Phone : (03213) 272 275

BEJOY NARAYAN MAHAVIDYALAYA

(GOVT. SPONSORED)

NAAC ACCREDITED

P.O. ITACHUNA, DIST. HOOGHLY, PIN - 712147

website : www.bnmv.ac.in ✪ e.mail ID : bnmv2012@yahoo.in

Ref. No. .....

Date. 01.09.2022

Certificate of Achievement

This is to certify that a total of 1719 students of Bejoy Narayan Mahavidyalaya (BNMV) actively participated in various project works as per the curriculum requirements during the academic session 2021-2022. The projects were undertaken in different Semesters and Subjects as outlined below :

1. Environmental Studies AECC-1 :
All the 1st Semester were bound to prepare a project report.
Number of Students : 1628.

2. Nutrition Department :
Semester-VI - DSE-VI – Project is mandatory.
Number of Students : 08.
Semester-IV – CC-9 – Project is mandatory.
Number of Students : 14.
Semester – II – CC-4 – Project is mandatory.
Number of Students : 14.

3. Chemistry Department :
Semester – VI – DSE-IV – Project is mandatory.
Number of Students : 12.

4. Botany Department :
Semester – VI – Project works are compulsory for paper DSE – III.
Number of Students : 08.

5. History Department :
Semester – III – Project works are mandatory for SEC-I.
Number of Students : 35

Undersigned appreciates the commitment and dedication shown by the students in completing their respective projects.

B. N. MAHAVIDYALAYA Estd- 1950 Govt. Sponsored P.O.-Itachuna, Hooghly

Principal
Bejoy Narayan Mahavidyalaya
P.O.- Itachuna, Dist.- Hooghly.

THE UNIVERSITY OF BURDWAN

RAJBATI, BURDWAN- 713104

Office of the Secretary, Council for U.G. Studies in Arts, Sc., Comm. etc.

No.- UG/Sem./(all Principals)/ Date: 05.05.2017

To,
The Principals/ Teachers-in- Charge
of all Degree Colleges affiliated to
the University of Burdwan.

Sir/ Madam,
I am directed to state that as per decision, taken by the Executive Council, B.U., at its meeting held on 28.12.2016, Semester with CBCS at Under- graduate level will be introduced from the academic year 2017-2018. Guidelines regarding implementation of Semester with CBCS at Under- graduate level is available on the university website (www.buruniv.ac.in).
This is for your kind information and necessary action.
Thanking you,

Yours faithfully,
Sd/-
Secretary,
UG Council, B.U.

No.- UG/Sem./(all Principals)/ Date: 05.05.2017
Copy forwarded for information to the
1. P.A. to Vice-chancellor, B.U.
2. Secretary to Pro Vice-chancellor, B.U.
3. P.A. to Registrar

Sd/-
Secretary,
UG Council, B.U.

THE UNIVERSITY OF BURDWAN

DRAFT OUTLINE OF THE SEMESTER WISE COURSE STRUCTURES OF B.A. /B.Sc. / B.Com. UNDER THE CHOICE BASED CREDIT SYSTEM (CBCS)

Under the CBCS there are broadly **two** course structures- i) **Honours** Course and ii) **Regular/ General** Course. The main components of the courses are as follows:

1. Core Course : A course, that should compulsorily be studied by a candidate as a core requirement, is termed as a core course.

2. Elective Course : Generally a course, which can chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/ subject/ domain or nurtures the candidate's proficiency/ skill, is called an Elective Course.

2.1 Discipline Specific Elective (DSE) Course : A course, which may be offered by the main discipline/ subject of study, is referred to as Discipline Specific Elective.

2.2 Generic Elective (GE) Course : An elective course, chosen generally from an unrelated discipline/ subject of study with an intention to seek an exposure, is called a Generic Course.

N.B.- A C**ore Course**, offered in a discipline/ subject, may be treated as an elective by other discipline/ subject and vice- versa and such electives may also be referred to as **Generic Elective**.

2.3 Dissertation/ Project : An elective course, designed to acquire special/ advanced knowledge, is termed as dissertation/ project. This is considered as a special course involving application of knowledge in solving/ analyzing / exploring a real life situation/ difficult problem. A dissertation/ project work will be of 6 credits. A dissertation/ project work may be given in lieu of a Discipline Specific Elective.

3. Ability Enhancement Courses (AEC) : The Ability Enhancement (AE) Courses may be of two kinds- Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC).

3.1 AECC : These are the courses based on the contents that lead to knowledge enhancement and consist of Environmental Studies & English/ MIL Communication. These are mandatory for all disciplines.

3.2 SEC : SEC are value- based and/ or skill- based and are aimed at providing hand-on-training, competency, skill etc. It will be minimum 2 for Honours Courses and 4 for General Courses. These may be chosen from a pool of courses designed to provide value- based and/ or skill- based knowledge would contain both theory and lab./ hands-on-training/ field work. The main purpose of these courses is to provide the students life-skill in hands-on-mode so as to increase their employability.

 # # Practical/ Tutorial : One each with every Core, Discipline Specific and Generic Elective Paper.

Course Structure (Honours & General)

Course Components	B.Sc.		B.A.		B.Com.	
	Honours	General	Honours	General	Honours	General
Core Course (CC)	14	12	14	12	14	12
Discipline Specific Elective (DSE) Course	4	6	4	4	4	4
Generic Elective (GE) Course	4	----	4	2	4	2
Ability Enhancement Compulsory Course (AECC)	2	2	2	2	2	2
Skill Enhancement Course (SEC)	2	4	2	4	2	4

Details of Courses of B.A./ B.Sc./ B.Com.(Honours) under CBCS

Course	Credit	
	Theory + Practical	**Theory + Tutorial**
1 Core Course (14 papers)	14x4 = 56	14x5 = 70
Core Course (Practical / Tutorial)* (14 papers)	14x2 = 28	14x1 = 14
2. Elective Courses (8 papers)		
A. DSE (4 papers)	4x4 = 16	4x5 = 20
DSE (Practical / Tutorial)* (4 papers)	4x2 = 8	4x1 = 4
B. GE (Interdisciplinary) (4 papers)	4x4 = 16	4x5 = 20
GE (Practical / Tutorial)* (4 papers)	4x2 = 8	4x1 = 4

 # Optional Dissertation/ Project Work in place of one DSE paper (6 credits) in 6th semester.

3. Ability Enhancement Courses		
A. AECC	2x2 = 4	2x2 = 4

(2 papers of 2 credits each)
ENVS, English Communication / MIL

B. SEC	2x2 = 4	2x2 = 4
(2 papers of 2 credits each)	---	---
Total Credit:	140	140

An Under-graduate Honours Degree in a discipline may be awarded if a student completes 14 core papers in that discipline, 4 papers each from a list of DSE and GE respectively, 2 papers in AECC and minimum 2 papers in SEC.

**** Wherever there is a practical, there will be no tutorial and vice- versa.***

Details of Courses of B.A./ B.Sc./ B.Com.(General) under CBCS

Course	Credit	
	Theory + Practical	**Theory + Tutorial**
1. Core Course	12x4 = 48	12x5 = 60
(12 papers)		
4 core papers each in 3 disciplines of choice		
Core Course (Practical / Tutorial)*	12x2 = 24	12x1 = 12
(12 papers)		
2. Elective Courses		
(6 papers)		
A. DSE	6x4 = 24	4x5 = 20
(6 papers for B.Sc./ 4 papers for B.A. and B.Com.)		
DSE (Practical / Tutorial)*	6x2 = 12	4x1 = 4
(6 papers for B.Sc./ 4 papers for B.A. and B.Com.)		
B. GE (Interdisciplinary)	-------	2x5 = 10
(2 papers for B.A. and B.Com.)		
GE (Practical / Tutorial)*	-------	2x1 = 2
(2 papers for B.A. and B.Com.)		

 # Optional Dissertation/ Project Work in place of one DSE paper (6 credits) in 6th semester.

3. Ability Enhancement Courses		
A. AECC	2x2 = 4	2x2 = 4
(2 papers of 2 credits each)		
ENVS, English Communication/ MIL		
B. SEC	4x2 = 8	4x2 = 8
(4 papers of 2 credits each)	---	---
Total Credit:	120	120

An Under-graduate General Degree in Science may be awarded if a student completes 4 core papers each in three disciplines of choice, 2 papers each from a list of DSEs based on the three disciplines of choice selected above, 2 papers in AECC and minimum 4 papers in SEC.

An Under-graduate General Degree in Humanities/ Social Sciences/ Commerce may be awarded if a student completes 4 core papers each in two disciplines of choice along with 2 core papers each in two Languages from English, Bengali and

Hindi respectively, 2 papers each from a list of DSEs based on the two disciplines of choice selected above and 2 papers from the list of GEs, 2 papers in AECC and minimum 4 papers in SEC.

**** Wherever there is a practical, there will be no tutorial and vice- versa.***

The evaluation of the candidates shall be based on continuous assessment. The structure of evaluation shall be as follows:

i) Each semester- assessment shall be divided into three (3) discrete components, viz. C_1, C_2 and C_3. The students will be informed about the modalities of continuous assessment activities well in advance. The first component (C_1) of assessment shall be of **10%** of the total marks of each course of a semester and will be based on class attendance, class test or assignment or seminar. During the first two months of each semester, 1/3 of the syllabus will be completed. The continuous assessment and C_1 will be consolidated during the 8^{th} week of the concerned semester. The second component (C_2) of assessment shall be of **10%** of the total marks of each course of a semester and will be based on class attendance, class test or assignment or seminar. During the second two months of each semester, 2/3 of the syllabus will be completed. The continuous assessment and C_2 will be consolidated during the 16^{th} week of the concerned semester. Appearance in C_1 & C_2 is mandatory.

ii) During the 21^{st} – 23^{rd} weeks of a semester, a Semester- end Examination shall be conducted for each course and the proportion of C_3 will be **80%** of the total marks each course of the semester.

iii) The result of each course in a semester shall be based on the values of C_1, C_2 & C_3 and shall be awarded in form of grade point.

Mechanism of computation of work-load per week:

i) 1 Credit = 1 Theoretical class of 1- hour duration
ii) 1 Credit = 1 Tutorial class of 1- hour duration
iii) 1 Credit = 1 Practical class of 2- hour duration

SEMESTER WISE DISTRIBUTION OF COURSES AND CREDITS

B.A./ B.Sc./ B.Com. Honours

Courses/ (Credits)	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total No. of Courses	Total Credit
CC (6)	2	2	3	3	2	2	14	84
DSE (6)					2	2	04	24
GE (6)	1	1	1	1			04	24
AECC (2)	1	1					02	04
SEC (2)			1	1			02	04
Total No. of Courses per Sem.	4	4	5	5	4	4	26	-----
Total Credit per Semester	20	20	26	26	24	24	------	140

SEMESTER WISE DISTRIBUTION OF COURSES AND CREDITS

B.A./ B.Com. General

Courses/ (Credits)	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total No. of Courses	Total Credit
CC - 1,2 (6)	2 (1A, 2A)	2 (1B, 2B)	2 (1C, 2C)	2 (1D, 2D)			8	48
Language CC- 1,2 (6)	1 (L_1-1)	1 (L_2-1)	1 (L_1-2)	1 (L_2-2)			4	24
DSE- 1,2 (6)					2 (1A, 2A)	2 (1B, 2B)	4	24
GE (6)					1 (GE-1)	1 (GE-2)	2	12

AECC (2)	1	1					2	04
SEC (2)			1	1	1	1	4	08
Total No. of Courses per Sem.	4	4	4	4	4	4	24	-----
Total Credit per Sem.	20	20	20	20	20	20	------	120

SEMESTER WISE DISTRIBUTION OF COURSES AND CREDITS

B.Sc. General

Courses/ (Credits)	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total No. of Courses	Total Credit
CC - 1,2,3 (6)	3 (1A, 2A, 3A)	3 (1B, 2B, 3B)	3 (1C, 2C, 3C)	3 (1D, 2D, 3D)			12	72
DSE- 1,2,3 (6)					3 (1A, 2A, 3A)	3 (1B, 2B, 3B)	6	36
GE (6)	-----	-----	-----	-----	------	-----	-----	------
AECC (2)	1	1					2	04
SEC (2)			1	1	1	1	4	08
Total No. of Courses per Sem.	4	4	4	4	4	4	24	-----
Total Credit per Sem.	20	20	20	20	20	20	------	120

Full marks of a course, having 6 credits/ 2credits, along with distribution of marks:

1. Full marks of each course of B.A./ B.Sc./ B.Com. (Hons. & Gen.), carrying 6 credits, be **75**
2. Full marks of each course of B.A./ B.Sc./ B.Com. (Hons. & Gen.), carrying 2 credits, be **50**
3. **For B.A. & B.Com.** (Hons. & Gen.) **Courses , having no practical, , distribution of 75 marks be as follows**:

i) Class Attendance cum Internal Assessment : 20% of 75 marks = 15 marks of which 5 marks be reserved for class attendance (both theoretical + tutorial) in the following manner:

Attendance 50% & above but below 60% - 2 marks
Attendance 60% & above but below 75% - 3 marks
Attendance 75% & above but below 90% - 4 marks
Attendance 90% & above - 5 marks

and 10 marks be reserved for class test/ assignment/ seminar (theoretical- 5 & tutorial - 5). Minimum 15 classes be allotted for tutorial portion.

ii) In the Semester-end- Examination of each course, Question Paper be set for 60 marks, distribution of which may be as under:

a) Answer 10 questions out of 15 carrying 02 marks each = 10x 02 =20
b) Answer 04 questions out of 06 carrying 05 marks each = 04x 05 =20
c) Answer 02 questions out of 04 carrying 10 marks each = 02x 10 =20

However, questions, carrying 05 or 10 marks, need not necessarily to be a single question.

4. **For B.Sc.** (Hons. & Gen.) **Courses, having practical, distribution of 75 marks be as follows**:

i) Class Attendance cum Internal Assessment : 20% of 75 marks = 15 marks of which 5 marks be reserved for theoretical class attendance in the following manner:

Attendance 50% & above but below 60% - 2 marks
Attendance 60% & above but below 75% - 3 marks
Attendance 75% & above but below 90% - 4 marks
Attendance 90% & above - 5 marks

and 10 marks be reserved for class test/ assignment/ seminar (theoretical -5 & practical -5).

ii) 20 marks be allotted for Semester-end- Practical Examination of each course, distribution of which may be as under:

a) Lab. Note Book : 05 Marks
b) Viva- voce : 05 Marks
c) Experiment : 10 marks

Or, as may be decided by the concerned Board of Studies.

iii) 40 marks be allotted for Semester-end-Theoretical Examination of each course, distribution of which may be as under:

a) Answer 05 questions out of 08 carrying 02 marks each = 05x02 = 10
b) Answer 02 questions out of 04 carrying 05 marks each =02x05 = 10
c) Answer 02 questions out of 04 carrying 10 marks each =02x10 = 20

However, questions, carrying 5 or 10 marks, need not necessarily to be a single question.

5. **For B.A. & B.Com.** (Hons. & Gen.) **Courses , having practical, distribution of 75 marks** be as under:

a) i) In case of '**Fully Practical**' based course, Class Attendance cum Internal Assessment : 20% of 75 marks = 15 marks of which 5 marks be reserved for practical class attendance in the following manner:

Attendance 50% & above but below 60% - 2 marks
Attendance 60% & above but below 75% - 3 marks
Attendance 75% & above but below 90% - 4 marks
Attendance 90% & above - 5 marks

and 10 marks be reserved for class test/ assignment.

ii) 60 marks be allotted for Semester-end- Practical Examination of each course, distribution of which may be as under:

Viva- voce : 10 Marks, Experiment : 50 marks

b) i) In case of a course, **containing theory and practical**, Class Attendance cum Internal Assessment : 20% of 75 marks = 15 marks of which 5 marks be reserved for theoretical class attendance in the following manner:

Attendance 50% & above but below 60% - 2 marks
Attendance 60% & above but below 75% - 3 marks
Attendance 75% & above but below 90% - 4 marks
Attendance 90% & above - 5 marks

and 10 marks be reserved for class test/ assignment/ seminar (theoretical -5 & practical -5).

ii) 20 marks be allotted for Semester-end- Practical Examination of each course, distribution of which may be as under:

Viva- voce : 05 Marks , Experiment : 15 marks

iii) 40 marks be allotted for Semester-end-Theoretical Examination of each course, distribution of which may be as under:

a) Answer 05 questions out of 08 carrying 02 marks each = 05x02 = 10
b) Answer 02 questions out of 04 carrying 05 marks each =02x05 = 10
c) Answer 02 questions out of 04 carrying 10 marks each =02x10 = 20

However, questions, carrying 5 or 10 marks, need not necessarily to be a single question.

6. **For B.Sc.** (Hons. & Gen.) **Courses , having no practical, distribution of 75 marks,** be same as **(3)** above.
7. In the Semester-end- Examination of **AECC** of B.A./ B.Sc./ B.Com, carrying 2 credits (ie. full marks 50), MCQ be set and OMR sheet be used. Under AECC, ENVS be taught in the 1st Semester and communicative Eng./ MIL be taught in the 2nd Semester.
8. **For B.A., B.Sc. & B.Com.** (Hons. & Gen.) **Courses , distribution of 50 marks (for each SEC) be as follows**:

i) Internal Assessment : 20% of 50 marks = 10 marks be reserved for class test/ assignment/ seminar.

ii) 40 marks be allotted for Semester-end-Theoretical Examination of each course, distribution of which may be as under:

a) Answer 05 questions out of 08 carrying 02 marks each = 5x2 = 10
b) Answer 02 questions out of 04 carrying 05 marks each = 2x5 = 10

c) Answer 02 questions out of 04 carrying 10 marks each = 2x10 = 20

However, questions, carrying 5 or 10 marks, need not necessarily to be a single question.

Distribution of total marks (1850), equivalent to 140 credits, of all courses to be studied by a student of B.A./ B.Sc./ B.Com. Hons.

CC : 75 x 14 = 1050
DSE : 75 x 4 = 300
GE : 75 x 4 = 300
AECC : 50 x 2 = 100
SEC : 50 x 2 = 100

Distribution of total marks (1650), equivalent to 120 credits, of all courses to be studied by a student of B.A./ B.Sc./ B.Com. Gen.

B.A. & B.Com. (Gen.)

CC : 75 x 12 = 900
DSE : 75 x 4 = 300
GE : 75 x 2 = 150
AECC : 50 x 2 = 100
SEC : 50 x 4 = 200

B.Sc. (Gen.)

CC : 75 x 12 = 900
DSE : 75 x 6 = 450
AECC : 50 x 2 = 100
SEC : 50 x 4 = 200

ENVIRONMENTAL STUDIES

Credits: 4

Course Code: AEECC1

COURSE TITLE: FUNDAMENTALS OF ENVIRONMENTAL STUDIES

Lectures – 80

Unit 1: Basic of Environmental Studies **(06)**

Definition, Nature, Scope and Importance; Components of environment: Environmental education

Unit 2: Natural Resources: Renewable & Non-renewable Resources **(15)**

Nature and natural resources their conservation and associated problems:

- Forest resources: Uses, types and importance, Joint Forest Management & Tribal population, Deforestation and its effects
- Water resources: Distribution of water on Earth; Use, over exploitation of surface and ground water; Dams: Benefits and problems; Flood and Drought
- Mineral resources: Mineral resources in India; Use and exploitation, Social impacts of mining
- Food resources: World food problems and food insecurities.
- Energy resources: Renewable and Non-renewable energy sources; Use of alternate energy sources - Case studies
- Land resources: Land as a resource; Land degradation, landslides, soil erosion, desertification
- Use of resources for sustainable development

Unit 3: Ecology & Ecosystems **(12)**

Concept of ecology, Population ecology, Community ecology

- Concept of an ecosystem, different types of ecosystem
- Food chains, food weds and ecological succession
- Energy flow in the ecosystem and energy flow models

Unit 4: Biodiversity & Conservation **(12)**

- Biodiversity: Levels of biological diversity
- Values of biodiversity
- Hot-Spots of biodiversity, Mega-biodiversity countries
- Threat to biodiversity
- Threatened and endemic species of India
- Conservation of biodiversity (*In- situ* and *Ex-situ)*
- Ecosystem services: Ecological, Economical, Social, Ethical, Aesthetical and Informational values

Unit 5: Environmental Pollution & Management **(12)**

(a) Nature, Causes, Effects and Control measures of –

(i) Air pollution

(ii) Water pollution

(iii) Soil pollution

(iv) Noise pollution

v) Nuclear hazards

(b) Fireworks Pollution: Definition, Composition/Ingredients, effects, monitoring strategies

- Solid waste management: Causes, effects and disposal methods; Management of biomedical and municipal solid wastes
- Disaster management: Floods, Earthquake, Cyclone and Landslides

Unit 6: Environmental Policies & Practices **(15)**

- Constitutional Provisions for protecting environment- Articles 48(A), 51 A (g)
- Environmental Laws: The Environment (Protection) Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act 1974; Forest (Conservation) Act, 1980
- The wildlife Protection Act, 1972
- Climate change, Global warming, ENSO, Acid rain, Ozone layer depletion; Montreal and Kyoto Protocols

Unit 7: Human Communities & Environment **(08)**

- Human population growth; Impacts on environment
- Population explosion – Family Welfare Programme
- Environment and human health: Concept of health and disease; Common communicable and Non- communicable diseases; Public awareness
- Environment movements in India: Chipko Movements, Silent Valley Movement, Movements in Karnataka

Unit 8: Field Work Report/Project Report/Term paper (based on any one of the following topics and to be evaluated by internal teachers only)

- Environmental assets - River/Forest/Grassland/Hill/Mountain *etc*.
- Environmental pollution - Urban/Rural/Industrial/Agricultural
- Study of common Plants/Insect /Birds/Wild life *etc*.
- Study of simple ecosystems: Pond/River/Hill slope *etc*.
- Municipal solid waste management and handling.

Phone : (03213) 272 275

BEJOY NARAYAN MAHAVIDYALAYA

(GOVT. SPONSORED)

NAAC ACCREDITED

P.O. ITACHUNA, DIST. HOOGHLY, PIN - 712147

website : www.bnmv.ac.in ✪ e.mail ID : bnmv2012@yahoo.in

Ref. No. ..... Date. .....

NOTICE/15.09.2021

This notice is for the information of all concerned that for the ENVS projects, the following Professors are engaged as mentors/guides as shown:

1. All Science ((Honors) + Pass - Mr. Suvendu Saha and Mr. P. Kamilya.
2. All Bengali (Honors) - Mr. A. Kalam and Ms. Sucharita Bhattacharyya
3. All English (Honors) - Mr. Anjan Dasgupta and Mr. S. Dasgupta
4. All History (Honors) - Mr. Bani Patua and Mr. Pritwis Biswas
5. All Philosophy (Honors) – Ms. Khukumani Talukdar
6. All Political Science (Honors) – Ms. Ishita Aditya
7. All Sanskrit (Honors) – Mr. Subrata Sarkar

All concerned students are hereby asked to feel free to reach out to the respective mentors for any guidance or assistance regarding your ENVS Project.

B. N. MAHAVIDYALAYA Estd- 1950 Govt. Sponsored P.O.-Itachuna, Hooghly

Principal

Principal
Bejoy Narayan Mahavidyalaya
P.O.- Itachuna, Dist.- Hooghly.

Phone : (03213) 272 275

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P.O. ITACHUNA, DIST. HOOGHLY, PIN - 712147

website : www.bnmv.ac.in ✪ e.mail ID : bnmv2012@yahoo.in

Ref. No. .....

Date. 18.09.2021

Allotment of Projects of ENVS (AECC-I) for Semester –I (2021-2022):

Course	Student details	Name of the Mentors/Guides	Project Title
B.Sc. General	All Students	Mr. P. Kamilya	Municipal Solid Waste Management & Handling

B. N. MAHAVIDYALAYA Estd- 1950 Govt. Sponsored P.O.-Itachuna, Hooghly

Principal
Bejoy Narayan Mahavidyalaya
P.O.- Itachuna, Dist.- Hooghly.

Fax & Phone: (03213)272-237/275

BEJOY NARAYAN MAHAVIDYALAYA

[GOVT. SPONSORED]

P.O.-ITACHUNA, DIST.-HOOGHLY, PIN-712147

Website: http://www.bnmv.ac.in email: bnmv2012@yahoo.in

CERTIFICATE

This is to certify that the project entitled – *"MUNICIPAL SOLID WASTE MANAGEMENT AND HANDLING"* submitted by *Mr. SOMNATH GHOSH* Roll No. **210640310016**, session **2021-2022,** in **SEM-I, AECC-I (ENVIRONMENTAL STUDIES),** of BEJOY NARAYAN MAHAVIDYALAYA, ITACHUNA, HOOGHLY, WEST BENGAL, in the partial fulfillment of the requirement for the award of Bachelors Degree in Science (~~Honours~~/ General) / ~~Arts (Honours/ General)~~ from THE UNIVERSITY OF BURDWAN, WEST BENGAL, is a record of the student's own work carried under my supervision and guidance. This report has not been submitted to any other University or Institution for the award of any degree.

Guide: Dr. Parasuram Kamilya

~~Assistant/~~ Associate Professor

Department of Botany

Bejoy Narayan Mahavidyalaya,

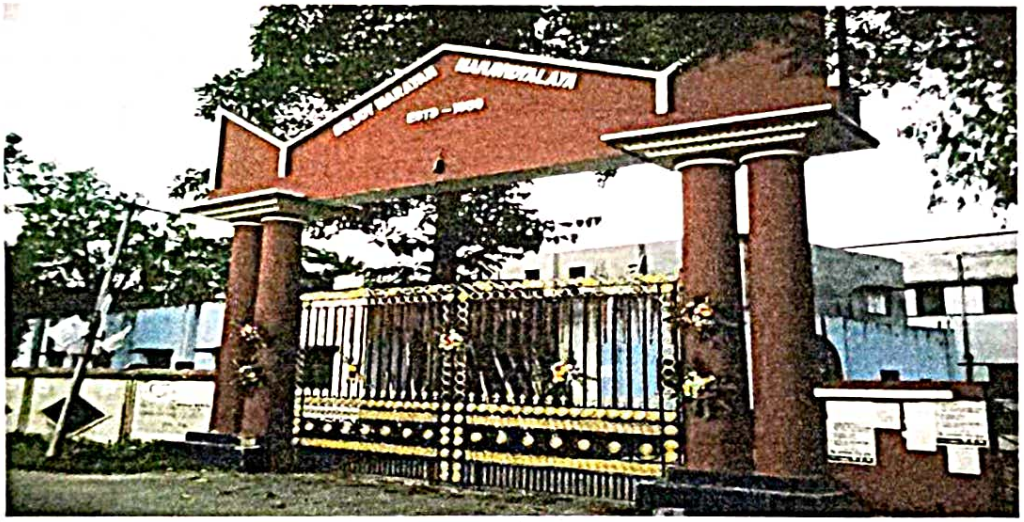
Itachuna, Hooghly, West Bengal.

Date: 17.12.2021

THE UNIVERSITY OF BURDWAN

BEJOY NARAYAN MAHAVIDYALAYA

ITACHUNA, KHANYAN, HOOGHLY.



NAME - SOMNATH GHOSH

CLASS - B.SC. GENERAL.

SEMESTER - 1ST

07/12/2021

REGISTRATION NO. - 202001006876 OF 2020-21

ROLL NO. - 210640310016

SUBJECT - ENVS

COURSE - AECC - 1

PROJECT - MUNICIPAL SOLID WASTE MANAGEMENT AND HANDLING

SESSION - 2021-2022

THE UNIVERSITY OF BURDWAN

ADMIT CARD

20211403SP277268

B.Sc. SEM-I EXAMINATION 2021

THREE YEAR DEGREE GENERAL PROGRAMME

Somnath Ghosh

Name : **SOMNATH GHOSH** GENDER : **Male**

Son / Daughter of : **AJOY GHOSH**

College Name : **BEJOY NARAYAN MAHAVIDYALAYA**

Chance Count : **1**

Roll No : **210640310016** Registration No : **202001006876 of 2020-21** Examinee Category : **Regular**

Subject	Course Code	Course Title
CHEMISTRY	CC-1A	Atomic Structure, Chemical Periodicity, Acids And Bases, Redox Reactions, General Organic Chemistry & Aliphatic Hydrocarbons
PHYSICS	CC-2A	Mechanics
MATHEMATICS	CC-3A	Differential Calculus
ENVIRONMENTAL STUDIES	AECC-1	Fundamentals of Environmental Studies

Date of Commencement : **07.03.2022**

SIGNATURE OF THE EXAMINEE

Anindya Jyoti Pal

CONTROLLER OF EXAMINATIONS

INSTRUCTIONS TO THE EXAMINEE

- Examinee can take their examination only in papers/ courses printed on the Admit Card.
- Since the examination is being taken in Blended Open Book mode, time schedule (2hrs or 3hrs as applicable) is to be strictly followed.
- As answer script is expected to be sent electronically, write answer using black/blue ball pen for image prominence of the scanned copy of the answer script.
- Examination sanctity is to be strictly maintained principally by:
  - taking the examination at the examinee's own place
  - writing answer without anybody's guidance
  - writing the answer in the examinee's own hand or in the hand of approved scribe
- The answer script must positively be submitted within half an hour from the end of examination as mentioned in examination schedule either electronically or personally at the college concerned.
- If submission of answer script is not done within half an hour, the examinee will be treated as ABSENT.
- Although examination is to be taken at home, the examinee will come under the purview of disciplinary measures for violating examination rules as notified by the Controller of Examinations from time to time.
- The above provisions shall be applicable only for this current academic session as one time measure.

By Order

■ Importance of Environmental Science:-

•) **Description:-** The environment can be defined as a sum of all living and non living elements and their effects which influence human life. While living or biotic elements are plants, animals, etc and nonliving or abiotic elements include water, land and air etc. The environment can be understood as a blanket that keeps life on the planet.

•) **Relation between environment and us:-**

Human need to interact with the environment for food, water, fuel, medicines and so many things. Advance Science and technology have helped us to explicit the environment for our benefit but we have introduced pollution, caused environmental damage.

• **we are dependent on Environment:-**

Human get so many things from nature. Human life is totally dependent on nature that's why we call her, 'Mother Nature'. It makes us, human beings Spiritually, physically and mentally focused.

Blessing of Environment :- Environment Studies is about learning the way we should live and how we can develope sustainable strategies to protect the environment, with natural resources such as air, water, oil, minerals and getting decrease rapidly. The course can help students to understand the importance of these resources and how we can improve the situation by taking appropriate actions in our regular lives to preserve the resources.

● Human activities that destroy the environment:-

Nature is the most beautiful creation of god which blessed to us as a precious gift because, nature has everything for us but we don't have anything for it even we are destroying it's property day by day to fulfill our selfish wishes. This has been showing up in recent times in form of global warming, floods, pollution, etc.

● Deforestation :- Deforestation refers to decrease in forest areas across the world that are lost for others uses such as agricultural. Urbanization, mining activities etc.

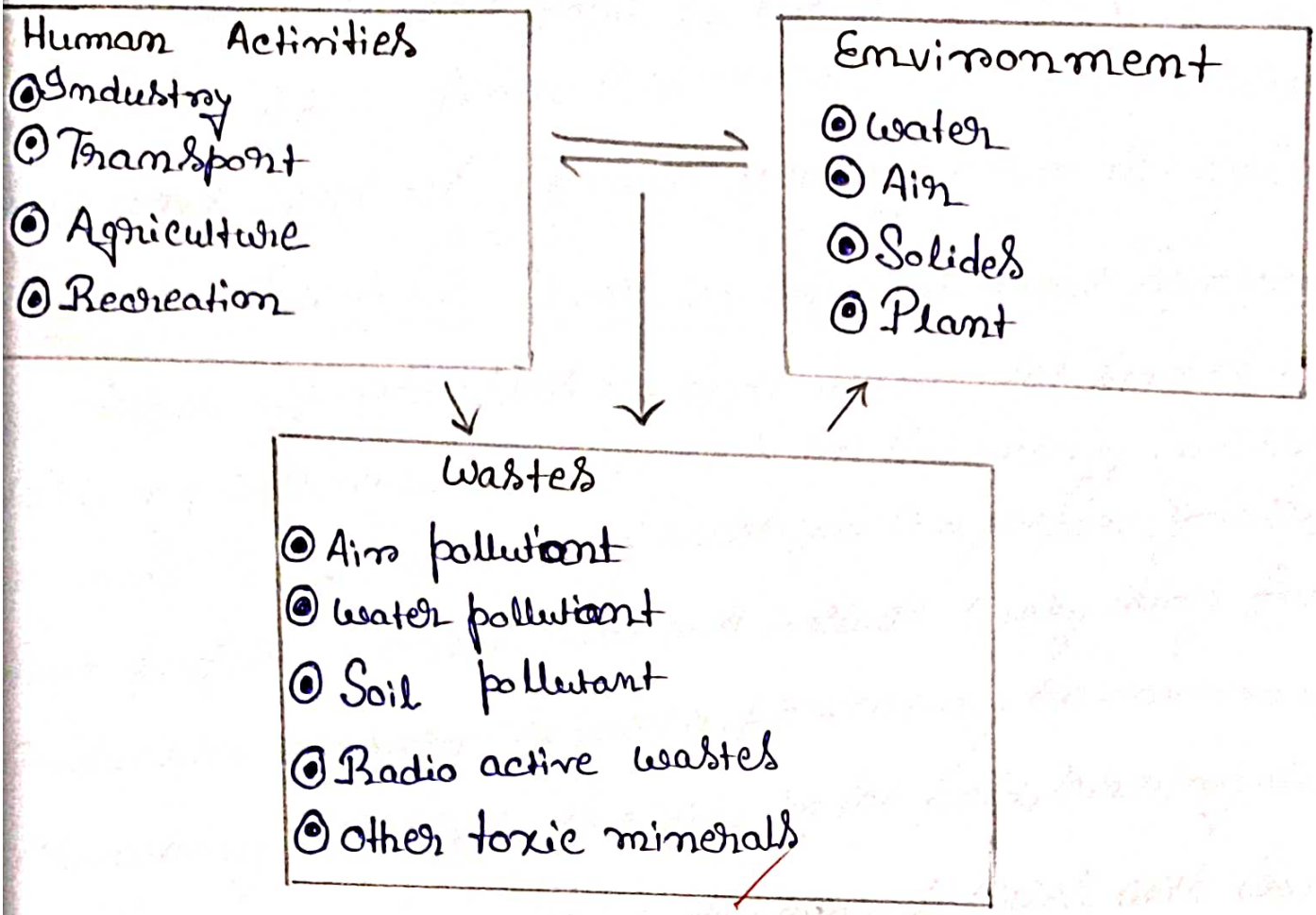
This can cause climate change, desertification, soil fewer crops, floods, increase green house gases etc.

- water pollution :- Discharged water from industries, lack of proper Sewage Systems, various human activities near water, also Spillages in the ocean can cause water pollution.
- Air pollution :- overpopulation, industrialisation, uses of vehicles for transportation etc. can cause air pollution. Harmful gases from industries are left into air, causing air poisonous and sometimes it causes acid rain, which cause water pollution, Stone cancer, etc.
- Global warming :- Irrational work of human result an increase in green house gases in atmosphere which cause increase global temparature day by day. It results melting of ice caps, hence rise in Sea levels, Cyclones increased drought, loss of Species, etc.

Urbanization :- Urbanization refers to general increase in population and the amount of industrialization of a settlement. It results poor nutrition, population related health problem, Communicable diseases etc.

) Protect our Environment :- The activities of human beings are so impactful on Environment that's why suitable measures need to be taken.

- Don't throw waste on the roads dump garbage in the bins.
- Don't throw waste in the ~~roads dump garbage~~ waterbodies.
- Recycle and reuse materials wherever possible.
- Avoid use to plastic, as they are non biodegradable.
- Promote afforestation.



• Tree Plantation :- Tree planting is the process of transplaning treeseedlings. Land reclamation or land Scaping purpose. It differs from transplantation of larger trees in arbariculture and from the lower cost but slower and less reliable distribution of tree seeds. Trees contribute to their Environment over long periods of time by providing oxygen, improving air quality, Climate amelioration, Conserving water, preserving soil and supporting wildlife. During the process of photosynthesis trees take in CO_2 and produce oxygen. It is linked to our

sic need for good food to eat and clean air to breathe. Aside from this necessities they preserve soil and control climate among other things.

Pursue a full time Career in Environment Science:-

Career opportunities in Environmental Studies are thriving with multiple options in the energy industry, animal conservation and more. you can prepare yourself for a fulfilling career that will include everything from conduction research, protecting environment crunching statistics, working in the field, learning about disaster management and drafting policies with low markers to conserve planet. To sum up the importance of introducing Environment Studies in course curriculam, the objectives are mainly to help students realize the significance of natural resources and learn to pressing Environmental problems. The aim should be developing a world where individual is aware of and concerned about for the current situation and preventing future problems.

Municipal Solid waste Management and Handling :-

Introduction :- Solid waste is defined as 'non liquid, non soluble' materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substance.

It also include :-

- Garbage
- Rubbish
- Demalition Products
- Sewage treatment residue
- Manure and discard material

'Solid waste management' is a term, is used to refer to the process of collecting and treating solid wastes. It also offers solutions for recycling items that don't belong to garbage or trash. As long as People have been living in settlements and residential areas. Garbage and solid waste become an issue. Waste management is all about how solid waste Can be Changed and used as a valuable resources Planning for proper disposal of solid waste management and recycling for all of the rubbish

Produced in this country is an enormous task which involves both logistical and scientific knowledge and understanding in order to balance the impact on environment and the cost effectiveness of the process.

To ease the pressure on government agencies numberous privately managed organisations also play a part in these waste management and recyclic programs.

• objective of Project work:-

- To ensure the protection of the environment through effective waste management measures.
- To protect the health and well-being of people by providing an affordable waste service.
- To grow the contribution of the waste sector to GDP.
- To ensure the design and manufacture of products that avoide or minimize waste generation.
- To discourage waste generation through cost reflective and volume based tariffs.

To management ensure an efficient and effective solid waste management.

To support the diversion of high calorific waste from landfill to recovery options.

- To Encourage the establishments of material Recovery facilities. (MRFs)
- To implement contaminated land measures in the waste act.

"Let's stop
wasting,
Let's start
composting."

Municipal waste - I(a)

Main Part:-

→ Types of Solid waste:- Broadly ther are 3 types of waste which as follows

ⓐ household waste as Municipal waste.

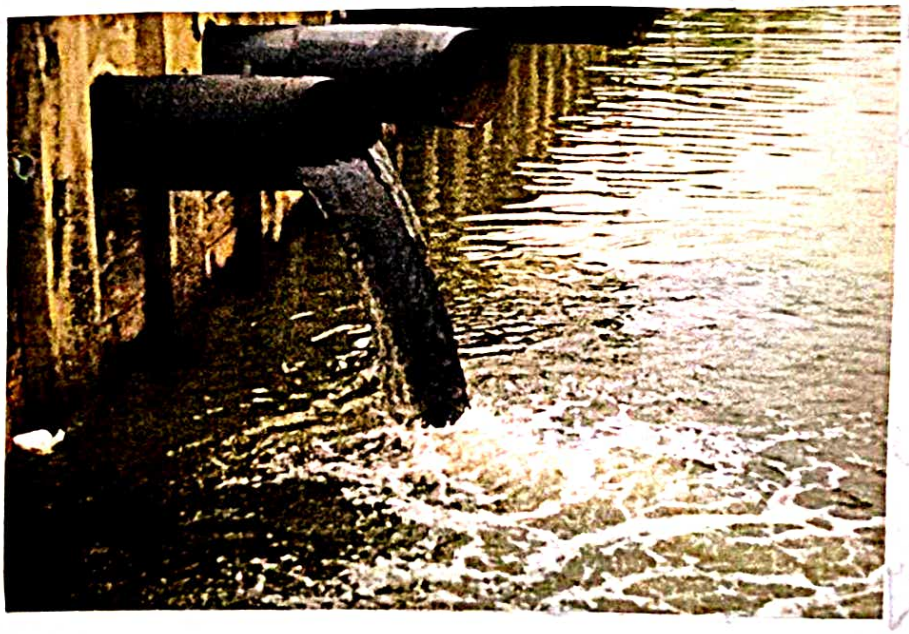
ⓑ Industrial waste as Hazardous waste.

ⓒ Biomedical waste or hospital waste as infectious waste.

Municipal waste:-

Municipal Solid waste Consist of house hold waste, Construction and demolition debris, Sanitation residue waste from streets.

Single and multiple family dwelling are one of the Primary Sources of Solid waste. Types of the waste that the residential Sector produces include plastics, food waste, leather, wood, glass, metals, papers, ashes and other items like Electronics, batteries, tires, used oil and more Solid wastes from homes. Condos and apartments are generally Collected and treated by a garbage collecting firm.



Industrial waste - 1(b)

Municipal waste - 1(b)

•) Industrial waste:- Industrial waste is considered hazardous as they may contain toxic substance. They are corrosive highly flammable or explosive.

It contribute largely to the production of solid waste. Typical waste generators are construction sites, manufacturing industries, Power and chemical Plants. Types of solid waste produced by industries include food, Packing and house keeping wastes, as-bestos.

Industrial waste - 1(a)

Bio-medical waste - 1(b)

Bio-medical waste:- Bio medical waste means "Any waste which is generated during diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing biological.

Bio-medical waste - 1(a)

Others:-

• Institutional waste:- Universities, School, Courts, Prisons and other government Centres. also Contribute to Solid waste production. Institutional waste comprises plastics, food waste, wood, rubber item, paper, Cardboard and other garbage.

) Municipal Service :-

Streats, parks, water treatment plants and recreational areas Contribute immensely to the Production of Solid waste. Types of waste generated include Street waste, dead leaves, tree trimmings and others.

Effects of Solid waste :-

a) health hazard :-

-) If Solid waste aren't Collected and allowed to accumulate, they may create unSanitory Conditions.
-) Many diseases like Cholera, Diarrhea, dysentery Jaundice or gastro-intestinal diseases may Spread and cause loss of human lives.

b) Environmental impact :-

-) If the Solid wastes are not treated properly to decomposition and Putrefaction (decay) may take place.
-) The organic Solid waste during decomposition may generate obnoxious (intolerable odour)

- An inefficient municipal Solid waste management System may create Serious negative Environmental impact like infectious diseases, land and water pollution, obstruction of drains and loss of bio diversity.

Solid waste management:-

When planning for the adoption of Solid waste technologies, Some authorities Should Consider the following among other issues.

- The planning, Construction and implementation of new Sanitary landfills are costly and lengthly and Small to medium Scale Solid waste management Practices will be need in the interim.
- The tendency for municipalities to import Expensive 'end of pipe' technologies Such as Collection vehicles and processing plants. often leads to additional unsustainable costs in training 'repair and Site maintainance.

- Dump upgrading, involving such measures as landfill liners, mandated landfill disposal standards and low cost remediation along with improved waste minimization strategies may prove to be cost effective alternatives to the development of expensive SWM site.

- Recycling, Composting, resources recovery and resale of reusable solid waste can be ~~bean~~ effective way of minimizing waste and contributing to the economic welfare of those living at a destitute fringe with in the urban community. For Example, Co-composing solid waste and sewage sludge.

- Produces soil conditioner and shredded auto mobile tries that can be added to soil to increase drought resitance.

- The 3Rs to be followed for waste management
  - Reduce
  - Reuse
  - Recycle

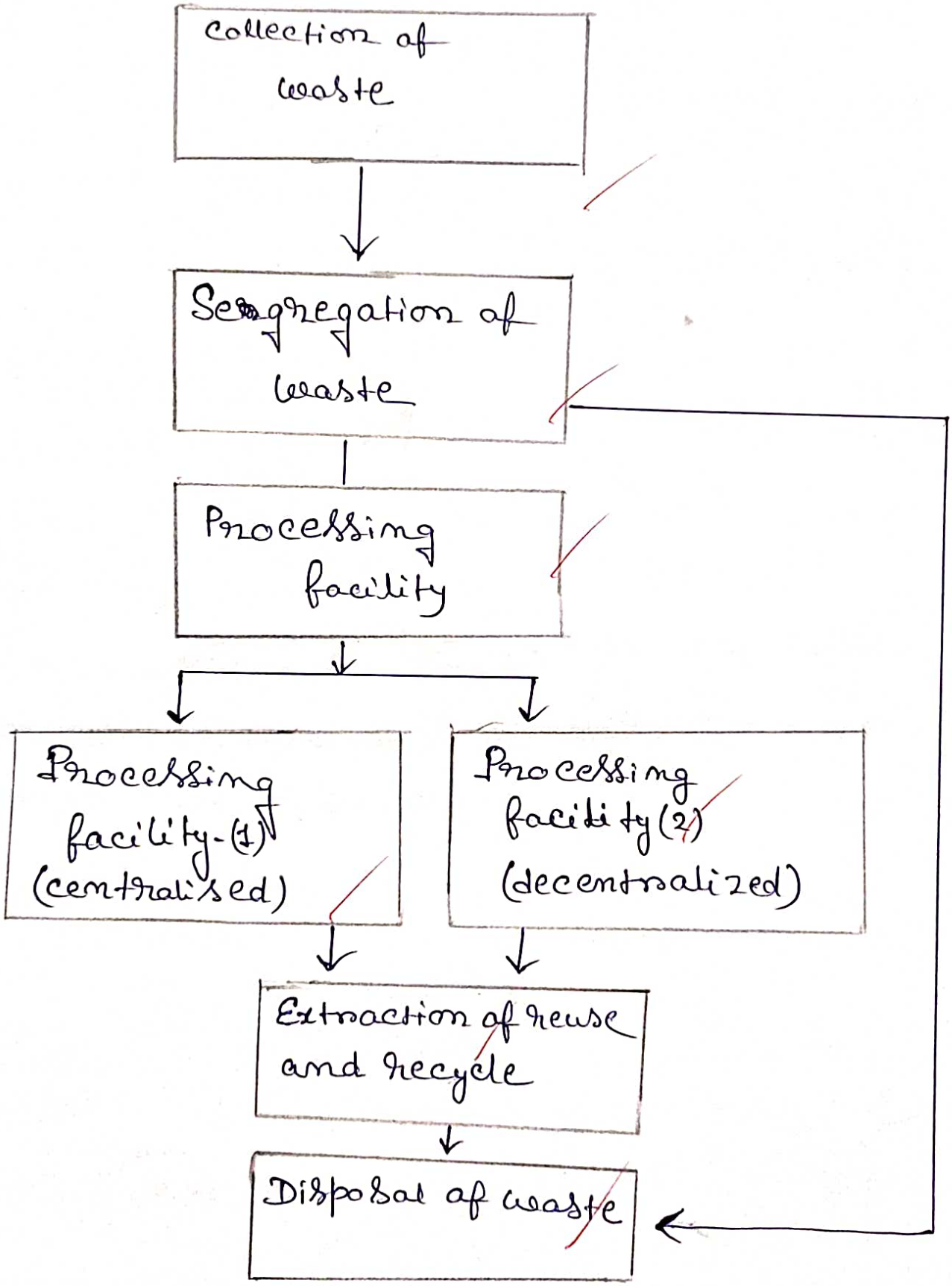
- Resources, recovery and commercial / industrial marketing or resale of reusable components of waste.
- Localized appropriate technologies designed to meet economic, environmental and social preferences to minimize waste.
- Separation and control of hazardous waste to reduce the distribution of their environmental impacts.

⇒ Conclusion:- Considering the nature and components of waste generated by household business places, the waste reduction, recycle, reuse and composting process would be more suitable in managing the challange. These management should be integrated in a suitable frame work.

⇒ Transport and handling:- Waste handing and separation involves activities associated with wast management until the waste is placed in storage containers for collection. Handling also movement of loaded containers to the paint of collection. Waste is transfered from a small collection vehicle to larger transport equipment.

- Recycling:-
  - Recycling refers to the collection and refuse of waste materials such as empty beverage container
  - The materials from which the items are made can be processed into new products.
  - Materials for recycling may be collected separately from general waste using dedicated bins.
- Disposal and monitoring of waste materials:-
  - Dumping
  - Incineration
  - Composting
  - manurepit.
- Don't use open fires for waste disposal. Instead of plastic, use eco or bio degradation Products because, Plastic Products are highly toxic in nature and cause pollution.
- Maintain proper waste management especially for hazardous which can be toxic or infectious, can reduce waste, hence pollution will be reduced.

- work flow of solid waste management system.



Acknowledgement :-

It is great pleasure for me to undertake this project entitled

"Municipal Solid waste Management and Handling."

I am grateful to my project guide — Subhendu Saha.

This project would not have completed without their enormous help, whenever I was need, they were behind me.

Although, this report has been ~~prepaps~~ prepared with almost care and deep routed interest.

08/12/2021

Somnath Ghosh

09/10

THE UNIVERSITY OF BURDWAN

SUBMITTED FOR, AECC-1 (ENVS), 2021

ROLL - 21034030 NO.- 0064

REGISTRATION NO.- 202101049879

of 2021-22

ENVIRONMENTAL SCIENCE PROJECT

09/10

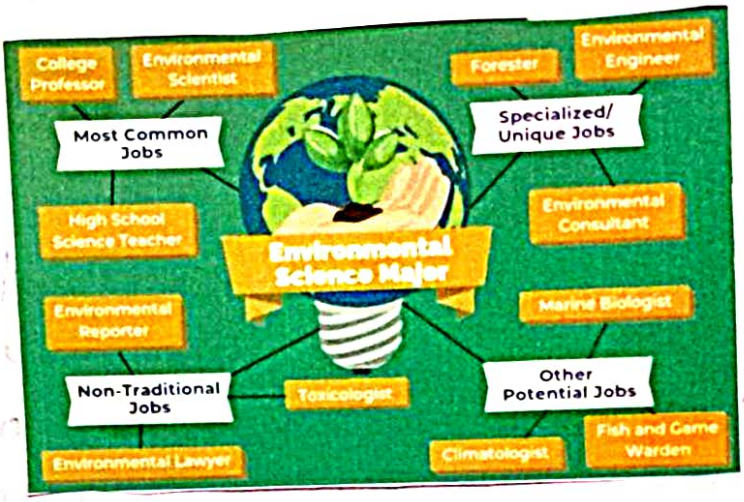
ENVIRONMENTAL SCIENCE

Introduction :—

The science of Environmental studies is a multi-disciplinary science because it comprises various branches of studies like chemistry, physics, medical science, life science, agriculture, Public health, sanitary engineering etc. It is the science of physical phenomena in the environment, It studies of the sources, reactions, transport, effect and fate of physical & biological species in the air, water and soil and the effect of from human activity upon these. For the last four decades, several environmental problems — such as pollution, global warming, ozone layer depletion, acid rain, deforestation and desertification - have remained a major focus of scientists, policy makers, and common public across the world. These problem are perceived as the major threats to the life supporting environment of the earth, thus making our survival on the planet increasingly unsafe.

Why study environmental science ?

If the answer of all the above question is yes, then choosing to study environmental science as a career is the better option. During the course, you will study all physical, chemical and biological changes to the environment and process which takes place to impact the planet.


Environmental Science Major
Most Common Jobs
College Professor
Environmental Scientist
High School Science Teacher
Environmental Reporter
Non-Traditional Jobs
Environmental Lawyer
Toxicologist
Specialized/ Unique Jobs
Forester
Environmental Engineer
Environmental Consultant
Marine Biologist
Other Potential Jobs
Fish and Game Warden
Climatologist

when study environmental science, we commit to learning about subjects like effects of environmental change, understanding earthe processes, controlling pollution and more.

Importance of Environmental Science :—

Before starting a career in environmental science, one should know the importance and future perspective of this field. The environmental science course will help us:

(i) To understand the latest developments on the environmental science.

(ii) To utilize the natural resources effectively and efficiently without harming our nature.

(iii) To discover sustainable ways of living

(iv) To learn and create awareness about enviro-nmental issues at the global level.

(v) It guides us to know how our developmental and day to day active affect environment and how we are affected by changes in the environmental conditions, as pollution is the most le effected environment.

Type of Environment :—

Environment, which means surroundings, is the sum of all external factors that influence the life of an organism. such as air, water, soil, rocks, minerals, and mountains). ther are 2 type of following groups,

① Essential life-supporting biophysical environment

It includes all the biophysical entities as well as the processes that contribute to providing all humans and other living beings the basic material needs of life, that is, oxygen, water, food, and habitat. In fact the concepts of environmental science are based on the meaning. The "essential life-supporting biophysical environment", "ecological system". These words are used almost synonymously.

② NON-essential life-supporting environment

It includes all the entities or processes that assist human life in various ways, but cannot be considered essential for the plant life, social systems, language, technology, economic system, education and human civilization.

Environmental Legislation

Legislation is needed to ensure environmental compliance. As per the constitution of India,

- The water (Prevention and control of Pollution) Act (1974):— establishes an institutions structure of preventing and abating water pollution by setting standards for water quality and effluent. As per the act, the pollution industries must seek permission to discharge waste into effluent bodies. The pollution board name is central Pollution Control Board (CPCB) and the State Pollution Control Board were constituted implementing act.

- The Air (Prevention and Control of pollution) Act (1981):-

Provides guidelines for the control and abatement of air pollution. It entrusts the power of enforcing this act to the CPCB.

- The Environment (Protection) Act (1986):-

authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting and operation of any industrial facility on environmental grounds.

- Hazardous waste (Management Handling) Rules (1989)

Provide guidelines to control the generation, collection treatment, import, storage, and handling of hazardous wastes.

- The municipal solid wastes (Management and Handling) Rules (2000) apply to every municipal authority responsible for the collection, segregation, storage, transportation, processing, and disposal of municipal solid wastes.
- The Ozone depleting substance (Regulation and control) Rules (2000)
- The Biological Diversity act (2002).

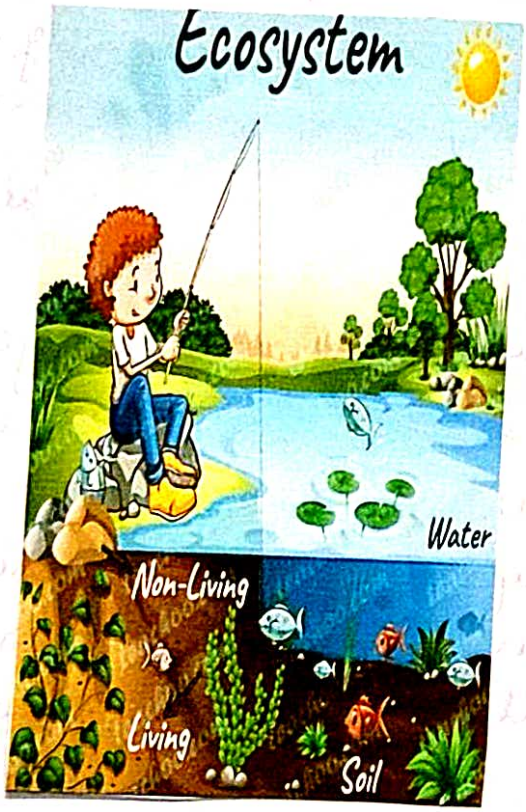
Physical, chemical, and Biological factors in the environment:-

Life-supporting of the earth is the outcome of complex interaction of innumerable physical, chemical and Biological factors. Physical factors

that have major and others, the life-supporting of earth are as follows:-

- Optimal distance between the sun and the earth which helps maintain an optimal temperature on the earth surface (18°C) which aids in sunlighting life.
- Optimal size and mass of the earth.
- Presence of the atmosphere on earth, which protects living. UV rays, burning meteors, cosmic rays, and extreme temperature.
- Presence of water which constitutes about 70% of the earth surface.
- Occurrence of hydrological cycle.
- Constantly incoming solar radiation.
- Occurrence of Biogeochemical cycle.
- Occurrence of rich biodiversity, which in turn results into numerous ecosystem services, including stability of the ecological system of the earth.

—— o ——


Ecosystem
Water
Non-Living
Living
Soil

ECOSYSTEM

Ecosystem :- An ecosystem is a geographic area where plants, animals and other organisms as well as weather and landscape, work together to form a bubble of life. Ecosystem contain biotic or living, parts as well as abiotic factors, or nonliving parts. Biotic factors include plants animals, and other organisms. Abiotic factors include rocks, temperature and humidity.

Ecosystems can be very large or very small. every factor in an ecosystem depends on every other factor, either directly or indirectly.

- **Ecosystem processes :-**

Ecosystem processes are external and internal factors -

- **external and internal factors :-** Ecosystems are controlled by both external and internal factors. External factors, also called state factor, control the overall structure of an ecosystem and the way things work within it, but are not influenced by the ecosystem. for example ecosystem can be quite different if situated in a small depression on the landscape. Versus one present on an adjacent steep hillside.

Internal factors in ecosystems not only control ecosystem processes but are also controlled by them. while the resource inputs are generally controlled by externall processes.

• Ecosystem ecology :- Ecosystem ecology is the study of the interaction between organisms and their environment as an "integrated system". The ecosystems can range up to ten orders of magnitude, from the surface layers of rocks to the surface of the plant.

Examples → The following articles are examples of ecosystems for particular regions, zones or condition :-

- Aquatic ecosystem
- Freshwater ecosystem
- Boreal ecosystem
- Lake ecosystem
- Groundwater - dependent ecosystem
- Large a marine ecosystem
- Marine ecosystem
- Montane ecosystem
- River ecosystem
- Terrestrial ecosystem
- Urban ecosystem
- Ecosystem goods and services :-

Ecosystem provide a variety of goods and services upon which people depend, Ecosystem include the "tangible, material products" of ecosystem processes such as water, food, fuel, construc material, and medicinal plants, genes from wild plants and animals that can be used to improve domestic species.

RIVER ECOSYSTEM

Rivers ecosystem are flowing waters that drain the landscape, and include the biotic (living) interaction amongest plants, animals and micro-organisms, as well as abiotic (nonliving) physical and chemical interactions of its many parts.
Rivers ecosystem are part of larger watershed networks or catchments, where smaller headwaters streams drain into mid-size stream Progressively drain into larger river network.
The major zones in river ecosystems are determined by the river bed's gradient or by the velocity of the current. Environmental threats to rivers include loss of water, dams, chemical pollution and introduced species.

- Human impacts :-

Human exert a geomorphic force that now rivals that of the natural earth. The period of human dominance has been termed the Anthropocene, and several onset.

- Pollution :- River pollution can include but is not limited to increasing sediment export all or non-Particles, chemicals, road salt, Pharmaceuticals are necity.

River ecosystem are prime example of lotic ecosystem. flowing waters, plants, biomoliculs.

RIVER ECOSYSTEM

GANGES RIVER

Introduction :— The Ganges is a trans-boundary river of Asia which flows through India and Bangladesh. The 2,525 km (1,569 mi) length, discharge 12,020 m^3/s and Basin area 1.32 million km^2. The river rises in the western Himalayas in the indian state of Uttarakhand. It flows south and east through the gangetic plain of North india, where it receives the right-bank tributary, the yamuna which also rises in the westen Indian Himalayas and several left bank tributaries from nepal that account for the bulk of its flow. In west Bengal state, India a feeder canal taking off from its right bank diverts .50%. of its flow southwards, artificially connecting it to the Hooghly river. The ganges continues into Bangladesh, its name changing to the padma. It is then joined by Jamuna, the lower stream of the Brahmaputra, and eventually the Meghna, forming the major estuary of the Ganges Delta, and emptying into the Bay of Bengal. The ganges-Brahmaputra-Meghna system is the third largest river on earth by discharge.

The Ganges is a lifeline to millions of people who live in its basin and depend on it for their daily needs. It has been important historically, with many former provincial

or imperial capitals such as Pataliputra, Kannauj, Kasa, Mangen, Kashi, Patna, Hajipur, Delhi, Bhagalpur Murshidabad, Baharampur, Kampilya, and Kolkata located on its banks or the banks of tributaries and connected waterways. The river is home to approximately 140 species of fish, 90 species of amphibians, and also ~~be~~ reptiles and mammals, including critically endangered species such as the ghanial and south Asian river dolphin, the ganges is the most sacred river to Hindus. It is worshipped as the goddess ganga in Hinduism.

The Ganga is threatend by severe pollution This poses a danger not only to humans but also to animals.

The levels of fecal coliform bacteria from human waste in the river near varanasi are more than a hundred times the India Government's official limit.

- Ecology and environment :—

Human development, mostly agriculture, has replaced nearly all of the original natural vegetative of the ganges basin. More than 95% of the upper Gangetic plain has been degraded or converted to agriculture or urban areas. Only on large block of relatively

• Anemelas :—

As recently as the 16th and 17th centuries the upper gangetic plain harboured impressive Populations of wild Asian elephant (Elephas maximus) Bengal tigers (Panthera t. tigris), Indian rhinoceros (Rhinoceros unicornis), gaurs (Bos gaurus), barasinghas (Rucervus duvaucelii), Sloth bears (Melursus ursinus) and Indian Lions (Panthera leo leo)

In the 21st century there are few large wild animals, mostly deer, wild boars, wildcats, and small number of Indian wolves, golden jackals, and red and Bengal foxes.

Bengle tigers survive only in the sundarbans area of the Ganges Delta. The sundarbans freshwater swamp ecoregion, however is nearly extinct. Threatened mammals in the upper Gangetic plain include the tiger, elephant, sloth bear, and four-horned antelope (Tetracerus Quadricornis).

• Birds :—

Many types of birds are found throughout the basin, such as myna, psittacula parakeets, crows kites, partridges, fowls. Ducks and snipes migrate across the Himalayas during the winter, attacted in large number to wetland areas. There are on endemic birds in the upper

Gangetic plain. The great Indian bustard (Ardeotis nigriceps) and lesser florican (Sypheotides indiens) are considered globally threatened.

The natural forest of the upper Gangetic plain has been so thoroughly eliminated that it is difficult to assign a natural vegetation type with certainty. There are few small patches of forest.

Today only about 3% of the ecoregion is under natural forest and only one large block, south of Varanasi, remains and less than 100 square kilometres (39 sq mi) and many number of species such as the smooth coated otter (Lutrogale perspicillata) and the large Indian civet (Viverra zibetha).

- Fish :— It has been estimated that about 350 fish species live in the entire Ganges drainage, including several endemics. In a major 2007 - 2009 study of fish in the Ganges basin, a total of 143 fish species were recorded including 10 non-native introduced species. The most diverse order are Cypriniformes, Siluriformes and Perciformes (Perciform fish) each comprising about 50%, 23% and 14% of the total fish species in the drainage.

• Crocodilians and turtles :-

The main sections of the Ganges river are home to the ghasial (Gavialis gangeticus) and mugger crocodile (Crocodylus palustris), and the ganges delta is home to the saltwater crocodile (C. porosus). Among the numerous aquatic and semi-aquatic turtles in the Ganges basin are the northern river terrapin. Indian Peacock softshell turtle (N. hurum) and Cantor's giant softshell turtle (Pelochelys cantorii); most of these are seriously threatened.

• Ganges river dolphin :-

The river's most famed faunal member is the freshwater Ganges river dolphin (Platanista gangetica gangetica), which has been declared India's national aquatic animal.

This dolphin used to exist in large schools near urban centres in both the Ganges and Brahmaputra rivers but is now seriously threatened by pollution and dam construction. A recent survey by the World Wildlife Fund found only 3,000 left in the water catchment of both river systems.

ECOSYSTEM SERVICES OF GANGA RIVER

Ecosystem services are the enumerable direct and Indirect, tangible and intangible benefits provided by ecosystem functions and processes that contribute to human wellbeing.

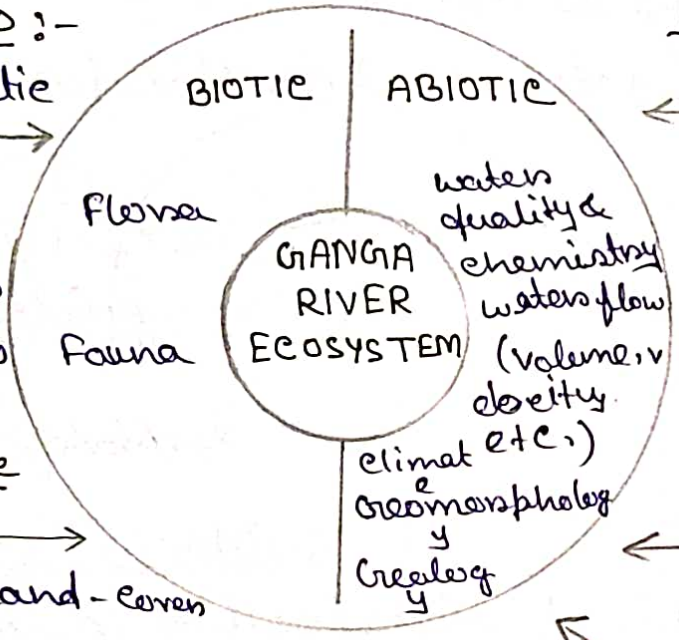
Direct Drivers

Natural Drivers :-

- Natural climatic variability, weather pttens
- Diseases, Pests
- Natural hazards disasters

Anthropogenic Drivers :-

- Land-Use-Land-cover changes
- over exploitation/extraction
- water abstraction
- Invasive species
- Zoonatic species
- Pollution
- climate change



Indirect Drivers

- Human Population/ Demographic
- Science & Technology
- Policy changes
  - Economic Policy
  - Environmental Policy
- Governance systems
- Global Economy

- **Ecosystem services provided by riverine ecosystem**

(a) Main stem River
(b) Floodplain/wetland
(c) Riparian Area

(A) MAIN STEM RIVER :—

consumptive use → drinking, domestic, agriculture industry.

Non-consumptive use → Power generation & navigation/ transport.

Aquatic organisms → Fish etc.

Riverbed material → Sand, Stones etc.

maintaining populations & Habitates —

water cycling

water purification

Nutrient cycling

Recreation

Religious & Spiritual

(B) FLOODPLAIN / WETLAND :—

main stem and floodplain / wetland are morethen same as this.

(C) RIPARIAN AREA :—

Food, raw (biotic) material, Raw (abiotic) material, climate regulation, carbon storage & sequestration. flood protection, soil formation, waste treatment and etc.

- Objectives :—

- To identify the key ecosystem services provided by the Ganga River.
- To develop a framework for assessing the ecosystem services of Ganga River.

Study Area :- Reflecting the variations in geology, geomorphology, soil type, climate, flora and fauna, and social and economic issues, the mainstem of the Ganga River can be divided into three stretches.

(i) Upper Ganga ↓ Gaumukh to Haridwar - 294 km

(ii) Middle Ganga ↓ Haridwar to Varanasi - 1082 km

(iii) Lower Ganga Varanasi to Ganga Sagar - 1134 km

- Stakeholders Perception Assessment :-

- Total 503 respondents surveyed in upper, middle and lower ganga.
- Upper ganga, water for drinking most cited ecosystem service (60.90%), followed by water for irrigation (56.41%) and religious / spiritual services (44.87%)
- Middle Ganga, water cited (55.01%) followed by religous/spiritual services (39.37%) and water cycles (28.35%)
- Lower Ganga, water cited (65.48%) followed provision of fish (50.60%) and water for drinking and religious / spiritual (48.21%)
- 10.90%, 23.62%, 26.19% respondents in upper, middle and lower ganga, respectively, mentioned Ganga river maintains population and habitat for diverse floral and faunal species.

Rivers Plastic Quantities show high correlation with (2019)

↓

- Population Density
- Urbanization
- wastewater Treatment
- wast management

Two top plastic waste generating states of India are along Ganga (UNIDO 2018)
Utlar Pradesh: 1,30,777
Jharkhand 35,854

Benefit of dumping waste in the rivers = cost of infrastructure / resources to manage the wast

In india, municipal agencies spend about 5%. - 25%. of their budgets on solid waste management. Urban local bodies spend around 500 to 1500 per metric tonne of solid waste, 60%. to 70%. is usuall spent on collection alone, and 20%. to 30%. in on transportion.

- Impact of plastic on riverine biodiversity :-

Sea to source plastic expedition' Ganga rivers 2019 (WII-NGRS). Amounts of plastic waste coming to ganga is less than other rivers for which date is available.

This could be probably due to recent ban on single-use plasties and Cpcb's. swatchh Bharat Abhiyan.

- Is the trade-off worth it?

→ Physical impact on biodiversity entanglement ingestion, starvation chemical impact, build up of persistent Bio-accumulative Transport of invasive species and pollutants from

polluted rivers to remote areas in the ocean economic impact, damage to fisheries, shipping and tourism Health impact, Affects human food chain through bioaccumulation.

• Some ways forward :—

(i) Understand plastic waste generation at community level,

(ii) Demand and supply of plastic waste, circular economy

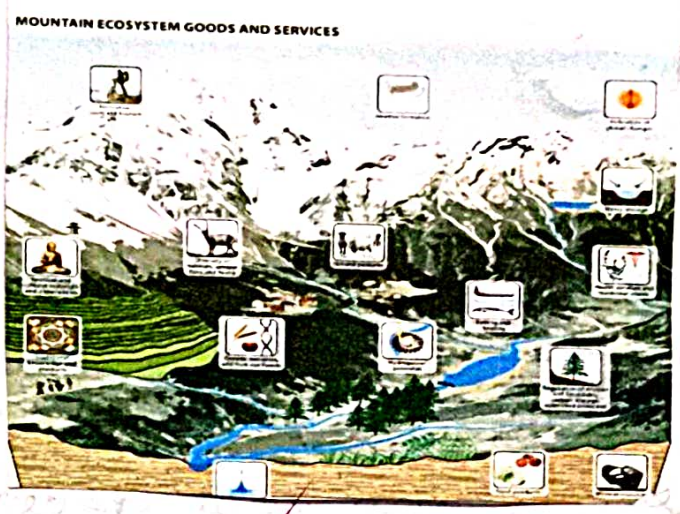
(iii) Engage communities, mass awareness, social movements (Cranga prashanis)

(iv) Trans - border cooperation between India and Bangladesh

(v) cost recovery for waste services differs across income levels, full cost recovery largely limited to high - income countries.

(vi) For microplastics, natural solutions such as strengthening mangrove forests of Sundarbans

AVOID PLASTICS - ECO-Friendly Alternative


MOUNTAIN ECOSYSTEM GOODS AND SERVICES

HILLS ECOSYSTEM

• **Introduction** :- Hills are unique geomorphic features of the Earth. They are characterized by high altitude, steep slope and rugged features. Mountain and hills ecosystem contain a series of climatically very different zone within short distances and elevations. They display a range of micro-habitats with great biodiversity. Hills ecosystem also harbor a wide range of significant natural resources and play a critical role in the ecological and economic processes of the planet Earth.

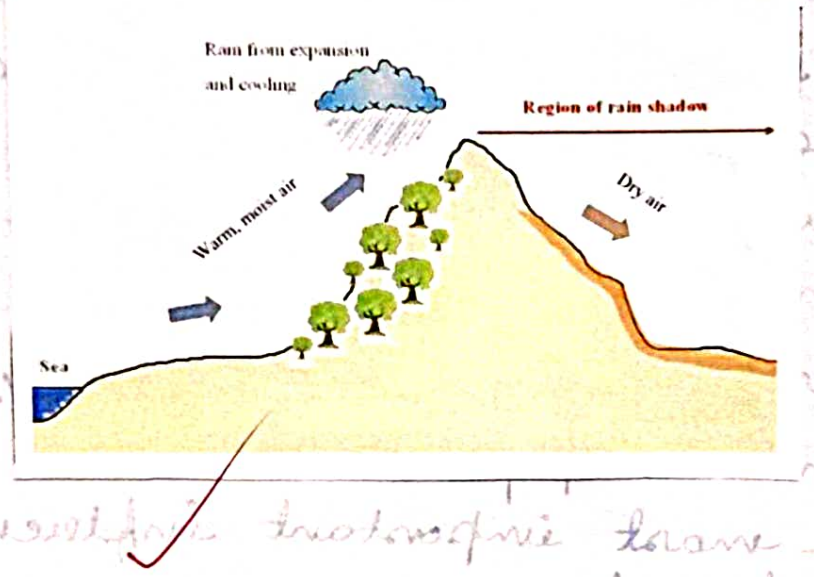
Mountain and hills coven about 24% of the earth's surface, and influence most of the planet. These areas are homes of about 12% of the world's human population.

The most important influence is on the hydrological cycle.

• **Objectives** :- • explain the distinct features of mountain ecosystem.

• describe the potential threats of climate change on glaciers, biodiversity, crop production, livelihood support system.

• Discuss soil erosion, sedimentation, bank cutting, floods, traditional agriculten and migration of people do to climate change.


Rain from expansion
and cooling
Region of rain shadow
Warm, moist air
Dry air
Sea

• Glacier melting and impacts :-

Glacier is defined as a mass of ice consisting of compacted and recrystallized ice on land that flows down under its own weight due to gravity. Local variation is so grate that it is impossible to make general statements about glacier response even within single hills ranges.

• Impact on water and River systems :-

In view of growing water scarcity, the capture and storage of excess water during periods of high water availability would be one of the major changes in the coming decades. It is most likely and human activities in the region, and extreme weather events there is need innovation in water and storage technologies and also adaption of traditional technology.

• Impact on Biodiversity :-

The term biodiversity refers to combinations of life forms and their interactions. These interaction occurs at different levels, and depend upon the physical environment. The hills ecosystem is rich in biodiversity due to the diversity in the habitats, and variation in the micro-climatic conditions.

• State-of-the-art on Indias hills Environment :-

Physical Environment :-

The Himalay and adjacent hill ranges in the north-eastern India represent a complex assay of physical and geo-political environment, well know for geo-hydrological, biological, aesthetic and cultural values. The region, collectively referred to as Indian Himalaya Region (IHR) in this document, encompasses a series of loft ranges many of which exceed 7000m above sea level.

Although the main Himalaya and the hills of north-eastern states have a number of similarities in their physiography and ecology. They differs inherently in terms of origin and evolution.

• Ecosystem services and Diversity :-

The abrupt rise of the mountains and hills less than 500m to over 8,000 m results in a diversity of ecosystem that range from sub-tropical to alpine and arid types. The complexity of topography, geology and relief features coupled with intensive biotic influence. have given rise to a variety of ecosystem. The combined effects of geological processes and total blow of ecosystem services and good from the IHR have not yet been fully ascertained. Some of the well recognized ecosystem services from IHR are given here.

• Life zones :-

As elevation increases, the climate becomes cooler, due to a decrease in atmospheric pressure and the adiabatic cooling of airmasses. The change in climate by moving up 100 meters on a mountain is roughly equivalent to moving 80 kilometers (45 miles on 0.75° of latitude) towards the nearest pole. The characteristic flora and fauna in the hills tend to strongly depend on elevation. The dependency causes life zones to form, bands of similar ecosystem at similar altitude.

• Hills Forests :- Hills forests occur between the submontane zone and the subalpine zone. The elevation at which one habitat changes to another varies across the globe, particularly by latitude. The upper limit of montane forests, the tree line, is often marked, in the California, the hills forest has dense stands of red fir,

Hills forests differ from low land forests in the same area. Human can disturb montane forests through forestry and agriculture.

Hills forests surrounded by treeless dry regions are typical 'sky island' ecosystems.

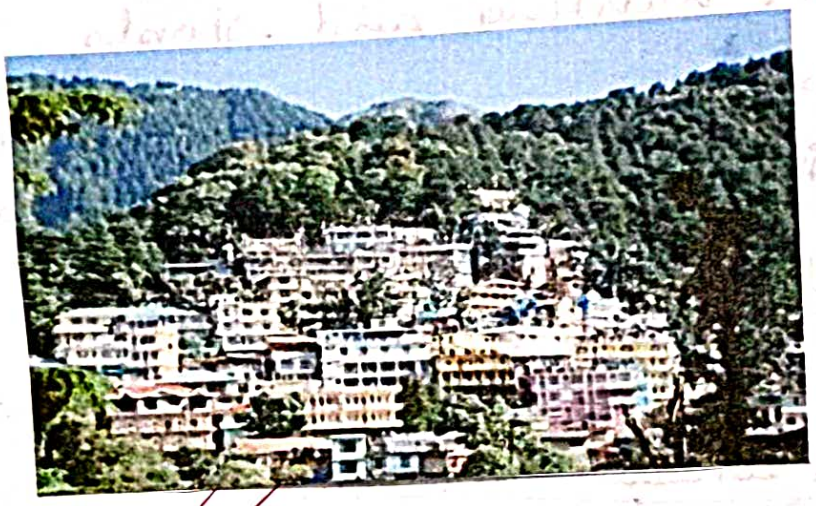
~~Humans~~

• Hills animals :- Some of animals live in hills, and latens of bird, foxes, bear, some tigers, deer, monkey, lamp, zebras and etc..

Human impact :-

Human activities like mining, livestock, energy production and tourism impact on Hills. Human activities pollute mountain and hills, change them, and change the complex interaction network of the species communities living there.

- Industries: mining forestry and logging
- Population: housing and roads
- Recreation: hunting and sports
- Energy production and climate change
- Positive impacts: nature preserves and wildlife corridors.
- water pollution :- Acid rock drainage: when chemicals leach into the water table.
- mines and wildlife habitats :-
  - Destruction of habitat and loss of biodiversity
  - Fragmentation of habitat.
  - Disruption of habital, direct and in-direct poisoning from chemicals.
  - Bioaccumulation, endemic species are most at risk.
- Loss of topsoil due to erosion
- Formation of sinkholes
- mountain becomes less stable



• Forestry: - Similar effects as mining —

• Logging cuts down large numbers of trees, and results in new roads and logging cabins.

• Topsoil lost due to erosion because tree roots help anchor the soil.

• Habitat is destroyed, disrupted and fragmented.

Different effects as mining —

• Effects on biotic factors such as trees, plants, and animals who live in the forests and rivers.

• Effects on abiotic factors such as climate change, lessening the air, and water cycle because forest return water to the atmosphere.

• Human Recreation :—

hiking, fishing, skiing, camping, hunting —

• Fragements habitat and disrupts wildlife with infrastructure (power lines, plumbing, roads) and cars.

• Pollution from vehicles and trash

• Hunting carnivores (puma, lynx, wolf, bear) affect their social structure: dominant carnivores in established territories are more likely at-risk for hunting.

• Human Population Growth :—

• Housing development in mountains and foothills fragments habitat and wildlife migration routes.

• Population growth leads to more logging and mining on hills.

- climate change disrupting patterns of snowfall snow-pack, glaciers, flooding and droughts.
- can humans have a positive effect on hills ecosystems :—
- conserve energy and produce energy in less harmful ways, such as wind powers, and reduce the use of fossil fuels.
- use more sustainable logging practices like. selective cutting.
- create wildlife corridors and set aside more habitat on nature reserves to reverse fragmention
- Rebuild carnivore population to manage prey overpopulation.
- Respect the habitat where you hike and camp; don't litter.

04/05/2022

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I would like to express my special thanks of gratitude to my teachers , who gave me the goden opportunity to do this wonderful project of "Subarnarekha River" on "ENVIRONMENTAL SCINCE" and "ECOSYSTEM" about rivers and hills, Who also helped me in completing my project. I came to know about so many new things I am really thankfull to them secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame

Swathi Roy

Ist Semister, (Botany Hons)

Date - 14.03.2022

THE UNIVERSITY OF BURDWAN

THE LIST OF THE CANDIDATES FOR B.Sc. 3 YEAR DEGREE GENERAL (CBCS) SEMESTER - I EXAMINATION DECEMBER 2021

DESCRIPTIVE ROLL

COLLEGE CODE : 403 **COLLEGE NAME : BEJOY NARAYAN MAHAVIDYALAYA**

CATEGORY	ROLL NUMBER	REGISTRATION NUMBER	REGISTRATION YEAR	GENDER	CASTE	STUDENT'S NAME	FATHER'S NAME/ GUARDIAN'S NAME	SUBJECTS				REMARKS
								GENERAL CC-1A	GENERAL CC-2A	GENERAL CC-3A	AECC-1	
2106	210640310016	202001006876	2020-21	Male	Unreserved	SOMNATH GHOSH	AJOY GHOSH	CHEMISTRY	PHYSICS	MATHEMATICS	ENVIRONMENTAL STUDIES	
2106	210640310019	202001039662	2020-21	Male	Unreserved	SOURAV PAUL	MRITYUNJOY PAUL	CHEMISTRY	ZOOLOGY	BOTANY	ENVIRONMENTAL STUDIES	
2006	200640310006	202001039695	2020-21	Male	SC	BIKRAM KUMAR MAJUMDER	BIKASH MAJUMDER	BOTANY				
2006	200640310011	202001039702	2020-21	Male	Unreserved	KIRONMOY MUKHERJEE	SUBHAS CHANDRA MUKHERJEE		BOTANY			
2006	200640310025	202001039723	2020-21	Male	SC	SOUVIK CHOWDHURY	SUSHIL CHOWDHURY	BOTANY	ZOOLOGY			
2006	200640310028	202001039726	2020-21	Male	Unreserved	SUBHAM DEY	MRINAL KANTI DEY		BOTANY			
2106	210640310001	202101049884	2021-22	Male	Unreserved	AKASH PAUL	SITARAM PAUL	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310002	202101049886	2021-22	Male	Unreserved	ANUPAM GHOSHAL	CHAPAL GHOSHAL	ZOOLOGY	BOTANY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310003	202101049887	2021-22	Male	OBC-B	ARJAN GHOSH	JAGABANDHU GHOSH	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310004	202101049888	2021-22	Male	Unreserved	ARNAB GHOSH	HARIPRASAD GHOSH	PHYSICS	MATHEMATICS	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310005	202101049893	2021-22	Male	Unreserved	DIBBENDU DAS	RATAN DAS	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310006	202101049897	2021-22	Male	Unreserved	MD KAYES	ABDUL MUZID	CHEMISTRY	BOTANY	ZOOLOGY	ENVIRONMENTAL STUDIES	
2106	210640310007	202101049898	2021-22	Female	Unreserved	MOLI ADHIKARI	ARUN ADHIKARI	CHEMISTRY	PHYSICS	MATHEMATICS	ENVIRONMENTAL STUDIES	
2106	210640310008	202101049900	2021-22	Female	SC	PRIYANKA MONDAL	ARUP MONDAL	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310009	202101049902	2021-22	Male	Unreserved	RITESH DAS	BISWAJIT DAS	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310010	202101049903	2021-22	Male	Unreserved	SAGNIK GANGOPADHYAY	GOUTAM GANGOPADHYAY	ZOOLOGY	BOTANY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310011	202101049904	2021-22	Male	Unreserved	SAHIRUL ISLAM	ANARUL ISLAM	CHEMISTRY	PHYSICS	MATHEMATICS	ENVIRONMENTAL STUDIES	
2106	210640310012	202101049905	2021-22	Male	SC	SAJIB MALLICK	SARBESH MALLICK	CHEMISTRY	PHYSICS	MATHEMATICS	ENVIRONMENTAL STUDIES	
2106	210640310013	202101049906	2021-22	Female	Unreserved	SAPNA KUMARI	JOY PRAKASH MISHRA	ZOOLOGY	BOTANY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310014	202101049907	2021-22	Male	Unreserved	SAPTARSHI JASH	KALYAN JASH	CHEMISTRY	ZOOLOGY	BOTANY	ENVIRONMENTAL STUDIES	
2106	210640310015	202101049909	2021-22	Male	OBC-B	SHUBHENDU SHEE	LATE NARAYAN CH SHEE	CHEMISTRY	PHYSICS	MATHEMATICS	ENVIRONMENTAL STUDIES	
2106	210640310017	202101049914	2021-22	Male	OBC-B	SOUMEN PAUL	KALI PADA PAUL	PHYSICS	MATHEMATICS	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310018	202101049915	2021-22	Male	Unreserved	SOUNAK CHATTERJEE	DEBNARAYAN CHATTERJEE	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	

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								GENERAL CC-1A	GENERAL CC-2A	GENERAL CC-3A	AECC-1	
2106	210640310020	202101049916	2021-22	Male	SC	SOUVIK MONDAL	SUNIL KUMAR MONDAL	BOTANY	ZOOLOGY	CHEMISTRY	ENVIRONMENTAL STUDIES	
2106	210640310021	202101049917	2021-22	Male	Unreserved	SUBHANKAR BANERJEE	BASUDEB BANERJEE	ZOOLOGY	BOTANY	CHEMISTRY	ENVIRONMENTAL STUDIES	