-22	Sreebarna Mondal	HISA
345	222561-21-0027	561-1111-0176-22	Subhajit Nandi	HISA
346	222561-21-0011	561-1111-0111-22	Subhodip Chattopadhyay	ENGA
347	222561-21-0055	561-1112-0242-22	Sudipta Mondal	PLSA
348	222561-21-0049	561-1112-0162-22	Sujay Das	HISA
349	222561-21-0052	561-1112-0190-22	Suman Ram	HISA
350	222561-21-0059	561-1112-0157-22	Surojit Mondal	HISA
351	222561-21-0006	561-1111-0073-22	Surya Das	EDCA
352	222561-21-0015	561-1111-0138-22	Susanta Chakraborty	HISA
353	222561-21-0061	561-1113-0128-22	Susar Hansda	GEOA
354	222561-21-0035	561-1111-0231-22	Swapnamoy Das	PLSA
355	222561-21-0026	561-1111-0174-22	Swarup Sardar	HISA
356	222561-21-0032	561-1111-0211-22	Trideb Pandit	PLSA
357	222561-21-0062	561-1114-0172-22	Tubai Mondal	HISA
358	222561-12-0108	561-1211-0742-22	Afrin Khatun	BA General

Serial Number	Roll Number	Registration Number	Name	Stream
359	222561-12-0177	561-1211-0923-22	Afrin Parvin	BA General
360	222561-12-0342	561-1215-1009-22	Afroja Khatun	BA General
361	222561-12-0147	561-1211-0853-22	Afsara Parvin	BA General
362	222561-12-0076	561-1211-0656-22	Afsona Khatun	BA General
363	222561-12-0206	561-1211-0976-22	Aksima Khatun	BA General
364	222561-12-0024	561-1211-0497-22	Albira Khatun	BA General
365	222561-12-0140	561-1211-0823-22	Alisa Parvin	BA General
366	222561-12-0233	561-1211-1041-22	Almina Khatun	BA General
367	222561-12-0166	561-1211-0894-22	Amrita Ghosh	BA General
368	222561-12-0304	561-1214-0870-22	Anamika Bakuli	BA General
369	222561-12-0194	561-1211-0953-22	Anamika Khatun	BA General
370	222561-12-0287	561-1212-1008-22	Anamika Mondal	BA General
371	222561-12-0065	561-1211-0639-22	Ananaya Samanta	BA General
372	222561-12-0151	561-1211-0862-22	Anannya Das	BA General
373	222561-12-0039	561-1211-0535-22	Ananya Dutta	BA General
374	222561-12-0162	561-1211-0886-22	Ananya Malick	BA General
375	222561-12-0251	561-1212-0528-22	Ananya Mondal	BA General
376	222561-12-0036	561-1211-0524-22	Anindita Das	BA General
377	222561-12-0335	561-1215-0891-22	Anisa Khatun	BA General
378	222561-12-0193	561-1211-0951-22	Anisa Khatun	BA General
379	222561-12-0205	561-1211-0975-22	Anisha Khatun	BA General
380	222561-12-0309	561-1215-0529-22	Anisha Khatun	BA General
381	222561-12-0190	561-1211-0947-22	Anisha Khatun	BA General
382	222561-12-0225	561-1211-1014-22	Anisha Khatun	BA General
383	222561-12-0075	561-1211-0655-22	Ankita Bera	BA General
384	222561-12-0232	561-1211-1033-22	Ankita Mata	BA General
385	222561-12-0087	561-1211-0695-22	Annwita Bose	BA General
386	222561-12-0201	561-1211-0967-22	Anu Sree Kunti	BA General
387	222561-12-0124	561-1211-0783-22	Anushka Das	BA General
388	222561-12-0224	561-1211-1013-22	Arafa Khatun	BA General
389	222561-12-0100	561-1211-0715-22	Aratrika Pramanick	BA General
390	222561-12-0132	561-1211-0804-22	Arifa Khatun	BA General
391	222561-12-0214	561-1211-0993-22	Arifa Khatun	BA General
392	222561-12-0327	561-1215-0824-22	Arina Khatun	BA General
393	222561-12-0351	561-1211-0615-22	Armina Khatun	BA General
394	222561-12-0129	561-1211-0798-22	Armina Khatun	BA General
395	222561-12-0330	561-1215-0836-22	Armina Khatun	BA General
396	222561-12-0299	561-1214-0492-22	Arpita Nath	BA General
397	222561-12-0176	561-1211-0921-22	Arpita Pora	BA General
398	222561-12-0130	561-1211-0800-22	Arpita Das	BA General
399	222561-12-0179	561-1211-0925-22	Arpita Panja	BA General
400	222561-12-0254	561-1212-0543-22	Arpita Sardar	BA General
401	222561-12-0289	561-1212-1036-22	Asima Das	BA General
402	222561-12-0141	561-1211-0832-22	Asmina Khatun	BA General
403	222561-12-0325	561-1215-0781-22	Aspia Khatun	BA General
404	222561-12-0229	561-1211-1026-22	Ayesa Siddika	BA General
405	222561-12-0220	561-1211-1004-22	Baisakhi Debnath	BA General
406	222561-12-0027	561-1211-0507-22	Barnali Gayen	BA General
407	222561-12-0013	561-1211-0471-22	Beauty Adhikary	BA General
408	222561-12-0178	561-1211-0924-22	Beauty Khatun	BA General
409	222561-12-0219	561-1211-1002-22	Beauty Khatun	BA General
410	222561-12-0115	561-1211-0758-22	Benjir Parvin	BA General
411	222561-12-0324	561-1215-0780-22	Bosira Parveen	BA General

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412	222561-12-0157	561-1211-0873-22	Chayanika Chakraborty	BA General
413	222561-12-0263	561-1212-0622-22	Chumki Mondal	BA General
414	222561-12-0181	561-1211-0929-22	Dipika Ghosh	BA General
415	222561-12-0255	561-1212-0558-22	Dipti Sardar	BA General
416	222561-12-0290	561-1212-1038-22	Diya Mondal	BA General
417	222561-12-0185	561-1211-0934-22	Dona Ghosh	BA General
418	222561-12-0034	561-1211-0519-22	Esha Dutta	BA General
419	222561-12-0300	561-1214-0560-22	Esha Karmakar	BA General
420	222561-12-0283	561-1212-0952-22	Esha Roy	BA General
421	222561-12-0008	561-1211-0464-22	Farhana Khatun	BA General
422	222561-12-0149	561-1211-0856-22	Farin Khatoon	BA General
423	222561-12-0011	561-1211-0469-22	Habiba Khatun	BA General
424	222561-12-0322	561-1215-0757-22	Hasina Khatun	BA General
425	222561-12-0247	561-1212-0495-22	Indira Majhi	BA General
426	222561-12-0288	561-1212-1020-22	Isha Naskar	BA General
427	222561-12-0029	561-1211-0511-22	Isha Shaw	BA General
428	222561-12-0005	561-1211-0455-22	Jahanara Khatun	BA General
429	222561-12-0198	561-1211-0957-22	Jahira Khatun	BA General
430	222561-12-0137	561-1211-0816-22	Jamima Parvin	BA General
431	222561-12-0119	561-1211-0768-22	Jasmin Parvin	BA General
432	222561-12-0066	561-1211-0642-22	Jasmina Khatun	BA General
433	222561-12-0082	561-1211-0676-22	Jasmina Parbin	BA General
434	222561-12-0226	561-1211-1018-22	Jayshree Debnath	BA General
435	222561-12-0138	561-1211-0817-22	Jeba Khatun	BA General
436	222561-12-0145	561-1211-0849-22	Jenia Parvin	BA General
437	222561-12-0279	561-1212-0865-22	Joti Bag	BA General
438	222561-12-0060	561-1211-0621-22	Juaria Khatun	BA General
439	222561-12-0217	561-1211-0998-22	Juspiya Khatun	BA General
440	222561-12-0164	561-1211-0890-22	Khadija Khatun	BA General
441	222561-12-0105	561-1211-0736-22	Koyel Bhattacharjee	BA General
442	222561-12-0035	561-1211-0520-22	Koyel Paul	BA General
443	222561-12-0197	561-1211-0956-22	Laxmi Chakraborty	BA General
444	222561-12-0043	561-1211-0554-22	Lipika Das	BA General
445	222561-12-0062	561-1211-0632-22	Liza Mondal	BA General
446	222561-12-0235	561-1211-1043-22	Madhurima Khan	BA General
447	222561-12-0207	561-1211-0981-22	Mafuja Khatun	BA General
448	222561-12-0339	561-1215-0966-22	Mahima Khatun	BA General
449	222561-12-0059	561-1211-0620-22	Maksuda Khatun	BA General
450	222561-12-0253	561-1212-0542-22	Mandira Naskar	BA General
451	222561-12-0334	561-1215-0878-22	Manisha Khatun	BA General
452	222561-12-0103	561-1211-0734-22	Marufa Khatun	BA General
453	222561-12-0296	561-1212-1087-22	Megha Dolui	BA General
454	222561-12-0238	561-1211-1075-22	Mehar Parvin	BA General
455	222561-12-0064	561-1211-0634-22	Mehnaz Khatun	BA General
456	222561-12-0294	561-1212-1065-22	Mili Sardar	BA General
457	222561-12-0257	561-1212-0575-22	Modhumita Dalui	BA General
458	222561-12-0143	561-1211-0844-22	Mohini Khatun	BA General
459	222561-12-0317	561-1215-0670-22	Momotaj Khatun	BA General
460	222561-12-0172	561-1211-0913-22	Monalisa Das	BA General
461	222561-12-0230	561-1211-1030-22	Monira Khatun	BA General
462	222561-12-0227	561-1211-1019-22	Monisha Khatun	BA General
463	222561-12-0313	561-1215-0578-22	Monisha Khatun	BA General
464	222561-12-0200	561-1211-0965-22	Monolisa Khatun	BA General

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465	222561-12-0204	561-1211-0973-22	Mou Samanta	BA General
466	222561-12-0167	561-1211-0896-22	Mousumi Khatun	BA General
467	222561-12-0080	561-1211-0671-22	Mousumi Bag	BA General
468	222561-12-0154	561-1211-0868-22	Mousumi Das	BA General
469	222561-12-0180	561-1211-0926-22	Mousumi Ram	BA General
470	222561-12-0211	561-1211-0989-22	Mursida Khatun	BA General
471	222561-12-0019	561-1211-0489-22	Muskan Gayen	BA General
472	222561-12-0077	561-1211-0660-22	Muskan Khatun	BA General
473	222561-12-0158	561-1211-0876-22	Muskan Parvin	BA General
474	222561-12-0242	561-1211-1090-22	Muslima Khatun	BA General
475	222561-12-0223	561-1211-1012-22	Nahida Jasmin	BA General
476	222561-12-0030	561-1211-0512-22	Najneen Parvin	BA General
477	222561-12-0004	561-1211-0450-22	Namrata Mahato	BA General
478	222561-12-0310	561-1215-0536-22	Nasima Khatun	BA General
479	222561-12-0195	561-1211-0954-22	Nasima Khatun	BA General
480	222561-12-0213	561-1211-0991-22	Nasrin Parvin	BA General
481	222561-12-0127	561-1211-0794-22	Nasrinnesa Khatun	BA General
482	222561-12-0006	561-1211-0458-22	Nazima Khatun	BA General
483	222561-12-0272	561-1212-0809-22	Neha Das	BA General
484	222561-12-0093	561-1211-0706-22	Neha Khatun	BA General
485	222561-12-0241	561-1211-1085-22	Neha Khatun	BA General
486	222561-12-0312	561-1215-0571-22	Nilufa Khatun	BA General
487	222561-12-0192	561-1211-0950-22	Nilufar Khatun	BA General
488	222561-12-0003	561-1211-0447-22	Pallabi Panchal	BA General
489	222561-12-0303	561-1214-0845-22	Pallabi Paramanick	BA General
490	222561-12-0236	561-1211-1057-22	Pallabi Polley	BA General
491	222561-12-0174	561-1211-0916-22	Payel Kundu	BA General
492	222561-12-0107	561-1211-0741-22	Pieu Naskar	BA General
493	222561-12-0244	561-1212-0446-22	Pinki Gayen	BA General
494	222561-12-0070	561-1211-0648-22	Piu Mondal	BA General
495	222561-12-0246	561-1212-0484-22	Piyali Mondal	BA General
496	222561-12-0187	561-1211-0943-22	Piyali Chakraborty	BA General
497	222561-12-0282	561-1212-0942-22	Piyali Mondal	BA General
498	222561-12-0153	561-1211-0867-22	Piyalika Majumdar	BA General
499	222561-12-0092	561-1211-0705-22	Piyasha Pal	BA General
500	222561-12-0079	561-1211-0663-22	Poulami Das	BA General
501	222561-12-0139	561-1211-0822-22	Poulami Das	BA General
502	222561-12-0352	561-1211-0937-22	Preeti Prasad	BA General
503	222561-12-0134	561-1211-0810-22	Priti Chakraborty	BA General
504	222561-12-0280	561-1212-0881-22	Priti Das	BA General
505	222561-12-0277	561-1212-0857-22	Priti Mondal	BA General
506	222561-12-0284	561-1212-0974-22	Priya Sardar	BA General
507	222561-12-0026	561-1211-0505-22	Priya Adhikary	BA General
508	222561-12-0049	561-1211-0587-22	Priya Bisai	BA General
509	222561-12-0261	561-1212-0613-22	Priya Das	BA General
510	222561-12-0258	561-1212-0601-22	Priyanka Tokal	BA General
511	222561-12-0044	561-1211-0562-22	Priyanka Mondal	BA General
512	222561-12-0069	561-1211-0647-22	Priyanka Samanta	BA General
513	222561-12-0259	561-1212-0607-22	Puja Rong	BA General
514	222561-12-0168	561-1211-0897-22	Puja Yadav	BA General
515	222561-12-0307	561-1214-1031-22	Purna Pal	BA General
516	222561-12-0021	561-1211-0491-22	Pushpita Adhikary	BA General
517	222561-12-0237	561-1211-1068-22	Rafija Khatun	BA General

Serial Number	Roll Number	Registration Number	Name	Stream
518	222561-12-0347	561-1215-1067-22	Rahima Khatun	BA General
519	222561-12-0343	561-1215-1016-22	Rahita Khatun	BA General
520	222561-12-0329	561-1215-0833-22	Raima Halder	BA General
521	222561-12-0311	561-1215-0545-22	Rani Parvin	BA General
522	222561-12-0326	561-1215-0808-22	Reshma Nasrin	BA General
523	222561-12-0337	561-1215-0958-22	Reshma Parvin	BA General
524	222561-12-0316	561-1215-0659-22	Rijiya Khatun	BA General
525	222561-12-0001	561-1211-0441-22	Rimi Manna	BA General
526	222561-12-0215	561-1211-0995-22	Rimi Pramanick	BA General
527	222561-12-0101	561-1211-0722-22	Rimi Roy	BA General
528	222561-12-0054	561-1211-0603-22	Rimjhim Chakraborty	BA General
529	222561-12-0240	561-1211-1083-22	Rimpa Bhattacharya	BA General
530	222561-12-0191	561-1211-0948-22	Rimpa Roy	BA General
531	222561-12-0122	561-1211-0775-22	Rinki Dutta	BA General
532	222561-12-0090	561-1211-0701-22	Rinki Samanta	BA General
533	222561-12-0135	561-1211-0812-22	Rittika Bhakta	BA General
534	222561-12-0249	561-1212-0515-22	Ritu Mondal	BA General
535	222561-12-0273	561-1212-0821-22	Riya Majhi	BA General
536	222561-12-0276	561-1212-0841-22	Riya Kayal	BA General
537	222561-12-0234	561-1211-1042-22	Riya Pramanick	BA General
538	222561-12-0271	561-1212-0803-22	Riya Roy	BA General
539	222561-12-0341	561-1215-1003-22	Rokeya Khatun	BA General
540	222561-12-0159	561-1211-0882-22	Roshni Khatun	BA General
541	222561-12-0102	561-1211-0723-22	Rubaiya Khatun	BA General
542	222561-12-0182	561-1211-0930-22	Rubina Parvin	BA General
543	222561-12-0104	561-1211-0735-22	Ruksar Khatun	BA General
544	222561-12-0305	561-1214-1001-22	Ruksar Khatun	BA General
545	222561-12-0315	561-1215-0609-22	Runalayla Khatun	BA General
546	222561-12-0117	561-1211-0763-22	Sabana Khatun	BA General
547	222561-12-0110	561-1211-0745-22	Sabrin Khatun	BA General
548	222561-12-0338	561-1215-0962-22	Sadia Parvin	BA General
549	222561-12-0081	561-1211-0675-22	Sadiya Parvin	BA General
550	222561-12-0292	561-1212-1056-22	Sagorika Naskar	BA General
551	222561-12-0088	561-1211-0697-22	Sahani Parvin	BA General
552	222561-12-0349	561-1211-1160-22	Saheli Barman	BA General
553	222561-12-0202	561-1211-0970-22	Sahima Khatun	BA General
554	222561-12-0321	561-1215-0755-22	Sahin Khatun	BA General
555	222561-12-0218	561-1211-0999-22	Sahina Khatun	BA General
556	222561-12-0040	561-1211-0544-22	Saima Khatun	BA General
557	222561-12-0208	561-1211-0982-22	Saimina Parvin	BA General
558	222561-12-0025	561-1211-0503-22	Salu Pradhan	BA General
559	222561-12-0046	561-1211-0582-22	Samina Parveen	BA General
560	222561-12-0188	561-1211-0945-22	Sampurna Pore	BA General
561	222561-12-0057	561-1211-0614-22	Sanaara Khatun	BA General
562	222561-12-0186	561-1211-0938-22	Sangita Khanra	BA General
563	222561-12-0170	561-1211-0906-22	Sania Kazi	BA General
564	222561-12-0173	561-1211-0914-22	Sania Khatun	BA General
565	222561-12-0028	561-1211-0509-22	Sania Parveen	BA General
566	222561-12-0015	561-1211-0482-22	Sarika Khatun	BA General
567	222561-12-0160	561-1211-0883-22	Sarmila Khatun	BA General
568	222561-12-0267	561-1212-0664-22	Sarnali Mondal	BA General
569	222561-12-0295	561-1212-1079-22	Sathi Sardar	BA General
570	222561-12-0248	561-1212-0510-22	Sathi Kayal	BA General

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571	222561-12-0256	561-1212-0569-22	Sathi Mondal	BA General
572	222561-12-0285	561-1212-1000-22	Sathi Purkait	BA General
573	222561-12-0118	561-1211-0765-22	Saubiya Parvin	BA General
574	222561-12-0269	561-1212-0782-22	Sayani Dhali	BA General
575	222561-12-0038	561-1211-0530-22	Sayani Jana	BA General
576	222561-12-0133	561-1211-0806-22	Sayantani Jana	BA General
577	222561-12-0209	561-1211-0985-22	Selima Khatun	BA General
578	222561-12-0032	561-1211-0516-22	Selki Santra	BA General
579	222561-12-0189	561-1211-0946-22	Seren Parven	BA General
580	222561-12-0169	561-1211-0902-22	Serina Khatun	BA General
581	222561-12-0114	561-1211-0752-22	Shawviya Mollick	BA General
582	222561-12-0144	561-1211-0848-22	Shayane Purkait	BA General
583	222561-12-0308	561-1215-0445-22	Sheerin Sanfui	BA General
584	222561-12-0072	561-1211-0650-22	Shilpa Mata	BA General
585	222561-12-0085	561-1211-0692-22	Shrabani Barui	BA General
586	222561-12-0012	561-1211-0470-22	Shrabani Panja	BA General
587	222561-12-0275	561-1212-0835-22	Shreya Singha	BA General
588	222561-12-0109	561-1211-0743-22	Simran Khatun	BA General
589	222561-12-0163	561-1211-0888-22	Simran Parvin	BA General
590	222561-12-0116	561-1211-0760-22	Sitara Khatun	BA General
591	222561-12-0270	561-1212-0797-22	Smrity Majhi	BA General
592	222561-12-0016	561-1211-0485-22	Snaha Samanta	BA General
593	222561-12-0203	561-1211-0972-22	Sneha Chakraborty	BA General
594	222561-12-0156	561-1211-0871-22	Sneha Paul	BA General
595	222561-12-0033	561-1211-0517-22	Sneha Adhikary	BA General
596	222561-12-0083	561-1211-0683-22	Sneha Bera	BA General
597	222561-12-0319	561-1215-0689-22	Sohana Khatun	BA General
598	222561-12-0146	561-1211-0850-22	Sohana Parvin	BA General
599	222561-12-0094	561-1211-0707-22	Sonia Mukherjee	BA General
600	222561-12-0301	561-1214-0597-22	Soumi Das	BA General
601	222561-12-0212	561-1211-0990-22	Soumita Mukherjee	BA General
602	222561-12-0120	561-1211-0769-22	Sovana Khatun	BA General
603	222561-12-0298	561-1214-0454-22	Srimoyee Nath	BA General
604	222561-12-0222	561-1211-1010-22	Suhana Mallick	BA General
605	222561-12-0096	561-1211-0709-22	Suhana Pervin	BA General
606	222561-12-0199	561-1211-0960-22	Suhani Parvin	BA General
607	222561-12-0002	561-1211-0444-22	Sukannya Biswas	BA General
608	222561-12-0328	561-1215-0827-22	Sultana Khatun	BA General
609	222561-12-0333	561-1215-0877-22	Sultana Khatun	BA General
610	222561-12-0022	561-1211-0494-22	Sumaiya Khatun	BA General
611	222561-12-0023	561-1211-0496-22	Sumaiya Khatun	BA General
612	222561-12-0086	561-1211-0694-22	Sumaiya Khatun	BA General
613	222561-12-0332	561-1215-0843-22	Sumaiya Parvin	BA General
614	222561-12-0165	561-1211-0892-22	Sumana Das	BA General
615	222561-12-0268	561-1212-0732-22	Sunayana Sardar	BA General
616	222561-12-0051	561-1211-0596-22	Susmita Gunin	BA General
617	222561-12-0291	561-1212-1049-22	Swagata Gayen	BA General
618	222561-12-0041	561-1211-0548-22	Swapna Mondal	BA General
619	222561-12-0336	561-1215-0900-22	Tabassum Sultan	BA General
620	222561-12-0063	561-1211-0633-22	Tananya Das	BA General
621	222561-12-0106	561-1211-0738-22	Tandra Bag	BA General
622	222561-12-0091	561-1211-0702-22	Tania Parbin	BA General
623	222561-12-0152	561-1211-0864-22	Taniea Mondal	BA General

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624	222561-12-0228	561-1211-1022-22	Taniya Khatun	BA General
625	222561-12-0131	561-1211-0802-22	Taniya Ghorui	BA General
626	222561-12-0121	561-1211-0774-22	Taniya Sanfui	BA General
627	222561-12-0331	561-1215-0838-22	Tanjim Khatun	BA General
628	222561-12-0350	561-1211-1164-22	Tiyasa Das	BA General
629	222561-12-0278	561-1212-0858-22	Tiyasa Das	BA General
630	222561-12-0078	561-1211-0661-22	Trisa Das	BA General
631	222561-12-0018	561-1211-0488-22	Trisha Biswas	BA General
632	222561-12-0161	561-1211-0884-22	Tuhina Khatun	BA General
633	222561-12-0306	561-1214-1024-22	Tulika Gayen	BA General
634	222561-22-0062	561-1111-0604-22	Afrati Khan	BA General
635	222561-22-0051	561-1111-0580-22	Ajibur Rahaman Mallick	BA General
636	222561-22-0025	561-1111-0508-22	Akash Chakraborty	BA General
637	222561-22-0004	561-1111-0453-22	Akash Halder	BA General
638	222561-22-0267	561-1114-0746-22	Akash Paul	BA General
639	222561-22-0203	561-1111-1069-22	Altamas Mollick	BA General
640	222561-22-0155	561-1111-0918-22	Aman Sepay	BA General
641	222561-22-0259	561-1112-1073-22	Amar Sanfui	BA General
642	222561-22-0174	561-1111-0969-22	Amit Maity	BA General
643	222561-22-0190	561-1111-1035-22	Ananya Singha	BA General
644	222561-22-0189	561-1111-1029-22	Anas Sha	BA General
645	222561-22-0266	561-1114-0658-22	Anchit Shee	BA General
646	222561-22-0240	561-1112-0772-22	Anish Mondal	BA General
647	222561-22-0230	561-1112-0617-22	Anish Dalui	BA General
648	222561-22-0162	561-1111-0935-22	Anish Kaji	BA General
649	222561-22-0241	561-1112-0778-22	Ankur Das	BA General
650	222561-22-0058	561-1111-0593-22	Anshu Santra	BA General
651	222561-22-0095	561-1111-0704-22	Argha Das	BA General
652	222561-22-0265	561-1114-0590-22	Argha Ghosh	BA General
653	222561-22-0154	561-1111-0910-22	Arnab Ghosh	BA General
654	222561-22-0023	561-1111-0502-22	Arpan Manna	BA General
655	222561-22-0072	561-1111-0629-22	Asfak Molla	BA General
656	222561-22-0204	561-1111-1070-22	Asif Molla	BA General
657	222561-22-0016	561-1111-0481-22	Asit Dutta	BA General
658	222561-22-0198	561-1111-1055-22	Atabuddin Laskar	BA General
659	222561-22-0087	561-1111-0686-22	Atanu Chatterjee	BA General
660	222561-22-0214	561-1111-1089-22	Ayan Khara	BA General
661	222561-22-0219	561-1112-0456-22	Ayan Mondal	BA General
662	222561-22-0005	561-1111-0460-22	Ayan Naskar	BA General
663	222561-22-0273	561-1115-0459-22	Bajid Ali Mallick	BA General
664	222561-22-0014	561-1111-0478-22	Bikash Halder	BA General
665	222561-22-0247	561-1112-0852-22	Bikram Bag	BA General
666	222561-22-0243	561-1112-0825-22	Bikrom Malick	BA General
667	222561-22-0101	561-1111-0726-22	Chiranjit Senapati	BA General
668	222561-22-0028	561-1111-0521-22	Debjeet Khara	BA General
669	222561-22-0149	561-1111-0904-22	Debjit Chakraborty	BA General
670	222561-22-0236	561-1112-0737-22	Debobrata Sardar	BA General
671	222561-22-0231	561-1112-0631-22	Deep Bag	BA General
672	222561-22-0261	561-1112-1082-22	Deep Kumar Dalui	BA General
673	222561-22-0194	561-1111-1047-22	Dipak Thakur	BA General
674	222561-22-0270	561-1114-0887-22	Dipan Bakuli	BA General
675	222561-22-0008	561-1111-0465-22	Dripan Kala	BA General
676	222561-22-0020	561-1111-0499-22	Elhan Mansiz Mollick	BA General

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677	222561-22-0200	561-1111-1060-22	Eshan Hazra	BA General
678	222561-22-0063	561-1111-0605-22	Firoz Khan	BA General
679	222561-22-0218	561-1112-0449-22	Gourab Pramanick	BA General
680	222561-22-0107	561-1111-0740-22	Hedayet Mallick	BA General
681	222561-22-0254	561-1112-0903-22	Himansu Maji	BA General
682	222561-22-0124	561-1111-0791-22	Indranil Karmakar	BA General
683	222561-22-0197	561-1111-1054-22	Irbaz Mollick	BA General
684	222561-22-0281	561-1115-0636-22	Irfan Ali Molla	BA General
685	222561-22-0312	561-1115-1161-22	Irfan Mallick	BA General
686	222561-22-0307	561-1115-1063-22	Irfan Mollick	BA General
687	222561-22-0233	561-1112-0674-22	Jeet Mondal	BA General
688	222561-22-0238	561-1112-0764-22	Jeet Khamrui	BA General
689	222561-22-0142	561-1111-0847-22	Jit Karmakar	BA General
690	222561-22-0049	561-1111-0577-22	Kaif Mollick	BA General
691	222561-22-0193	561-1111-1046-22	Krishnendu Adak	BA General
692	222561-22-0022	561-1111-0501-22	Manab Sardar	BA General
693	222561-22-0253	561-1112-0899-22	Manash Kumar Ukil	BA General
694	222561-22-0102	561-1111-0727-22	Md Akim Ali Gayen	BA General
695	222561-22-0285	561-1115-0667-22	Md Mijanur Rahaman Molla	BA General
696	222561-22-0286	561-1115-0700-22	Md Sahim	BA General
697	222561-22-0114	561-1111-0761-22	Md Samser	BA General
698	222561-22-0152	561-1111-0908-22	Moinul Jamadar	BA General
699	222561-22-0223	561-1112-0504-22	Moon Sakhari	BA General
700	222561-22-0085	561-1111-0682-22	Mostak Mistry	BA General
701	222561-22-0300	561-1115-0986-22	Moudud Sepai	BA General
702	222561-22-0128	561-1111-0801-22	Nabidul Hassan	BA General
703	222561-22-0010	561-1111-0474-22	Nadim Hossain	BA General
704	222561-22-0093	561-1111-0698-22	Nisrin Khatun	BA General
705	222561-22-0268	561-1114-0788-22	Osman Ahmed Molla	BA General
706	222561-22-0207	561-1111-1074-22	Pallab Polley	BA General
707	222561-22-0086	561-1111-0684-22	Pappu Mondal	BA General
708	222561-22-0003	561-1111-0452-22	Partha Jana	BA General
709	222561-22-0226	561-1112-0555-22	Pitam Bag	BA General
710	222561-22-0185	561-1111-1015-22	Pranab Sarkar	BA General
711	222561-22-0150	561-1111-0905-22	Prasun Das	BA General
712	222561-22-0091	561-1111-0693-22	Prem Balmiki	BA General
713	222561-22-0225	561-1112-0549-22	Pritam Gayen	BA General
714	222561-22-0201	561-1111-1062-22	Priyam Das	BA General
715	222561-22-0242	561-1112-0789-22	Pronojit Gayen	BA General
716	222561-22-0037	561-1111-0541-22	Puskar Das	BA General
717	222561-22-0167	561-1111-0941-22	Rajdeep Manna	BA General
718	222561-22-0239	561-1112-0771-22	Rahul Mal	BA General
719	222561-22-0212	561-1111-1086-22	Raj Paik	BA General
720	222561-22-0246	561-1112-0840-22	Raju Mondal	BA General
721	222561-22-0127	561-1111-0799-22	Rakibul Mollick	BA General
722	222561-22-0118	561-1111-0776-22	Ramiz Raja Sanfui	BA General
723	222561-22-0220	561-1112-0457-22	Ranish Naskar	BA General
724	222561-22-0208	561-1111-1078-22	Ranit Hazra	BA General
725	222561-22-0215	561-1111-1091-22	Rigankar Mondal	BA General
726	222561-22-0224	561-1112-0526-22	Rohan Sardar	BA General
727	222561-22-0080	561-1111-0672-22	Rohisuddin Kazi	BA General
728	222561-22-0205	561-1111-1071-22	Rohit Ghosh	BA General
729	222561-22-0227	561-1112-0556-22	Rohit Mondal	BA General

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730	222561-22-0017	561-1111-0483-22	Roni Saha	BA General
731	222561-22-0156	561-1111-0919-22	Rupak Mondal	BA General
732	222561-22-0029	561-1111-0522-22	Rupan Adak	BA General
733	222561-22-0050	561-1111-0579-22	Rupankar Gayen	BA General
734	222561-22-0179	561-1111-0980-22	Rupantan Dey	BA General
735	222561-22-0123	561-1111-0790-22	Sagar Pal	BA General
736	222561-22-0133	561-1111-0818-22	Sahariyar Khan	BA General
737	222561-22-0089	561-1111-0688-22	Sahid Kazi	BA General
738	222561-22-0163	561-1111-0936-22	Sahid Mallick	BA General
739	222561-22-0171	561-1111-0961-22	Sahil Sardar	BA General
740	222561-22-0131	561-1111-0813-22	Saieb Ali Khan	BA General
741	222561-22-0202	561-1111-1064-22	Sakil Aktar Mondal	BA General
742	222561-22-0137	561-1111-0829-22	Samanta Bachar	BA General
743	222561-22-0030	561-1111-0523-22	Sanjib Singha	BA General
744	222561-22-0045	561-1111-0564-22	Santanu Das	BA General
745	222561-22-0256	561-1112-1017-22	Sawan Mondal	BA General
746	222561-22-0090	561-1111-0691-22	Sayan Bose	BA General
747	222561-22-0018	561-1111-0486-22	Sayan Mondal	BA General
748	222561-22-0232	561-1112-0640-22	Sayan Bag	BA General
749	222561-22-0178	561-1111-0979-22	Sayan Bodak	BA General
750	222561-22-0066	561-1111-0616-22	Sayan Mondal	BA General
751	222561-22-0115	561-1111-0767-22	Sayan Purkait	BA General
752	222561-22-0151	561-1111-0907-22	Sayan Samanta	BA General
753	222561-22-0157	561-1111-0920-22	Sayan Singha	BA General
754	222561-22-0283	561-1115-0641-22	Sekh Jahed	BA General
755	222561-22-0251	561-1112-0880-22	Shyan Das	BA General
756	222561-22-0071	561-1111-0628-22	Sk Izaz Ahamed	BA General
757	222561-22-0043	561-1111-0561-22	Sk Kaif	BA General
758	222561-22-0042	561-1111-0553-22	Sk Mijanur	BA General
759	222561-22-0035	561-1111-0539-22	Sk Ramez	BA General
760	222561-22-0169	561-1111-0949-22	Sk Shahil	BA General
761	222561-22-0134	561-1111-0819-22	Sk Zian Uddin	BA General
762	222561-22-0293	561-1115-0811-22	Sk Abdul Malick	BA General
763	222561-22-0176	561-1111-0977-22	Sk Akil Ali	BA General
764	222561-22-0002	561-1111-0448-22	Sk Alamgir	BA General
765	222561-22-0192	561-1111-1045-22	Sk Anis	BA General
766	222561-22-0302	561-1115-1027-22	Sk Anisur	BA General
767	222561-22-0130	561-1111-0807-22	Sk Anowar	BA General
768	222561-22-0141	561-1111-0846-22	Sk Anwaruddin	BA General
769	222561-22-0138	561-1111-0831-22	Sk Arif	BA General
770	222561-22-0294	561-1115-0851-22	Sk Arif Hossen	BA General
771	222561-22-0290	561-1115-0731-22	Sk Ariyan Hossain	BA General
772	222561-22-0103	561-1111-0728-22	Sk Arman	BA General
773	222561-22-0213	561-1111-1088-22	Sk Arman Ali	BA General
774	222561-22-0140	561-1111-0842-22	Sk Asraful	BA General
775	222561-22-0211	561-1111-1084-22	Sk Ayaz Akhter	BA General
776	222561-22-0309	561-1115-1095-22	Sk Ejajul	BA General
777	222561-22-0031	561-1111-0531-22	Sk Emran	BA General
778	222561-22-0001	561-1111-0443-22	Sk Farhan	BA General
779	222561-22-0125	561-1111-0792-22	Sk Hafijul Rahaman	BA General
780	222561-22-0153	561-1111-0909-22	Sk Injamul	BA General
781	222561-22-0077	561-1111-0666-22	Sk Irfan Ali	BA General
782	222561-22-0275	561-1115-0566-22	Sk Jahir Hossain	BA General

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783	222561-22-0180	561-1111-0983-22	Sk Mahammed Sahil	BA General
784	222561-22-0291	561-1115-0733-22	Sk Masud	BA General
785	222561-22-0059	561-1111-0595-22	Sk Md Mhaboob Raja	BA General
786	222561-22-0038	561-1111-0546-22	Sk Minajul Islam	BA General
787	222561-22-0304	561-1115-1040-22	Sk Miraz	BA General
788	222561-22-0297	561-1115-0885-22	Sk Misbahul Islam	BA General
789	222561-22-0295	561-1115-0872-22	Sk Naquibul Hasan	BA General
790	222561-22-0191	561-1111-1039-22	Sk Parbhaj	BA General
791	222561-22-0110	561-1111-0753-22	Sk Raisuddin	BA General
792	222561-22-0064	561-1111-0606-22	Sk Rajmool	BA General
793	222561-22-0083	561-1111-0678-22	Sk Rakib	BA General
794	222561-22-0047	561-1111-0568-22	Sk Rakibul	BA General
795	222561-22-0280	561-1115-0635-22	Sk Riaz	BA General
796	222561-22-0068	561-1111-0625-22	Sk Rizwanuddin	BA General
797	222561-22-0306	561-1115-1053-22	Sk Sadik	BA General
798	222561-22-0143	561-1111-0859-22	Sk Sahajada Ali	BA General
799	222561-22-0282	561-1115-0637-22	Sk Sahid	BA General
800	222561-22-0113	561-1111-0759-22	Sk Sahid	BA General
801	222561-22-0195	561-1111-1050-22	Sk Sahid	BA General
802	222561-22-0070	561-1111-0627-22	Sk Sahil	BA General
803	222561-22-0106	561-1111-0739-22	Sk Sahin	BA General
804	222561-22-0082	561-1111-0677-22	Sk Saidul	BA General
805	222561-22-0301	561-1115-1011-22	Sk Sajib	BA General
806	222561-22-0199	561-1111-1059-22	Sk Samim	BA General
807	222561-22-0084	561-1111-0680-22	Sk Samir Hossain	BA General
808	222561-22-0088	561-1111-0687-22	Sk Samir Hossain	BA General
809	222561-22-0136	561-1111-0826-22	Sk Serif	BA General
810	222561-22-0160	561-1111-0928-22	Sk Sohel	BA General
811	222561-22-0060	561-1111-0600-22	Sk Soyel	BA General
812	222561-22-0299	561-1115-0984-22	Sk Tamim Hassan	BA General
813	222561-22-0187	561-1111-1025-22	Sk Waquab Ur Rahaman	BA General
814	222561-22-0206	561-1111-1072-22	Sk Yeasin Ali	BA General
815	222561-22-0069	561-1111-0626-22	Sk Zahid	BA General
816	222561-22-0308	561-1115-1094-22	Sk Zahid Hussain	BA General
817	222561-22-0276	561-1115-0567-22	Sk. Sanju Mistri	BA General
818	222561-22-0272	561-1114-1061-22	Somenath Bera	BA General
819	222561-22-0074	561-1111-0644-22	Soumadeep Mondal	BA General
820	222561-22-0012	561-1111-0476-22	Soumo Das	BA General
821	222561-22-0021	561-1111-0500-22	Soumodeep Naskar	BA General
822	222561-22-0027	561-1111-0518-22	Soumyadip Biswas	BA General
823	222561-22-0245	561-1112-0830-22	Sounak Polen	BA General
824	222561-22-0076	561-1111-0665-22	Sourin Khamaru	BA General
825	222561-22-0188	561-1111-1028-22	Souvik Mondal	BA General
826	222561-22-0262	561-1114-0538-22	Srijan Das	BA General
827	222561-22-0092	561-1111-0696-22	Srijan Ghosh	BA General
828	222561-22-0098	561-1111-0717-22	Srinjoy Chakraborty	BA General
829	222561-22-0257	561-1112-1044-22	Subha Pramanick	BA General
830	222561-22-0053	561-1111-0583-22	Subhadeep Parui	BA General
831	222561-22-0096	561-1111-0710-22	Subhankar Chakraborty	BA General
832	222561-22-0036	561-1111-0540-22	Subhankar Samanta	BA General
833	222561-22-0249	561-1112-0874-22	Subhasis Bag	BA General
834	222561-22-0075	561-1111-0662-22	Subho Sahani	BA General
835	222561-22-0217	561-1112-0442-22	Subhro Naskar	BA General

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836	222561-22-0184	561-1111-1005-22	Sudip Banerjee	BA General
837	222561-22-0235	561-1112-0719-22	Sudip Naskar	BA General
838	222561-22-0228	561-1112-0576-22	Sudipta Das	BA General
839	222561-22-0237	561-1112-0762-22	Sudipta Mondal	BA General
840	222561-22-0260	561-1112-1076-22	Sudipta Sardar	BA General
841	222561-22-0311	561-1111-1162-22	Sujan Kar	BA General
842	222561-22-0210	561-1111-1081-22	Sujoy Adhikary	BA General
843	222561-22-0094	561-1111-0703-22	Suman Das	BA General
844	222561-22-0147	561-1111-0893-22	Sunay Pramanick	BA General
845	222561-22-0108	561-1111-0744-22	Sunayan Naskar	BA General
846	222561-22-0032	561-1111-0532-22	Supriyo Chakraborty	BA General
847	222561-22-0274	561-1115-0472-22	Surajit Ghosh	BA General
848	222561-22-0221	561-1112-0473-22	Surojita Mistry	BA General
849	222561-22-0079	561-1111-0669-22	Suvanjit Pradhan	BA General
850	222561-22-0271	561-1114-0915-22	Swanjan Paul	BA General
851	222561-22-0258	561-1112-1066-22	Tanusree Sardar	BA General
852	222561-22-0284	561-1115-0657-22	Tofayel Mollick	BA General
853	222561-22-0287	561-1115-0713-22	Touhid Mollick	BA General
854	222561-22-0263	561-1114-0557-22	Toushik Das	BA General
855	222561-22-0159	561-1111-0927-22	Utsha Das	BA General
856	223561-11-0052	561-1215-0266-22	Abida Khatun	ZOOA
857	223561-11-0054	561-1215-0281-22	Afroja Parveen	GEOA
858	223561-11-0053	561-1215-0273-22	Alka Yeasmin	ZOOA
859	223561-11-0041	561-1212-0310-22	Ananya Naskar	FNTA
860	223561-11-0005	561-1211-0270-22	Anindita Pramanick	ZOOA
861	223561-11-0024	561-1211-0320-22	Annanya Das	GEOA
862	223561-11-0025	561-1211-0321-22	Anwesa Banu	GEOA
863	223561-11-0026	561-1211-0325-22	Barsha Jana	GEOA
864	223561-11-0035	561-1212-0282-22	Bidisha Naskar	BOTA
865	223561-11-0027	561-1211-0328-22	Brishti Samanta	GEOA
866	223561-11-0040	561-1212-0308-22	Bristi Naskar	FNTA
867	223561-11-0034	561-1212-0277-22	Bristy Naskar	BOTA
868	223561-11-0032	561-1212-0267-22	Chaitali Malik	ZOOA
869	223561-11-0047	561-1214-0269-22	Debika Santra	ZOOA
870	223561-11-0009	561-1211-0279-22	Deboleena Chakraborty	BOTA
871	223561-11-0039	561-1212-0302-22	Debolina Santra	FNTA
872	223561-11-0018	561-1211-0301-22	Indrani Bhandari	FNTA
873	223561-11-0004	561-1211-0268-22	Maitry Adhikary	ZOOA
874	223561-11-0008	561-1211-0278-22	Mousumi Nath	FNTA
875	223561-11-0051	561-1214-0330-22	Oindrila Paul	GEOA
876	223561-11-0045	561-1212-0326-22	Piu Mondal	GEOA
877	223561-11-0042	561-1212-0312-22	Piyali Mondal	GEOA
878	223561-11-0020	561-1211-0305-22	Pritisha Addhya	FNTA
879	223561-11-0029	561-1211-0331-22	Ricta Chakraborty	GEOA
880	223561-11-0006	561-1211-0271-22	Rimika Manna	ZOOA
881	223561-11-0057	561-1215-0315-22	Rimna Khatun	GEOA
882	223561-11-0044	561-1212-0323-22	Ritu Das	GEOA
883	223561-11-0007	561-1211-0274-22	Riya Malakar	ZOOA
884	223561-11-0023	561-1211-0319-22	Sanghamitra Mazumder	GEOA
885	223561-11-0028	561-1211-0329-22	Sanjana Chandra	GEOA
886	223561-11-0055	561-1215-0304-22	Sannafaa Perveen	FNTA
887	223561-11-0030	561-1211-0333-22	Sayani Das	GEOA
888	223561-11-0050	561-1214-0311-22	Shraya Adhikary	FNTA

Serial Number	Roll Number	Registration Number	Name	Stream
889	223561-11-0016	561-1211-0299-22	Shreya Mondal	FNTA
890	223561-11-0010	561-1211-0285-22	Sk Jariya Bakhtiar	ZOOA
891	223561-11-0021	561-1211-0307-22	Sneha Das	FNTA
892	223561-11-0056	561-1215-0309-22	Sneha Khatoon	FNTA
893	223561-11-0031	561-1212-0265-22	Sneha Naskar	GEOA
894	223561-11-0019	561-1211-0303-22	Sneha Roy	FNTA
895	223561-11-0017	561-1211-0300-22	Sneha Samui	FNTA
896	223561-11-0013	561-1211-0291-22	Sohelley Rayhan	ZOOA
897	223561-11-0033	561-1212-0272-22	Suchandra Sardar	ZOOA
898	223561-11-0058	561-1215-0332-22	Sumaita Parvin	GEOA
899	223561-11-0043	561-1212-0314-22	Supriya Mondal	GEOA
900	223561-11-0003	561-1211-0264-22	Susmita Debnath	GEOA
901	223561-11-0001	561-1211-0262-22	Sweta Kar	GEOA
902	223561-11-0014	561-1211-0297-22	Trisha Khanra	ZOOA
903	223561-11-0046	561-1212-0327-22	Trisha Mondal	GEOA
904	223561-11-0049	561-1214-0306-22	Tuhina Sepai	FNTA
905	223561-21-0015	561-1114-1159-22	Amiya Paul	GEOA
906	223561-21-0011	561-1114-0316-22	Mehdi Hassan Sepai	GEOA
907	223561-21-0009	561-1112-0295-22	Rana Mondal	ZOOA
908	223561-21-0005	561-1111-0296-22	Shouvik Mandal	ZOOA
909	223561-21-0001	561-1111-0276-22	Siraj Sekh	ZOOA
910	223561-21-0007	561-1111-0324-22	Sk Rafiqul	GEOA
911	223561-21-0014	561-1115-0318-22	Sk Sahil	GEOA
912	223561-21-0006	561-1111-0322-22	Soumodip Singha	GEOA
913	223561-21-0010	561-1114-0313-22	Suman Pal	GEOA
914	223561-12-0011	561-1211-1121-22	Aasema Yasmin	B.Sc. General
915	223561-12-0009	561-1211-1114-22	Koyel Banerjee	B.Sc. General
916	223561-12-0015	561-1215-1120-22	Muhsinah Perveen	B.Sc. General
917	223561-12-0006	561-1211-1108-22	Nazma Akbar	B.Sc. General
918	223561-12-0005	561-1211-1107-22	Neha Halder	B.Sc. General
919	223561-12-0007	561-1211-1109-22	Nitu Maji	B.Sc. General
920	223561-12-0008	561-1211-1112-22	Oishi Dutta	B.Sc. General
921	223561-12-0001	561-1211-1100-22	Puja Mondal	B.Sc. General
922	223561-12-0003	561-1211-1103-22	Riya Mondal	B.Sc. General
923	223561-12-0012	561-1211-1122-22	Shraya Dutta	B.Sc. General
924	223561-12-0014	561-1212-1119-22	Tithi Mondal	B.Sc. General
925	223561-22-0010	561-1114-1110-22	Arpan Das	B.Sc. General
926	223561-22-0009	561-1114-1096-22	Pritam Das	B.Sc. General

UNIVERSITY OF
CALCUTTA

BUDGE BUDGE COLLEGE PROJECT

ENVIRONMENTAL STUDIES

TOPIC

Pond Ecosystem

NAME: SREHA MONDAL

Semester: 2nd

Stream: B.Com(Hon)

University Roll No. 221561-11-0019

University Reg. No. 561-1211-0416-22

ପୁନଃ ବାଣିଜ୍ୟ ଯେତେ

[Study of Pond Ecosystem]

● Editor (Introduction)

⑤ समस्या (Problem)

① Importance of the Problem

It is very important to study the present
condition and the future development of
the project. It will help us to know the
present condition of the project, its
strengths and weaknesses, its
present problems, its
future prospects, etc.

② Objectives of the Project

- (a) To provide employment to the people of the area.
- (b) To develop the area and reduce poverty or unemployment.
- (c) To provide basic services like water supply, electricity, roads, etc.

③ Plan of work

The plan of work includes the following steps:
1. Survey and reconnaissance, 2. Feasibility study,
3. Detailed planning, 4. Construction, 5. Operation and maintenance.
The survey and reconnaissance involve collecting
information about the area, its resources, population, local
and national economy, its history, culture, etc., which
will help in formulating a feasible plan. The detailed
planning involves the preparation of a detailed
plan for the project, including the design, construction,
operation, and maintenance. The construction
phase involves the actual construction of the project,
which may take several years. The operation and
maintenance phase involves the day-to-day
management of the project, including the
monitoring of performance, maintenance of equipment,
and handling of emergencies.

କାହାର ଦେଖିଲୁ ନାହିଁ, କାହାର ପାଇଁ କାହାର କାହାର କାହାର
କାହାର କାହାର କାହାର, କାହାର କାହାର କାହାର, କାହାର କାହାର
କାହାର କାହାର | କାହାର କାହାର କାହାର କାହାର
କାହାର, କାହାର କାହାର, କାହାର କାହାର, କାହାର କାହାର
କାହାର କାହାର.

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- 3) ପରେ ଏକାନ୍ତରୀଣ ମୁଦ୍ରା ହେଲା.

ગુજરાત: રાજકોટ : ગુજરાત

ଦେଶବିନ୍ଦୁ : ପରିମ୍ବା

၆) အနေဖြင့် အမျိုး ၃၂:ၤ၄

৬) মানবিক তথ্যঃ ২৫/০৪/২০২৬

② କର୍ମକୁ ନିଜାକୁ ପରିଦ୍ୱାରା ଅନୁଷ୍ଠାନିକ କରିବାକୁ ପରିଚାଳନା କରିବାକୁ ଆବଶ୍ୟକ।

4) କର୍ମଚାରୀ: ଡାକ୍, ପାଇଁ, ପାଇଁର, ପାଇଁରୁ ପାଇଁରୁ, କର୍ମଚାରୀ, କର୍ମଚାରୀ, କର୍ମଚାରୀ,

७) अद्यः विद्या, अनुवान, शब्दोऽपि, एवं विद्या, विद्या, विद्या, विद्या, विद्या, विद्या,

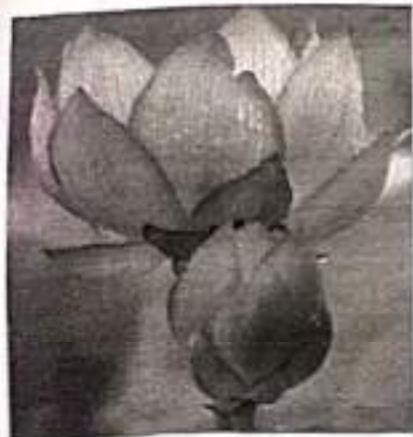
8) *(Tentative title: The Great Lakes, Lake Ontario, Lake Huron, Lake Michigan,*

၃) အနေအထာက်၊ အမြတ်၊ အရှင်ပါ



ପ୍ରକାଶକୁ ଧରି

① Data analysis (Data analysis) के लिए विभिन्न तरीकों का उपयोग किया जाता है। इनमें से कुछ महत्वपूर्ण तरीके निम्नलिखित हैं:



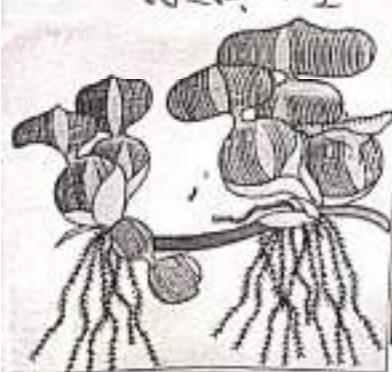
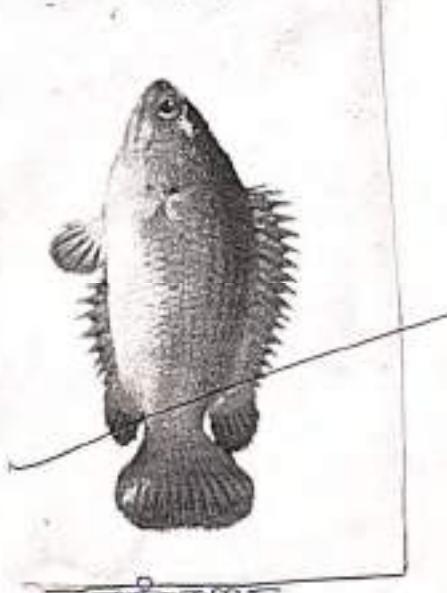
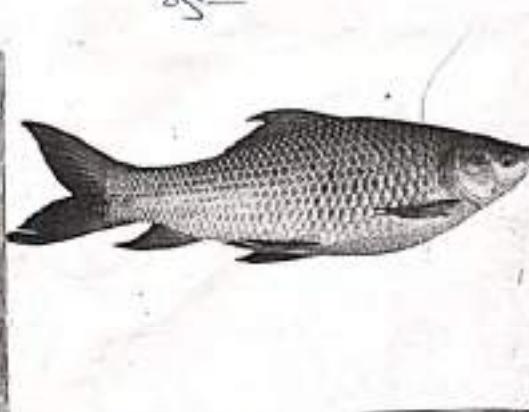
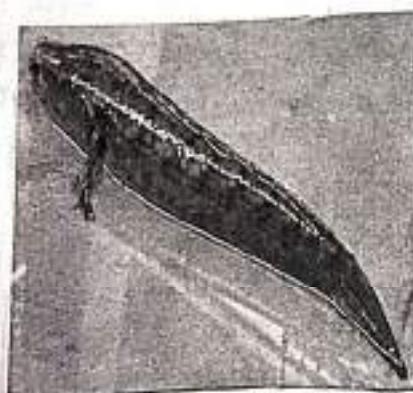
1995-96



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⑥ ବୁଦ୍ଧି (Buddhism)

⑥ अधिकारी शिवाय (Initiation of the Study)

~~the best way to do this is to have a separate
sheet for each subject. This will help you to
keep track of what you have learned and what you
still need to study. It will also make it easier to
review your notes later on. Another good idea is
to use a spiral notebook or a folder to keep your
notes organized. This will help you to find what
you need quickly and easily. Finally, it's important
to take breaks while studying. If you feel like you
are getting tired, take a short break and then
come back to your notes. This will help you to
stay focused and avoid burnout.~~

④ ବ୍ୟାଜକ୍ ପରିମାଣ (Interest Rates)

- 1) 'ନିର୍ଦ୍ଦିତ ଦର' - ବ୍ୟାଜ ଦର ନିର୍ଦ୍ଦିତ,
- 2) ବ୍ୟାଜ, ଅନୁକରଣ ଦର,
- 3) ବ୍ୟାଜ, ଅନୁକରଣ ଦର.

⑤ ଆଚାର୍ଯ୍ୟ ପରିମାଣ (Acknowledgement)

ଆଚାର୍ଯ୍ୟ ଦର/ବରଷିଗ୍ରାମ, ଶରୀରକ ଦରର କ୍ଷମିତା ?
ଆଚାର୍ଯ୍ୟ ଦରର ଉପରେ କୌଣସି କହିଲୁ କିମ୍ବା କିମ୍ବା କିମ୍ବା
ଏବଂ ଆଚାର୍ଯ୍ୟ ଦରର କୌଣସି କିମ୍ବା କିମ୍ବା କିମ୍ବା
କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା
କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା

U.Roy
06.07.2023

CALCUTTA UNIVERSITY
BUDGE BUDGE COLLEGE

NAME: RUHINA KHATUN

CU ROLL NO: 222561-11-0194

REG. NO.: 561-1215-0205-22.

SUB: ENVS

PAPER: AECC - 2

SESSION: 2022 - 2023

TOPIC OF PROJECT: [Study of pond Ecosystem]

ବୁଦ୍ଧିମତ୍ତେ

ବୁଦ୍ଧିମତ୍ତେ

୧. ଡ୍ରୋମ୍ୟ

୨. ଅଭ୍ୟାସ

୩. ଅଭ୍ୟାସ ପ୍ରକଳ୍ପ

୪. ପ୍ରକଳ୍ପର ଦୈନିକୀ

୫. କାର୍ଯ୍ୟ ଆବଶ୍ୟକତା

୬. ତେଜ୍ଜ ଅନ୍ତର୍ଗତ

୭. ତେଜ୍ଜ ବିଜ୍ଞାନ

୮. ବ୍ୟାକ୍ସନ

୯. କାର୍ଯ୍ୟ ଆବଶ୍ୟକତା ଜୀବି

୧୦. ପ୍ରେକ୍ଷଣ

୧୧. ବୃତ୍ତକ୍ରମ ପ୍ରକଳ୍ପ

ମୁଖ୍ୟାଲ୍ୟ

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ପ୍ରକାଶର ବାନ୍ଦିତଳେ

[Study of pond Ecosystem]

ଓଡ଼ିଆ, ଅର୍ଥାତ୍ କୋର୍ଟରେ କମାପୁଣ୍ଡି କାହାରେ ମୁହଁତେ
କଳ ଦୂଷିତ ହୁଏ ଏବଂ ସୁନ୍ଦର ପ୍ରେସ୍ ଲାଇସେନ୍ସ ଜୀବର
ବାରପ୍ରଧାନ [ଜଗନ୍ନାଥ] ମୁହଁତେ ଏବଂ କାହାରେ
ଫେଡରାଲ୍ ରିବନ୍ ହୁଏ, ଫର୍ମିଳ ସଞ୍ଚାର ଏକ୍ସିଟ୍ କେବଳ
କେଣ୍ଟ ମୁହଁତେ କାହାରେ ନିର୍ଦ୍ଦିତ ହେବାରେ
କାହାରେ ମୁହଁତେ କାହାରେ କାହାରେ କାହାରେ କାହାରେ
ବେଳକୁବେଳ,

- ଅଭିଭ୍ୟାବ ଶ୍ରେଣୀ : ଅଭିଭ୍ୟାବ ଫର୍ମିଳ କାହାରେ ମୁହଁତେ
କେଣ୍ଟ ରାଜ୍ ଓ ଜଗନ୍ନାଥ ଦ୍ୱାରା କାହାରେ ଏବଂ କାହାରେ
କାହାରେ ଏବଂ କାହାରେ ଏବଂ, କିମ୍ବା ନିର୍ଦ୍ଦିତ କାହାରେ
କାହାରେ ଏବଂ କାହାରେ ଏବଂ, କାହାରେ ଏବଂ କାହାରେ
ଏବଂ କାହାରେ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ
ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ
ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ
ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ ଏବଂ
- ପ୍ରଣାମର କ୍ଷେତ୍ରକୁ : 'ମୁହଁତେ କାହାରେ ଦର୍ଶନ' ଅବଶ୍ୟକ
ଦ୍ୱାରା କାହାରେ -

(1) ମୁହଁତେ କାହାରେ ମଧ୍ୟରେ ଉପରେ ଉପରେ କାହାରେ ଏବଂ
କାହାରେ ଏବଂ କାହାରେ ଏବଂ କାହାରେ ଏବଂ କାହାରେ ଏବଂ
କାହାରେ ଏବଂ କାହାରେ ଏବଂ କାହାରେ ଏବଂ କାହାରେ ଏବଂ

(2) ମୁହଁତେ କାହାରେ କାହାରେ ଏବଂ କାହାରେ ଏବଂ
କାହାରେ ଏବଂ କାହାରେ ଏବଂ କାହାରେ ଏବଂ କାହାରେ ଏବଂ
କାହାରେ ଏବଂ କାହାରେ

(3) ମେଲିଖାତ ପୁଷ୍ଟିର ଆଶିନ୍ତା କୁଣ୍ଡ ରଖାଯାଏ ଏବଂ ପରିଚି
ବାଜାରିଙ୍କୁ କ୍ଷେତ୍ରରେ ବନ୍ଦ,

□ ସମ୍ବନ୍ଧିତ ବିଷୟ : ପ୍ରଥମ ବୋର୍ଡର କମିକ୍ସ / କ୍ଷେତ୍ର

ଏ ଜାମ୍ ଏବଂ 'ପୁଷ୍ଟିର ବାହୁଦିନ ମର୍ଗରେ' ପ୍ରକଳ୍ପ
ମୁଦ୍ରା ଦର୍ଶନ କରିଲାମ, ଏବଂ ପଦ ହେଉଥିଲା
ବୋର୍ଡର କମିକ୍ସ ବାହୁଦିନ ପ୍ରକଳ୍ପ ମୁଦ୍ରା
ମେଲିଖାତ ହଜାର, କେବଳ ବ୍ୟବସାୟ କାର୍ଯ୍ୟ, ବ୍ୟବସାୟିକ
ପ୍ରକଳ୍ପ, ବ୍ୟବସାୟ କାର୍ଯ୍ୟରେ ଅଳ୍ପ, ବ୍ୟବସାୟିକ
ଅତିକାରୀ ହେଉଥିଲା, ବେଳେ ବ୍ୟବସାୟ କାର୍ଯ୍ୟ
ବାଧନାମ, ମୁଦ୍ରାରେ ବ୍ୟବସାୟ କାର୍ଯ୍ୟ
କାର୍ଯ୍ୟ ଏବଂ ପୁଷ୍ଟିର ଉପରେ ବ୍ୟବସାୟ କାର୍ଯ୍ୟ
କାର୍ଯ୍ୟ, ବ୍ୟବସାୟ ଉପରେ ପ୍ରାକିନ୍ଦି ବେଳେ ବୋର୍ଡ
କମିକ୍ସ କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ ଉପରେ ଏବଂ ବ୍ୟବସାୟ
କାର୍ଯ୍ୟ ଉପରେ ଏବଂ ଏହି କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ
କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ କାର୍ଯ୍ୟ

625 34°31'2":

- পুস্তক কলাক্ষেত্র নাম :- চৰঙ্গতি বাৰ্তা প্ৰচাৰ

 - ১) বেঞ্চন : প্ৰাচী প্ৰযোগৰ
 - ২) পৰৱেশনৰ অবস্থা : প্ৰমাণিত
 - ৩) পৰৱেশনৰ তাৰিখ :- 20/5/2023
 - ৪) দৈনিক বেঞ্চন প্ৰক্ৰিয়া :— বালকী, শুভাব্যাস, দল,
 - ৫) কলাত বৈচিত্ৰ্য :— মূল, কোথুক, চৰুচিনি, ক্ষোভন, কৰ্মসূচি,
 - ৬) পালি :— চৰঙ্গতি, কৰ্মসূচি, দল, বালকী, ক্ষোভন,
 - ৭) প্ৰাবল্যাবলী :— উপর অৱস্থা, অক্ষয় স্তোত্ৰ, শুভাব্যাস,
 - ৮) পালিঃ— কৰ্মসূচি, দল, দল, পালকীটি,

৯) ওঝে বেঞ্চনৰ কথা : অংতীম ওঝে প্ৰেৰণা আৰম্ভ হ'ল পুস্তক
বস্তৰজনীৰ কৰ্মসূচি পুনৰুৎপন্ন কৰা
— কৰ্মসূচি অন্তৰ কৰ্মসূচি এবং একই পুনৰুৎপন্ন অন্তৰ
হ'লে। এই বাস্তৰজনীৰ পুনৰুৎপন্ন হ'ল কৰ্মসূচি
কৰণ, অৱস্থাৰ পুনৰুৎপন্ন হ'ল কৰ্মসূচি
অন্তৰ কৰণ, কৰ্মসূচি, অক্ষয় স্তোত্ৰ
কৰণ কৰণ, কৰ্মসূচি, দল, দল, পালকীটি
পুনৰুৎপন্ন কৰণ, কৰ্মসূচি, অক্ষয় স্তোত্ৰ
কৰণ —

ଅଲିପି ଭାଷା	ଆତ୍ମ ଠାଙ୍କ	ଫ୍ରଣ୍ଟ ଟଙ୍କ	ଦ୍ୱାରା	ଅଧିକାରୀ ପତ୍ର
୧) ଶୁଣିବ ଏଥାରୁ	ଶୁଣନ୍ତିଲା, ଶୁଣନ୍ତିଲା ଶୁଣନ୍ତିଲା ଆଶିଖିଲା ଶୁଣନ୍ତିଲା ଆଶିଖିଲା	ଶୁଣିବ ଓ ଲିଖିଲା ଶୁଣନ୍ତିଲା, ଶୁଣନ୍ତିଲା ଶୁଣନ୍ତିଲା ଓ ଲିଖିଲା	ଶୁଣନ୍ତିଲା (ମାତା) ଶୁଣନ୍ତିଲା, ଶୁଣନ୍ତିଲା ଶୁଣନ୍ତିଲା,	ପଢ଼ିବା
୨) ଶୁଣିବ କହିଲା	ଶୁଣନ୍ତିଲା	ଶୁଣିବ କହିଲା	ଶୁଣନ୍ତିଲା (ମାତା, ଆଶିଖିଲା)	ପଢ଼ିବା
୩) ବ୍ୟାହ	ବ୍ୟାହ, ଶୁଣନ୍ତିଲା	ଶୁଣନ୍ତିଲା କହିଲା	ଶୁଣନ୍ତିଲା କହିଲା ବାବାର ବ୍ୟାହ କହିଲା ଏବଂ ଶୁଣନ୍ତିଲା	ପଢ଼ିବା, ଶୁଣନ୍ତିଲା
୪) ଅଳା	ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା	ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା	ଅଳା ଓ କହିଲା କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା	ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା ଅଳା ଓ କହିଲା
୫) ହାତ	ହାତମୁଣ୍ଡର	ହାତମୁଣ୍ଡର ହାତମୁଣ୍ଡର	ହାତମୁଣ୍ଡର, ଅଳା ଅଳା, ଅଳା	ପଢ଼ିବା

ଅନୁଷ୍ଠାନିକ : ଅନୁଷ୍ଠାନିକ କାର୍ଯ୍ୟ କରିବାର ସମ୍ବନ୍ଧରେ ଅଣ୍ଟାର୍ଥିକ ଅନୁଷ୍ଠାନିକ କାର୍ଯ୍ୟ କରିବାର ପାଇଁ ଏହା କାହାର ଦେଖିଲୁ ନାହିଁ । କାହାର ଦେଖିଲୁ ନାହିଁ ।

□ কর্ম পরিবহনার জীবনস্তোত্র : পুরুষের বাহুত্তম সুবিজ্ঞপ্তির জৰ্দি
 অঙ্গে কীবৰে কালক্রমে বলা অঙ্গে ইত্যুৎস ওঠে না,
 এগুলো ভূমিকার বাহুত্তম পৌরুষের ক্ষেত্রে দ্রুত
 পুরুষের পুরুষ অধিকার করে ইত্যুৎস, কুকুর দেখলা
 এই বাহুত্তম ক্ষেত্রে পুরুষের অধিকার করে ইত্যুৎস
 পুরুষ, বলুণ ফুব বলু অঙ্গে এগুচি পুরুষ
 শোলে বাহুত্তম অঙ্গে উচ্চুণ ক্ষেত্রে পুরুষের ক্ষেত্রে,
 টেরে দেখলুণ বাহু জীবনস্তোত্র, পুরুষ পুরুষ
 বাহুত্তম যে খেড়েকুকুল সাড়ে দ্রুত দেখলুণ,
 অঙ্গ অঙ্গে পুরুষের ক্ষেত্রে অঙ্গ ইত্যুনি,

■ অঙ্গসাঙ্গী:

- 1) 'পরিবেশ ক্ষেত্র' — ক্ষেত্র অব্যাক্তিক্ষেত্র উভয়ে,
- 2) আম্ব এ. : পরিবেশ ক্ষেত্র,
- 3) কীবৰ একান পুরুষে — ধী, ট্রোচার্স, আড়ে,
- 4) পরিবেশ ক্ষেত্র — এড়া, বি. ও. আটোরা,

କୁଣ୍ଡଳା ଛୀମନ୍ଦିର : ପୁରୁଷୀ ଗୁରୁତ୍ବ କର୍ମଚାରୀ ପ୍ରମାଣିତ
କାହାର ଜଳ ଲୋକାଧିକ ବଣିକାଙ୍କ ଆଧ୍ୟାତ୍ମିକ
ପରିଵାର ଶେଷପ୍ରାପ୍ତ ଅନ୍ତର୍ଗୁର୍ବର ବଣତ୍ର ପ୍ରକାଶ କାର୍ଯ୍ୟ
ଆଧ୍ୟାତ୍ମିକ ମାଧ୍ୟମରେ ଉପରେ ଆଧ୍ୟାତ୍ମିକ ପ୍ରକାଶକ
କାହାର କାର୍ଯ୍ୟ ଅନ୍ତର୍ଗୁର୍ବର ହୁଏ ନା, ସାଥୀଙ୍କ କାନ୍ତି କୁଣ୍ଡଳା
କାନ୍ତିଙ୍କୁ ଯାରେ କୁଣ୍ଡଳାର ଦୁର୍ଦ୍ଵାରା କାନ୍ତି କାନ୍ତି
ଆଧ୍ୟାତ୍ମିକ ଆଧ୍ୟାତ୍ମିକ ବଣିକାଙ୍କ ଆଧ୍ୟାତ୍ମିକ କାନ୍ତି

U.R.S X
05.07.2023

UNIVERSITY OF CALCUTTA
BUDGE BUDGE COLLEGE
SEMESTER - 2nd
B.Sc GEOGRAPHY HONOURS

REGISTRATION NO. - 561-1215-0315-22

ROLL NO. - 223561-11-10057

SUBJECT - ENVS

YEAR - 2023

TOPIC - ECOSYSTEM OF POND

ପୁରୁଷରେ ବାଧ୍ୟତନ୍ତ୍ର

ପ୍ରମିଳା (Introduction):- ଅନୁକୂଳ ପରିବଳେ ଉତ୍ସାହୀୟ ପ୍ରମିଳା
ବୈଚି ଥାକେ, ତାକେ ଆହୁତିକ ବାଜାରମି ଏଲେ, ପରିବଳେରେ ମର୍ଦ୍ଦ ଆହୁତିକ
ପରିବଳେ ଏକଟି ଶୁଦ୍ଧପୂର୍ଣ୍ଣ ଉତ୍ସାହ ଜାଣି। Limnology ମନ୍ଦିର ବିଜ୍ଞାନ
ମିଶି ହଜେଇଁ ମାତୃତିକ ପରିବଳେ ନିମ୍ନେ ଆଲୋଚନା କରୁଥିଲୁ, ଅବଧି
ଜଳେରେ ଆହୁତିକ ବାଜାରମି ବା ଲେଖାତିକ ହୃଦୟରେ ଏବୁ ଏକଟି ଶୁଦ୍ଧ
ଉତ୍ସାହ ମାତୃତିକ ପୁରୁଷି। ପୁରୁଷ ହଲ ନମାତ୍ମକରୁ ଉପିଦିତ ଓ ମନୀର ବାଜାରୁାନ,
ବିଜ୍ଞାନ ଏକଟି ଆଚୀନତା ଏବୁ ଜୀବଜ ଉତ୍ସାହର ଏକ ଅଗରେର ଅଳ୍ପ ବିନ୍ଦୁମୁଖ୍ୟ
କିମ୍ବା ଏକଟି ବାଧ୍ୟତନ୍ତ୍ର ଜାରି କରେ, ପୁରୁଷରେ ବାଧ୍ୟତନ୍ତ୍ର ହଲ ଏକଟି ମୁଣ୍ଡାଯୁଦ୍ଧର
ବାଧ୍ୟତନ୍ତ୍ର, ପୁରୁଷରେ ଏକଟି ଜୁଲିନିର୍ମିତ ଆନ୍ଦ୍ୟକୃତୀଯତା ଦେଖା ଥାଏ, ମାତୃତିକ ଉତ୍ସାହ
ଏବୁ ବିଭୋଜନେ,

ଅନ୍ୟାନ୍ୟ (Problem):- ପ୍ରାଣେ ପୁରୁଷର ଶୁଦ୍ଧ ଆଧିକୀୟ, ଲାଗୁ ପୁରୁଷରେ
ଜଳେ ମୂଳ, କାମଙ୍ଗ କାଟା, ପରି ମାଜା ହିତ୍ତରେ ଆମ୍ବାତ୍ମ
ଜୀବରେ ସମନ୍ଵ୍ୟ କରୁ, କିନ୍ତୁ ପୁରୁଷର ତତ୍ତ୍ଵ ଜକାନ୍ତିପରିଶ୍ରବ୍ୟ ମୂଳ, ଆବଶ୍ୟକ
ଦ୍ୱେଳା ଏବୁ କାମଙ୍ଗ କାଟା ଦ୍ୱେଳାର ଜଳ ପୁରୁଷରେ ବାଧ୍ୟତନ୍ତ୍ରରେ ଝାଁଙ୍ଗ
କରେ ଦିଲ୍ଲେ, ଯା ଆହୁତିକ ଉତ୍ସାହରେ ବିନଷ୍ଟ କରୁଛୁ। ଆଜେ ପୁରୁଷରେ
ବାଧ୍ୟତନ୍ତ୍ର ଲାଗେଇନ କୃତ ଏବୁ କୃତ ମୁହଁଷେ ଶୁଦ୍ଧପୂର୍ଣ୍ଣ

ଉଦ୍ଦେଶ୍ୟ (Objectives):-

- ତାରେ ପୁରୁଷ କୀ କୀ ଉପିଦିତ ଓ ମନୀ ଆକେ ତାର ନମ ଲିପିବିଦ୍ୟା କରା
- ଉପିଦିତ ବାଧ୍ୟତନ୍ତ୍ର ଲିପିବିଦ୍ୟା କରାଟି,
- ମନୀଦେର ଶ୍ଵାଶଅର୍ଦ୍ଦୀ, ମମନାର୍ଦ୍ଦୀ ଏବୁ ମାତୃ ଲିପିବିଦ୍ୟା କରା,
- ପୁରୁଷର ଜଳ କୋଣତାରେ ଦୂରି ରାଖୁ କିମା ଆ ନିନ୍ଦିତ କରା,
- କୀଜାରେ ଦୂର ମତିଜୀବି କରା ଏବୁ ଉତ୍ସାହ ଉପାଦାନ ନିମ୍ନ କରା,

ମାତ୍ର ଅନ୍ୟାନ୍ୟର ଟୋକୋଲିକ ଅଧ୍ୟାନ (Location or Study Area):-

- ପୁରୁଷରେ ନାମଙ୍କ ଚିନ୍ତାତିରେ ପୁରୁଷ
- ପୁରୁଷରେ ଅଧ୍ୟାନ (ପ୍ରାମ ଏ ସୌରାଜନେର ନମ): ବଜାଜ ସୌରାଜନ
- ଦୂରି (କାଳିତ ଏକେ କିମିର ଅମ୍ବାତ୍ମ ଦୂରି): ୧୦ ମିନିଟ୍

তথ্যসংগৃহণের পদ্ধতি (Methods of Data Collection):-

① প্রাথমিক তথ্যসংগৃহণ :- আমি অনুসরে এমন নির্দেশ
পুরুষের লোকের বিভিন্ন তথ্যসংগৃহণ করে জোড়াকে
হুলে ফেলাম। ক্যালেন্ডার উপরে বিভিন্ন টেপিদের সাথীয় ছবি
হুলিমাম, পুরুষের মাঝি স্বয়ং তার অংশ করে কলেজে পড়ালাম।
এবং পুরুষ মাঝে পুরুষ স্বয়ং বিভিন্ন ঘন্টাগুরুত্ব তাবাখ্যে অনেক হচ্ছে মাঝে
স্বেচ্ছাচারণ করে বিভিন্ন তথ্যসংগৃহণ করুলাম।

② অনেকের মধ্যে তথ্যসংগৃহণ :- বিভিন্ন বর্ষ ও পরিষেবা মধ্যে প্রাণী ও
অধিকারীর বিভিন্ন অ্যাডভার্টিশন করছি।

ফলাফল (Results):-

Table : 1

টেপিদের নাম	ব্যক্তিগত	অন্যান্য ক্ষেত্রে অবস্থান
A. শারীরিকঃ ১. অন্তর্টার্ক্যান্টার্স ২) গামুটার্ম	জলের মধ্যে	প্রাণী
B. ম্যানেজঃ ১. পুরুষ ২. মহিলা ৩. কালুক ৪. কাঁচি	জলের ধারে জলের ধারে মাছীর বেলে জলে অজ্ঞান	প্রাণী প্রাণী প্রাণী প্রাণী

পুরুষের অবৃত্ত টেপিদ আরেক অঙ্গীয় ডেপার্টমেন্ট অঙ্গীয়-
বিভিন্ন অবস্থায় মাঝে প্রাণীর অবস্থার ক্ষেত্রে, জলের ক্ষেত্রে প্রাণীর অবস্থার
ক্ষেত্রে মাদু-জ্বাই ক্ষেত্রে এবং তাপের হোঁকে শাত্ৰুর জেলে বীৰ্য্যের
পুলিশে মাদু বিমোচনে প্রক্রিয়া ক্ষেত্রে, পুরুষের জলে ৫ পুরুষের ডেপার্টমেন্ট
ক্ষেত্রে মাদু মাদু, মাদু কাঁচি মাদু ক্ষেত্রে জলে পুরুষের অবস্থায় চিহ্নিত
ক্ষেত্রে মাদু, বাবিতুলি মাদু ক্ষেত্রে দেখাতে পুরুষের অবস্থায়

କିମ୍ବା ତାଙ୍କୁ ଡଲେଟ୍ ସାଥେ ବ୍ୟବସାୟ କରିବାକୁ, ଆବଶ୍ୟକ କିମ୍ବା ତାଙ୍କୁ ଡଲେଟ୍ ଅଣିବେ ବ୍ୟବସାୟ କରିଛି। ଡାକ୍ଷତମ ମାତ୍ରରେ ମ୍ୟାଗ୍ ହିଂଜେ ଶ୍ୱରପ୍ରତି ରୁଷ ଶ୍ୱର ବାଟୁ ବାଟୁଳି ଡଲେ ଡୋ (Dissolve Oxygen) - ଏହି ଜାନ ବାଜାରୁ ବୁଝେ, ତା ଚାହୁଁ ଓ ଏ ଗାତ୍ରେ କିମ୍ବା ଡଲେଟ୍ ପରିପାର୍ଶ୍ଵରେ ବ୍ୟବସାୟାଳା,

Table : 2

ପ୍ରାଚୀନ ଲାଠା	ବ୍ୟାପକ୍ୟାତ	ମାନ୍ୟଲ୍ୟାଙ୍କର ଅଧ୍ୟାତ୍ମ
୧. ଦ୍ରୋଷିତିଳ୍ପିଆ (a) ଆମ (ଜଳଦଶ୍ରୀ)	ଜଳେଟ ବାଟୁ	ତୁମ୍ହିଁ ଯାହିଁର ଥାଏନ୍ତି
୨. ପାଣିର (a) ମାତୃବ୍ୟାକ (b) ଛୁଟ	ମୁହୂର୍ତ୍ତର ପାଣି - ମାତୃବ୍ୟାକ ଜଳେ ମୁହୂର୍ତ୍ତର ଛୁଟ ଉତ୍ସମାନ	ତୁମ୍ହିଁ ଆହୁରିତ ଥାଏନ୍ତି ତୁମ୍ହିଁ ଯାହିଁର ଥାଏନ୍ତି

ପ୍ରଦ୍ରବ୍ୟକୁ ଡଳେ 13 ମି ଲାଗୁମିଳ ଥାଏନ୍ତି; ଏ ଲି ହିରୀଶ୍ ଅଣିହିଁ ଥାଏନ୍ତି
ଏବୁ 2 ଲି ହିରୀଶ୍ କାହିଁରୁ ଥାଏନ୍ତି ବଢ଼ିମାନ । ହରଦ୍ଵାରା ବାତାଖାନ ପ୍ରକାଶ ହାତୁ
Niche ଅଳାକା ଅବେ ହରଦ୍ଵାରା ହାତୁ ଲୋକୋ ସଜିମାନିଙ୍କ କ୍ଷେତ୍ର ବ୍ୟାପି ।

Table : 3

ପ୍ରାଣୀର ନାମ	ଗମନାଳ୍ପିତ	ଶ୍ଵାସଅଳ୍ପି	ଧାର୍ଯ୍ୟ
୧. ପୁଁଲି ମାଟ୍ୟ	ପାଥନା	ପୁଲିକା	ପାଇଦେଖିଲୁଏଇବୁ ହେଲାଏଇବୁ
୨. ଚିତ୍ତି	ଏକ ଟିଳାଣ୍ଡି	ପୁଲିକି	ପାଇଦେଖିଲୁଏଇବୁ ହେଲାଏଇବୁ
୩. ବୋଲି ମାଟ୍ୟ	ପାଥନା	ପୁଲିକା	ବୋଲିଦେଖିଲୁଏଇବୁ ହେଲାଏଇବୁ
୪. ପାତ୍ର	ଲିପୁଲାଦ	ଶ୍ଵାସପ୍ରାଣ	କିମାତୀ
୫. ମାଟୁଡାତା	ପାଥନା	ଶ୍ଵାସପ୍ରାଣ	ମାଟୁଡାତା
୬. ହୀମ	ଲିପୁଲାଦ	ଶ୍ଵାସପ୍ରାଣ	ହୀମ ପୁଲି

ବାହୁଦ୍ରୁଦ୍ଧ ଟୋବିଲେ କେନ୍ଦ୍ରରେ ପାଇଁ ରମ୍ ଫିଡ଼ିଜ୍ ପ୍ଲାନୀଟ୍ ଗମନଳୀ
ଶାଖା, ଅମନ-କ୍ଲୁଡ୍ ପାରିଶର, ଆବାସ୍ କାର୍ଯ୍ୟ ଲିମିଟ୍‌ଡ୍, ଆବାସ୍
କର୍ମ୍ୟୋକ୍ଷ ଏବଂ ଡୋକ୍ସ୍, କେଳା ପ୍ଲାନୀଟ୍ ଥ୍ରୀମ୍ ଓର୍କ୍ସ୍ ମୁଦ୍ରାତ୍ମକ ଅଧିକ
କାର୍ଯ୍ୟ ମୂଳକା, (୨୩୬ ମୁଦ୍ରା)ଟୁକରେ ମାୟ, ଆବାସ୍ (୨୩୬ କିଂପାଞ୍ଚ ମାୟ

ର୍ଧିତ ନିମ୍ନ ଦେଖା ଲେଲ ପାହୁରୁ 10-12 ଟଙ୍କା ଘରୁରୁ ଲୋକ ମୁହଁରେ
ଜଳ କାପ୍ତ କରିଛି ଆଗରୁ 5-6 ଟଙ୍କା ଘରୁରୁ ଲୋକ ତାରୁ ଏବୁରେ
ଉଦ୍‌ବନ୍ଧକାଳେ ମୁହଁରେ ଜଳ ଥାଇ କରିଥିଲୁ । ଆଗରୁ କର୍ମସଂଗ୍ରହ
ଜନ୍ମରୁ ଆପଣ ବୈଷ୍ଣବ ପାଠ୍ଯ, ଥାଳେ ପିଲ୍ଲ ଚିଖଳ ପ୍ରେସରି ପାଠ୍ୟ
ହୋଇ ଆମେ ମୁହଁରେ ଜଳେ ମିଳେ ମୁହଁରେ ଜଳ ମୁହଁରେ ୨୫,

निर्देश (Suggestion) :-

- ୧) ମାତ୍ରେ ଲୋକେଣ୍ଠର ବେଳେତେ ଏବେ ପୁଅବି ଆଜ ଜୀବନ୍ୟକୁଟେ—
ମାମତ୍ର, ତାରୁ ତଳେ ଅପାର୍ଯ୍ୟ କରସାହି ଥାବେନା,
 - ୨) ବରାହାରି ପୁରୁଷରେ ଜୈତା ଶୁଣି ଖାଲ କରାଣେ ମାତ୍ରିଲ୍ୟ,
 - ୩) ପୁରୁଷେ ଜୀବି ଶିଥାର ଜୈତା ମାତ୍ର ନ ଦୋଷ ପ୍ରାପ୍ତିକେ ଲାଗୁ
ରାଖିବେ ଇଥେ,
 - ୪) ପୁରୁଷେ ଅବଳ ଜଳ ଜ୍ଞାନର ପାଇଁମନ ଶୀର୍ଷେ ଶୀର୍ଷେ କମାଇ—
ଇଥେ ।

(6)

কাঠের সীমাবদ্ধতা (Limitation of Study):

বিশ্বাচারকে জাতি জাতি দলভাগে লক্ষণাত্মক করে উচ্চ

গুরুসন্নিধি (References):-

- ① পরিবেশ কিভা - উচ্চমাধ্যমিক চিকিৎসা রচনা
- ② পরিবেশ কিভা প্রাচীর প্রতিলিপি - এ. পাঠ
- ③ পরিবেশ বিদ্যা - এ. পাঠ
- ④ পরিবেশ - এ. চট্টগ্রামিয়া
- ⑤ পরিবেশ পদক্ষেপ - এম. টি. হাস ও এম. সি. পাঁচজন

কুণ্ডলতা প্রীবার :-

আমি আমার কিংবদন্তে আল্লাহর স্বীকৃত আলোচনা।
তিনি প্রয়োগে দৃশ্য করার জন্যে আমাকে অবস্থা আবে
ভাইশ্য বলেছে। প্রয়োগ দৃশ্যে বহু অংশ ও অ্যাল্গোন
অংশ দিয়ে এই প্রয়োগটি অসম্ভব করার জন্যে উৎসোচীত
ব্যৱহৃত হচ্ছেন।

তারিখ:- ২১.০৬.২০২৩

৫.৮৬
০৫.০৭.২০২৩