



## MAHISHADAL RAJ COLLEGE

(Govt. Sponsored)

NAAC Accredited 'A' Grade College

DST (FIST) Govt. Of India approved College, NSDC Training Partner

Estd. : 1946

Mahishadal : Purba Medinipur

Phone STD 03224 No. 240220

Ref. No. MRC/ADD ON/1/2018-19

Date: 15.09.2018

### ADD ON COURSE 2018-19

**Organised by Department Zoology & Computer Science**

**Topic: Basic Bioinformatics**

Add on course summary:

#### REPORT:

Name of the course- Basic Bioinformatics

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology, Mahishadal Raj College)

Date of commencement: 14.08.2018

Date of completion: - 31.08.2018

Number of participant enrolled: 30

Total duration day: 15

Total duration hour: 30

Evaluation method:- Paper pen MCQ and practical work

#### RESULT DETAILS:-

Number of student participate in this program: 30

Number of student completes this program: 28

Number of student got certificate in this program: 28

Name of the course: Basic Bioinformatics

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology, Mahishadal Raj College)



Principal  
MAHISHADAL RAJ COLLEGE



## Basic Bioinformatics

### + About the course:

Bioinformatics course is an interdisciplinary field of Science that deals with Biological information. The two main Sciences that find applications in bioinformatics are Molecular Biology and Genetics. Bioinformatics course is a fusion of many fields such as Computer Science, Mathematics, Engineering, and Statistics. These fields combine to examine and exemplify Biological data. In other words, a Bioinformatics course is a study of information on Biological data. The Bioinformatics course is among the fastest growing fields in the field of Science, which helps in advancements of Biology as well as the processing and storing of related data. These tools are used in Bioinformatics courses to advance Biology research and to handle and store data linked to Biology. In a Bioinformatics course, candidates can study a variety of areas holistically while earning their degree.

### + Learning outcomes:

Completing a bioinformatics course opens up various job opportunities in diverse sectors where biological data analysis and computational biology skills are in demand. Job opportunities in bioinformatics continue to grow as advancements in genomics, personalized medicine, and data-driven research become increasingly important in various industries. Completion of this course, you have job opportunities in the fields of computational biologist, genomic data analyst, clinical bioinformatician, biotech research scientist, data scientist in life science, agricultural bioinformatics specialist, and environmental bioinformatician. Along with the booming Bioinformatics career scope, it has also become one of the highest-paid sectors and is continually rising.

### + Target audience:

Any interested students (UG & PG), research scholars, faculty members and, Industrial personals. Persons who have very much interest in Software based work.

### + Course content overview:

**Bioinformatics** is an interdisciplinary field of science that develops methods and software tools for understanding biological data, especially when the data sets are large and complex. Bioinformatics uses biology, chemistry, physics, computer science, computer programming, information engineering, mathematics and statistics to analyze and interpret biological data. The subsequent process of analyzing and interpreting data is referred to as computational biology. Computational, statistical, and computer programming techniques have been used for computer simulation analyses of biological queries. They include reused specific analysis "pipelines", particularly in the field of genomics, such as by the identification of genes and single nucleotide polymorphisms (SNPs). These pipelines are used to better understand the genetic basis of disease, unique adaptations, desirable properties (esp. in agricultural species), or differences between populations. Bioinformatics also includes proteomics, which tries to understand the organizational principles within nucleic acid and protein sequences.



➤ **Schedule: Total 30 hours**

DAY	SCHEDULE
Day 1	Introduction to Bioinformatics (T) (2 hours)
Day 2	Nucleic acid databases and sequence retrieval (T+P) (2 hours)
Day 3	Sequence alignment- BLAST, pair wise sequence alignment, multiple sequence alignment. (T+P) (2 hours)
Day 4	Phylogenetic analysis and interpretation (T+P) (2 hours)
Day 5	Protein databases and protein structure analysis (T+P) (2 hours)
Day 6	Protein interaction study (T+P) (2 hours)
Day 7	Protein Tertiary structure and Visualization tools(T+P)(2 hours)
Day 8	Enzyme database. (T+P) (2 hours)
Day 9	Bioinformatics in Agriculture – Challenges and Opportunities (T) (2 hours)
Day 10	Basics of molecular interactions in medicinal chemistry and Drug design (P) (2 hours)
Day 11	Artificial Intelligence for Bioinformatics. (T) (2 hours)
Day 12	Introduction to functional genomics data analysis (T). (2 hours)
Day 13	Hands-on training session on "Genomics data analysis in R 1 (P). (2 hours)
Day 14	Hands-on training session on "Genomics data analysis in R 2 (P)
Day 15	Hands-on training session on "Genomics data analysis in R 3 (P)

➤ **Detail Work Schedule**

Date	Day	Contents	Time	Duration	Experts	Designation
14.08.18	1	Introduction to Bioinformatics (T)	12 to 2pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
16.08.18	2	Nucleic acid databases and sequence retrieval (T+P)	1 to 3 pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
17.08.18	3	Sequence alignment- BLAST, pairwise sequence alignment, multiple sequence alignment. (T+P)	3 to 5pm	2	Prof. Saheli Maiti	SACT Mahishadal Raj College
18.08.18	4	Phylogenetic analysis and interpretation (T+P)	03 to 05pm	2	Prof. Saheli Maiti	SACT Mahishadal Raj College
20.08.18	5	Protein databases and protein structure analysis (T+P)	02 to 04pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
21.08.18	6	Protein interaction study (T+P)	01 to 03pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
22.08.18	7	Protein Tertiary structure and Visualization tools(T+P)preparation (T+P)	03 to 05pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY



23.08.18	8	Enzyme database	02 to 05pm	2	Prof. Sagnik Mandal	SACT Mahishadal Raj College
24.08.18	9	Bioinformatics in Agriculture – Challenges and Opportunities (T)	02 to 04pm	2	Prof. Manik Das	SACT Mahishadal Raj College
25.08.18	10	Basics of molecular interactions in medicinal chemistry and Drug design (P)	01 to 03pm	2	Prof. Manik Das	SACT Mahishadal Raj College
27.08.18	11	Artificial Intelligence for Bioinformatics. (T)	02 to 04pm	2	Prof. Moumita Jana	SACT Mahishadal Raj College
28.08.18	12	Introduction to functional genomics data analysis (T)	02 to 04pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
29.08.18	13	Hands-on training session on "Genomics data analysis in R 1 (P)	01 to 03pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
30.08.18	14	Hands-on training session on "Genomics data analysis in R 2 (P)	02 to 04pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
31.08.18	15	Hands-on training session on "Genomics data analysis in R 3 (P) Evaluation, valediction, feedback	02 to 04pm	2	Dr. Subhamoy Day, Dr. Rajkumar Guchhait, Prof. Sagnik Mandal, Prof. Manik Das and Prof. Moumita Jana. DR. Asim Kr Bera	HOD & SACT., Zoology; Principal, MRC
				30 hours		



✦ Course structure and examination scheme:

Course name	Theory classes (hr.)	Practical classes (hr.)	Continuous assessment		Total marks
			Theory	Practical	
Basic bioinformatics	15	15	50	50	100

✦ Participant's Details and attendance:

Enrolment Details of Students

Sl. No.	Class	Roll No.	Name	Signature
1.	B. Sc. General	2180404	RITTIK CHAKRABORTY	Rittwik Chakraborty
2.	B. Sc. Generic	21800142	INDRANI SEN	Indrani Sen.
3.	B. Sc.,(HONS)	2170610	TAMALIKA DAS	Tamalika Das.
4.	B. Sc. (HONS)	2170025	MAMPA DAS	Mampa Das
5.	B. Sc.,(HONS)	2170032	SANGITA ADHIKARY	Sangita Adhikary.
6.	B. Sc.,(HONS)	2170278	AMIT PRAMANIK	Amit pramanik.
7.	B. Sc. General	2180447	NAIMA AKTAR	Naima Aktar.
8.	B. Sc. Generic	2180198	SOUMYATTAM BERA	Soumyattam Bera
9.	B. Sc.,(HONS)	2170280	SK. MUSTANGIR	Sk. Mustangin
10.	B. Sc.,(HONS)	2170285	SUDIP DAS	Sudip Das
11.	B. Sc.,(HONS)	2170287	BITHI BERA	Bithi Bera
12.	B. Sc.,(HONS)	2170289	SRABANTI MISTRI	Srabanti Mistri
13.	B. Sc.,(HONS)	2170298	NAMITA BERA	Namita Bera
14.	B. Sc. General	2180458	SOUMYADIP PANDA	Soumyadip Panda
15.	B. Sc. Generic	2180531	SUTALIKA MAITY	Sutalika Maity
16.	B. Sc.,(HONS)	2170300	RAHUL ROY	Rahul Roy
17.	B. Sc. General	2180474	PAPIYA MAITY	Papiya Maity
18.	B. Sc. Generic	2180333	SHUVASIS KUNDU	Shuvasis Kundu



19.	B. Sc.,(HONS)	2170302	TINA JANA	Tina Jana
20.	B. Sc.,(HONS)	2170303	MOUSUMI GHORAI	Mousumi Ghorai
21.	B. Sc. General	2180475	JAYASHREE BHOWMIK	Jayashree Bhowmik.
22.	B. Sc. Generic	2180543	PARAMITA MAJI	Paramita Maji.
23.	B. Sc.,(HONS)	2170304	ARNAB DAS	Annab Das
24.	B. Sc.,(HONS)	2170307	RESHMA KHAN	Reshma Khan
25.	B. Sc.,(HONS)	2170311	PABITRA PATRA	Pabitra Patra
26.	B. Sc.,(HONS)	2170312	SHRABANTI PRAMANIK	Shrabanti Pramanik
27.	B. Sc.,(HONS)	2170322	SUPRIYA GIRI	Supriya Giri
28.	B. Sc.,(HONS)	2170342	SUVENDU DAS	Suwendu Das
29.	B. Sc.,(HONS)	2170347	RESHMA KHATUN	Reshma Khatun
30.	B. Sc.,(HONS)	2170348	TRISHA MANDAL	Trisha Mandal.



**Add on course- 2018-2019**  
**Organized by Department Zoology**  
**Topic: - Basic Bioinformatics**  
**Attendance Record (Day1-Day 8)**

Sl. No.	Name of Students	14.08.18	16.08.18	17.08.18	18.08.18	20.08.18	21.08.18	22.08.18	23.08.18
1.	RITTIK CHAKRABORTY	R. Chakraborty		R. Chakraborty	R. Chakraborty		R. Chakraborty		R. Chakraborty
2.	INDRANI SEN	I. Sen		I. Sen		I. Sen		I. Sen	
3.	TAMALIKA DAS	T. Das	T. Das	T. Das	T. Das		T. Das	T. Das	
4.	MAMPA DAS	M. Das	M. Das		M. Das	M. Das		M. Das	
5.	SANGITA ADHIKARY	S. Adhikary		S. Adhikary	S. Adhikary			S. Adhikary	
6.	AMIT PRAMANIK	A.P	AP		AP	AP	AP		AP
7.	NAIMA AKTAR	N Aktar		N Aktar		N Aktar		N Aktar	
8.	SOUMYATTAM BERA	S. Bera	S. Bera		S. Bera		S. Bera	S. Bera	
9.	SK. MUSTANGIR		SK. Mustangir		SK. Mustangir		SK. Mustangir		SK. Mustangir
10.	SUDIP DAS	S. Das		S. Das	S. Das		S. Das		S. Das
11.	BITHI BERA	B. Bera		B. Bera			B. Bera		B. Bera
12.	SRABANTI MISTRI	S. Mistri	S. Mistri	S. Mistri	S. Mistri		S. Mistri		S. Mistri
13.	NAMITA BERA	N. Bera		N. Bera		N. Bera		N. Bera	
14.	SOUMYADIP PANDA	S. Panda		S. Panda			S. Panda		
15.	SUTALIKA MAITY		S. Maity	S. Maity		S. Maity		S. Maity	
16.	RAHUL ROY	R. Roy		R. Roy		R. Roy		R. Roy	
17.	PAPIYA MAITY	P. Maity	P. Maity		P. Maity		P. Maity		P. Maity
18.	SHUVASIS KUNDU	S. Kundu		S. Kundu			S. Kundu		
19.	TINA JANA	T. Jana		T. Jana	T. Jana	T. Jana		T. Jana	
20.	MOUSUMI GHORAI	M. Ghorai			M. Ghorai			M. Ghorai	



21.	JAYASHREE BHOWMIK	J. Bhowmik		S. Bhowmik	S. Bhowmik		S. Bhowmik		S. Bhowmik
22.	PARAMITA MAJI	P. Maji	P. Maji	P. Maji	P. Maji		P. Maji	P. Maji	
23.	ARNAB DAS		A. Das		A. Das		A. Das		A. Das
24.	RESHMA KHAN	R. Khan	R. Khan		R. Khan			R. Khan	
25.	PABITRA PATRA	P. Patra	P. Patra		P. Patra		P. Patra	P. Patra	
26.	SHRABANTI PRAMANIK	S. Pramanik		S. Pramanik		S. Pramanik	S. Pramanik		S. Pramanik
27.	SUPRIYA GIRI	S. Giri	S. Giri		S. Giri	S. Giri		S. Giri	
28.	SUVENDU DAS	S. Das			S. Das	S. Das	S. Das		S. Das
29.	RESHMA KHATUN	R. Khatun	R. Khatun	R. Khatun		R. Khatun		R. Khatun	
30.	TRISHA MANDAL	T. Mandal			T. Mandal	T. Mandal			T. Mandal





### Attendance Record (Day9-Day 15)

Sl. No.	Name of Students	24.08.18	25.08.18	27.08.18	28.08.18	29.08.18	30.08.18	31.08.18	
1.	RITTIK CHAKRABORTY	R. Chakra aborty	R. Chakra aborty		R. Chakra aborty		R. Chakra aborty	R. Chakra aborty	
2.	INDRANI SEN	I. Sen	I. Sen			I. Sen		I. Sen	
3.	TAMALIKA DAS	T. Das		T. Das		T. Das		T. Das	
4.	MAMPA DAS	M. Das		M. Das		M. Das	M. Das		M. Das
5.	SANGITA ADHIKARY	S. Adhikary	S. Adhikary	S. Adhikary		S. Adhikary	S. Adhikary	S. Adhikary	
6.	AMIT PRAMANIK	A. Prama nik	A. Prama nik		A. Prama nik		A. Prama nik	A. Prama nik	
7.	NAIMA AKTAR	N. Aktar	N. Aktar	N. Aktar		N. Aktar	N. Aktar	N. Aktar	
8.	SOUMYATTAM BERA	S. Bera	S. Bera		S. Bera		S. Bera		S. Bera
9.	SK. MUSTANGIR	SK. Mustangir	SK. Mustangir		SK. Mustangir	SK. Mustangir		SK. Mustangir	
10.	SUDIP DAS	S. Das	S. Das		S. Das		S. Das	S. Das	
11.	BITHI BERA	B. Bera	B. Bera		B. Bera	B. Bera		B. Bera	B. Bera
12.	SRABANTI MISTRI	S. Mistri	S. Mistri	S. Mistri	S. Mistri	S. Mistri	S. Mistri	S.	S. Mistri
13.	NAMITA BERA	N. Bera	N. Bera		N. Bera	N. Bera		N. Bera	N. Bera
14.	SOUMYADIP PANDA	S. Panda	S. Panda		S. Panda	S. Panda	S. Panda		S. Panda
15.	SUTALIKA MAITY	S. Maity	S. Maity	S. M	S. Maity	S. Maity		S. Maity	S. Maity
16.	RAHUL ROY	R. Roy	R. Roy		R. Roy		R. Roy	R. Roy	R. Roy
17.	PAPIYA MAITY	P. Maity		P. Maity	P. Maity		P. Maity		P. Maity
18.	SHUVASIS KUNDU	S. Kundu	S. Kundu	S. Kundu			S. Kundu	S. Kundu	
19.	TINA JANA	T. Jana	T. Jana		T. Jana	T. Jana	T. Jana		
20.	MOUSUMI GHORAI	Mousumi Ghorai		M. Ghorai		M. Ghorai		M. Ghorai	
21.	JAYASHREE BHOWMIK	J. Bhowmik		J. Bhowmik	J. Bhowmik		J. Bhowmik		J. Bhowmik
22.	PARAMITA MAJI	P. maji		P. maji		P. maji		P. maji	



23.	ARNAB DAS	A. Das		A. Das	A. Das	A. Das		A. Das	A. Das
24.	RESHMA KHAN	R. Khan.	R. Khan	R. Khan	R. Khan		R. Khan		R. Khan
25.	PABITRA PATRA	P. Patra	P. Patra		P. Patra		P. Patra	P. Patra	
26.	SHRABANTI PRAMANIK	S. Pramanik		S. Pramanik		S. Pramanik		S. Pramanik	
27.	SUPRIYA GIRI	S. Giri	S. Giri			S. Giri		S. Giri	S. Giri
28.	SUVENDU DAS	S. Das	S. Das		S. Das		S. Das		S. Das
29.	RESHMA KHATUN		R. Khatun	R. Khatun		R. Khatun	R. Khatun	R. Khatun	
30.	TRISHA MANDAL	T. Mandal	T. Mandal		T. Mandal			T. Mandal	T. Mandal

### Sample Question of Examination

2018/Add On Course/ Examination

**ADD ON COURSE**  
**Department of Zoology & Computer Science, Mahishadal Raj College**  
**Basic Bioinformatics**

Full Marks: 50

Time: 2 hrs

*The figures in the right-hand margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable. Illustrate the answers wherever necessary.*

**A. Answer the following MCQ :**

**15x2=30**

- Can you identify the Homology and similarity tool from the options below?
  - BLAST
  - RasMol
  - EMBOSS
  - PROSPECT
- When was the SWISSPROT protein sequence database initiated?
  - 1988
  - 1985
  - 1986
  - 1987
- Who among the following scientists established the first Bioinformatics database?
  - Dayhoff
  - Pearson
  - Richard Durbin
  - Michael J. Dunn
- Approximately how many base pairs does the human genome contain?
  - 6 billion base pairs
  - 5 billion base pairs
  - 3 billion base pairs
  - 4 billion base pairs
- What is the term for drug identification through genomic study?
  - Genomics
  - Pharmacogenomics
  - Pharmacogenetics
  - Cheminformatics
- What is the term for drug identification through genomic study?
  - Genomics
  - Pharmacogenomics
  - Pharmacogenetics
  - Cheminformatics
- What is the one fact about FASTA that is incorrect?
  - In reality, it was created before BLAST and was the first database similarity search tool.
  - A string of identical residues with a length of k is searched for using the "hashing" method by FASTA.
  - The string of residues is referred to as a "block."
  - Its acronym is FAST ALL.



2018/Add On Course/ Examination

8. Which of the following does not constitute an online resource for aligning sequence pairs?
- (a) BLASTN
  - (b) BCM Search Launcher
  - (c) BLASTX
  - (d) SIM
9. Which of the factors listed below is not an advantage of BLAST?
- (a) Speed
  - (b) Statistical rigor
  - (c) Handling gaps
  - (d) More perceptive
10. The method of determining the relative position of genes on a chromosome is known as \_\_\_\_\_
- (a) Gene monitoring
  - (b) Genome-walking
  - (c) Genome mapping
  - (d) Chromosome walking
11. There exist three types of interactions between domains. Which of the following is not one of them?
- (a) Stable complex
  - (b) Transient interaction
  - (c) Multi-domain protein
  - (d) Unstable interaction
12. Which of the following is not an advantage of Needleman-Wunsch algorithm?
- (a) New algorithmic improvements as well as increasing computer capacity make it possible to align a query sequence against a large DB in a few minutes
  - (b) Similar sequence region is of same order and orientation
  - (c) This does not help in determining evolutionary relationship
  - (d) If you have 2 genes that are already understood as closely related, then this type of algorithm can be used to understand them in further details
13. Which of the following does not describe PAM matrices?
- (a) These matrices are used in optimal alignment scoring
  - (b) It stands for Point Altered Mutations
  - (c) It stands for Point Accepted Mutations
  - (d) It was first developed by Margaret Dayhoff
14. What is the term for the laboratory work using computers and associated with web-based analysis generally online?
- (a) In silico
  - (b) Dry lab
  - (c) Wet lab
  - (d) All of the above
15. What does computer simulation refer to?
- (a) Dry lab
  - (b) Invitro
  - (c) In silico
  - (d) Wet lab

2018/Add On Course/ Examination

**B. Answer the following questions:**

**2x10=20**

1. Give the applications of bioinformatics in drug discovery, QSAR, microbial genome and crop improvement. 10
2. What is phylogeny? What are the various methods for phylogenetic analysis? Give differences between NJ, MP and ML trees. 10



✦ SAMPLE CERTIFICATE OF COURSE COMPLETION



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

*Shrabanti Pramanik*

has successfully completed the **Add-on Course** on *Basic Bioinformatics*  
held during 2018-19 academic year at Mahishadal Raj College.

*Sublaxmy D.*

Course Co-ordinator

*Jyoti*

IQAC Co-ordinator

DATE: 29.08.2018

*S.P.*

Principal



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

*Soumyadip Panda*

has successfully completed the **Add-on Course** on *Basic Bioinformatics*  
held during 2018-19 academic year at Mahishadal Raj College.

*Sublaxmy D.*

Course Co-ordinator

*Jyoti*

IQAC Co-ordinator

DATE: 29.08.2018

*S.P.*

Principal





## MAHISHADAL RAJ COLLEGE

(Govt. Sponsored)

NAAC Accredited 'A' Grade College

DST (FIST) Govt. Of India approved College, NSDC Training Partner

Estd. : 1946

Mahishadal : Purba Medinipur

Phone STD 03224 No. 240220

Ref. No. MRC/Add on/2/2018-19

Date: 01.10.2018

### **ADD ON COURSE 2018-19**

**Organised by Department Zoology**  
**Topic: Wildlife Ecology and Conservation**

Add on course summary:

#### **REPORT:**

Name of the course- Wildlife Ecology and Conservation

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)

Date of commencement: 03.09.2018

Date of completion: - 19.09.2018

Number of participant enrolled: 30

Total duration day: 15

Total duration hour: 30

Evaluation method:- Paper pen MCQ and practical field work

#### **RESULT DETAILS:-**

Number of student participate in this program: 30

Number of student completes this program: 27

Number of student got certificate in this program: 27

Name of the course: Wildlife Ecology and Conservation

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)



  
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## Wildlife Ecology and Conservation

### ✦ About the course:

Conserving the world's wildlife and protecting the planet are truly grand challenges and the motivation behind all that you will do with this major. This course focuses on student knowledge of the ecology, conservation, and management of wildlife and habitats for the economical, ecological, aesthetic, and recreational values. Conservation of biodiversity is one of the important themes of our course along with a blend of lectures, labs, and field trips.

### ✦ Learning outcomes:

Wildlife ecology and conservation is an ever-evolving field that not only captures the imagination of nature enthusiasts but also offers a multitude of career pathways. This course opens up various job opportunities in both the public and private sectors. Completion of this course, you have the job opportunity on field of wildlife biologist or ecologist, conservation scientist, park ranger or wildlife officer, environmental consultant, wildlife rehabilitation specialist, research scientist, environmental educator, wildlife manager, conservation planner, policy analyst, climate change specialist, and zoo or aquarium conservation specialist. Networking, gaining relevant experience through internships or volunteer work, and staying informed about current issues in wildlife conservation can enhance your chances of securing a rewarding career in this field.

### ✦ Target audience:

Any interested students (UG & PG), research scholars, faculty members and, Industrial personals.

### ✦ Course content overview:

Wildlife ecology is the science behind the practice of wildlife management that seeks to manage wildlife populations. Wildlife ecology began as applied science discipline during the 1920s and 1930s at the University of Wisconsin–Madison with the development of an academic program by Aldo Leopold. Wildlife ecology is the science behind the practice of wildlife management that seeks to manage wildlife populations for the benefit of humans. Although people enjoy viewing wildlife and hunting animals for food and fur, conflicts arise because wild animals kill livestock, cause vehicle collisions, and damage crops. Wildlife ecology has become progressively more quantitative, especially since the 1990s; even so, it still retains a strong orientation toward techniques with an emphasis on statistical methods rather than ecological principles. In the early 1980s the discipline of conservation biology emerged mainly because wildlife ecology was slow to embrace modern ecological theory and broader concerns for the preservation of biodiversity. Since then, however, wildlife ecology has converged as essentially a subdiscipline of conservation biology focused largely on the applied ecology and management of wild populations of birds and mammals.



✚ **Schedule:** Total 30 hours

DAY	SCHEDULE
Day 1	Introduction to wildlife, ecology and conservation (2 hours)
Day 2	Ecological structure and interactions (2 hours)
Day 3	Population and community ecology (2 hours)
Day 4	Distribution and abundance (2 hours)
Day 5	Human Ecology (2 hours)
Day 6	Applied ecology (2 hours)
Day 7	Monitoring wild animals (2 hours)
Day 8	Monitoring and managing habitat (2 hours)
Day 9	Management of wildlife diseases (2 hours)
Day 10	Capturing and restraining wild animals (2 hours)
Day 11	Conservation genetics (2 hours)
Day 12	Ex-situ conservation (2 hours)
Day 13	Field trip (Terrestrial Ecology). (2 hours)
Day 14	Field trip (Aquatic Ecology). (2 hours)
Day 15	Doubts clear and Discussion

✚ **Detail Work Schedule**

Date	Day	Contents	Time	Duration	Experts	Designation
03.09.18	1	Introduction to wildlife, ecology and conservation	12 to 2pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
04.09.18	2	Ecological structure and interactions	1 to 3 pm	2	Prof. Sagnik Mandal	SACT Mahishadal Raj College
05.09.18	3	Population and community ecology	3 to 5pm	2	Prof. Moumita Jana	SACT Mahishadal Raj College
06.09.18	4	Distribution and abundance	03 to 05pm	2	Prof. Saheli Maiti	SACT Mahishadal Raj College
07.09.18	5	Human Ecology	02 to 04pm	2	Prof. Manik Das	SACT Mahishadal Raj College
08.09.18	6	Applied ecology	01 to 03pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
10.09.18	7	Monitoring wild animals	03 to 05pm	2	Prof. Sagnik Mandal	SACT Mahishadal Raj College
11.09.18	8	Monitoring and managing habitat	02 to 04pm	2	Prof. Moumita Jana	SACT Mahishadal Raj College
12.09.18	9	Management of wildlife diseases	02 to 04pm	2	Prof. Saheli Maiti	SACT Mahishadal Raj College



13.09.18	10	Capturing and restraining wild animals	01 to 03pm	2	Prof. Manik Das	SACT Mahishadal Raj College
14.09.18	11	Conservation genetics	02 to 04pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
15.09.18	12	Ex-situ conservation	02 to 04pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
17.09.18	13	Field trip (Terrestrial Ecology)	01 to 03pm	2	Dr. Subhamoy Das, Prof. Moumita jana, Prof. Soheli Jana, Prof. Manik Das	HOD DEP. of ZOOLOGY, SACT Mahishadal Raj College
18.09.18	14	Field trip (Aquatic Ecology)	01 to 03pm	2	Dr. Subhamoy Das, Dr. Rajkumar Guchhait, Prof. Sagnik Mandal	HOD DEP. of ZOOLOGY, SACT Mahishadal Raj College
19.09.18	15	Evaluation, valediction, Discussion	12 to 2 pm	2	Dr. Subhamoy Das, Prof. Moumita jana, Prof. Soheli Jana, Prof. Manik Das, Dr. Rajkumar Guchhait, Prof. Sagnik Mandal.	HOD DEP. of ZOOLOGY, SACT Mahishadal Raj College
				30 hours		

📌 **Course structure and examination scheme:**

Course name	Theory classes (hr.)	Practical Classes (hr.)	Internal Marks	External Marks			Total Marks
				Theory	Practical	Field report	
Wildlife Ecology and Conservation	20	10	20	50	20	10	100





Participant's Details and attendance:

Enrolment Details of Students

Sl. No.	Class	Roll No.	Name	Signature
1.	B. Sc. Generic	2170335	MAHAMAYA DAS	Mahamaya Das
2.	B. Sc. Generic	2170354	JULEKHA KHATUN	Julekha khatun
3.	B. Sc.,(HONS)	2170357	SNEHA MONDAL	Sneha Mondal.
4.	B. Sc. (HONS)	2170358	SRIPARNA SHIT	Sriparna shit
5.	B. Sc.,(HONS)	2170404	KRISHNA PARDHAN	knishna Pandhan
6.	B. Sc.,(HONS)	2170408	SUJATA MAITY	Sujata maity
7.	B. Sc. Generic	2170586	MADHUMITA BERA	madhumita Bera
8.	B. Sc. Generic	2170282	PARAMITA MONDAL	Paramita Mandal
9.	B. Sc.,(HONS)	2170437	SUKCHAND JANA	Sukchand Jana
10.	B. Sc.,(HONS)	2170446	SAMARPITA BHOWMIK	Samarpita Bhowmik
11.	B. Sc.,(HONS)	2170528	PUJA BHOWMIK	Puja Bhowmik.
12.	B. Sc.,(HONS)	2170525	DIPTASREE MAITY	Diptasree maity.
13.	B. Sc.,(HONS)	2170549	DISHA CHAWLAY	Disha Chawlay
14.	B. Sc. Generic	2170288	BARNALI SHIT	Barnali shit
15.	B. Sc. Generic	2170327	KRISHNA SAMANTA	krishna Samanta .
16.	B. Sc.,(HONS)	2170562	RIYA PACHHAR	Riya Pachhan
17.	B. Sc. Generic	2170331	SOUMEN DAS	Soumen das
18.	B. Sc. Generic	2170391	IPSRITA PRADHAN	Ipsrita Pradhan
19.	B. Sc.,(HONS)	2170571	SUSMITA SAMANTA	Susmita Samanta
20.	B. Sc.,(HONS)	2170572	SANKHADEEP ACHARYA	Sankhadeep Acharya
21.	B. Sc. Generic	2170590	SRABANTI DOLAI	Srabanti Dalal
22.	B. Sc. Generic	2170603	BIDISHA PATRA	Bidisha patra
23.	B. Sc.,(HONS)	2170578	RACHANA BIUNIA	Rachana Bhuvia



24.	B. Sc.,(HONS)	2170579	SUBHANWITA MAITY	Subhanwita Maity
25.	B. Sc.,(HONS)	2170582	MOUMITA CHAKRABORTY	Moumita Chakraborty
26.	B. Sc.,(HONS)	2170625	BANDHAN BHUNIA	Bandhan Bhunia
27.	B. Sc., Generic	2170376	AMRITA SHARMA	Amrita Sharma
28.	B. Sc., Generic	2170409	JAYEETA PRAMANIK	Jayeeta Pramanik
29.	B. Sc., Generic	2170469	SHRABANTI MAJI	Shrabanti Maji
30.	B. Sc., Generic	2170540	KEYA MAITY	Keya Maity



Add on course- 2018-2019

Organized by Department Zoology

Topic: - Wildlife Ecology and Conservation

Attendance Record (Day1-Day 8)

Sl. No.	Name of Students	03.09.18	04.09.18	05.09.18	06.09.18	07.09.18	08.09.18	10.09.18	11.09.18
1.	MAHAMAYADAS	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das
2.	JULEKHA KHATUN	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun
3.	SNEHA MONDAL	S.Mondal		S.Mondal		S.Mondal	S.Mondal	S.Mondal	S.Mondal
4.	SRIPARNA SHIT	S.Shit	S.Shit	S.Shit		S.Shit		S.Shit	
5.	KRISHNA PARDHAN	K.Pradhan		K.Pradhan	K.Pradhan		K.Pradhan		K.Pradhan
6.	SUJATA MAITY	S.Maity	S.Maity	S.Maity	S.Maity	S.Maity	S.Maity	S.Maity	S.Maity
7.	MADHUMITA BERA	M.Bera		M.Bera	M.Bera		M.Bera		M.Bera
8.	PARAMITA MONDAL	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal
9.	SUKCHAND JANA	S.Jana		S.Jana	S.Jana		S.Jana		S.Jana
10.	SAMARPITA BHOWMIK	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik
11.	PUJA BHOWMIK	P.Bhowmik	P.Bhowmik		P.Bhowmik		P.Bhowmik		P.Bhowmik
12.	DIPTASREE MAITY	D.Maity	D.Maity	D.Maity		D.Maity	D.Maity		D.Maity
13.	DISHA CHAWLAY	D.Chawlay		D.Chawlay		D.Chawlay	D.Chawlay	D.Chawlay	D.Chawlay
14.	BARNALI SHIT	B.Shit	B.Shit		B.Shit	B.Shit	B.Shit		B.Shit
15.	KRISHNA SAMANTA	K.Samanta		K.Samanta	K.Samanta		K.Samanta		K.Samanta
16.	RIYA PACHHAR	R.Pachhar		R.Pachhar		R.Pachhar		R.Pachhar	
17.	SOUMEN DAS	S.Das	S.Das		S.Das		S.Das	S.Das	S.Das
18.	IPSRITA PRADHAN	I.Pradhan	I.Pradhan		I.Pradhan	I.Pradhan	I.Pradhan	I.Pradhan	I.Pradhan
19.	SUSMITA SAMANTA	S.Samanta		S.Samanta		S.Samanta		S.Samanta	S.Samanta



20.	SANKHADEEP ACHARYA	S. Acharya		S. Acharya	S. Acharya		S. Acharya	S. Acharya	S. Acharya
21.	SRABANTI DOLAI	Solai	Solai		Solai	Solai	Solai		Solai
22.	BIDISHA PATRA	Patra	Patra		Patra	Patra		Patra	
23.	RACHANA BHUNIA	R. Bhunia	R. Bhunia	R. Bhunia		R. Bhunia	R. Bhunia	R. Bhunia	
24.	SUBHANWITA MAITY	S. Maity	S. Maity	S. Maity	S. Maity		S. Maity	S. Maity	
25.	MOUMITA CHAKRABORTY	M.C	M.C		M.C	M.C	M.C	M.C	M.C
26.	BANDHAN BHUNIA	B.bhunia	B.bhunia	B.bhunia		B.bhunia	B.bhunia		B.bhunia
27.	AMRITA SHARMA	A.Sharma	A.Sharma		A.Sharma		A.Sharma		A.Sharma
28.	JAYEETA PRAMANIK	J.P	J.P	J.P		J.P	J.P	J.P	
29.	SHRABANTI MAJI	S. Maji	S. Maji		S. Maji	S. Maji	S. Maji		S. Maji
30.	KEYA MAITY	K. Maity	K. Maity	K. Maity		K. Maity	K. Maity		K. Maity



### Attendance Record (Day9-Day 15)

Sl. No.	Name of Students	12.09.18	13.09.18	14.09.18	15.09.18	17.09.18	18.09.18	19.09.18	
1.	MAHAMAYA DAS	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das	
2.	JULEKHA KHATUN	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun	J.Khatun
3.	SNEHA MONDAL	S.Mondal	S.Mondal	S.Mondal	S.Mondal	S.Mondal	S.Mondal	S.Mondal	S.Mondal
4.	SRIPARNA SHIT								Incomplete
5.	KRISHNA PARDHAN								Incomplete
6.	SUJATA MAITY	S.Maity		S.Maity		S.Maity		S.Maity	S.Maity
7.	MADHUMITA BERA								
8.	PARAMITA MONDAL	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal	P.Mondal	
9.	SUKCHAND JANA								Incomplete
10.	SAMARPITA BHOWMIK	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik	S.Bhowmik		S.Bhowmik
11.	PUJA BHOWMIK	P.Bhowmik			P.Bhowmik	P.Bhowmik		P.Bhowmik	
12.	DIPTASREE MAITY	D.Maity		D.Maity		D.Maity		D.Maity	
13.	DISHA CHAWLAY		D.Chawlay		D.Chawlay	D.Chawlay	D.Chawlay		
14.	BARNALI SHIT	B.Shit	B.Shit		B.Shit		B.Shit		B.Shit
15.	KRISHNA SAMANTA	K.Samanta	K.Samanta		K.Samanta		K.Samanta	K.Samanta	
16.	RIYA PACHHAR	R.Pachhar	R.Pachhar			R.Pachhar		R.Pachhar	
17.	SOUMEN DAS	S.DAS		S.DAS		S.DAS		S.DAS	S.DAS
18.	IPSRITA PRADHAN		I.Pradhan	I.Pradhan	I.Pradhan		I.Pradhan		I.Pradhan
19.	SUSMITA SAMANTA	S.Samanta		S.Samanta	S.Samanta	S.Samanta		S.Samanta	
20.	SANKHADEEP ACHARYA	S.Acharya	S.Acharya		S.Acharya		S.Acharya		S.Acharya
21.	SRABANTI DOLAI	S.Dolai		S.Dolai		S.Dolai		S.Dolai	





**ADD ON COURSE**  
**Department of Zoology, Mahlshadal Raj College**  
**Wildlife Ecology and Conservation**  
**Full Marks: 50** **Time: 2 Hrs**

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*The figures in the right-hand margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.  
Illustrate the answers wherever necessary.*

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**Answer the following MCQ questions: 10x1=10**

1. What is the animal symbol of W. W. F (World Wildlife Fund) ?  
a. Red Panda , b. Giant Panda , c. Tiger , d. Kangaroo
2. Red Data Book Provides data on  
a) Red flowered plants b) Red coloured fishes c) Lists of plants and animals d) Endangered plants and animals
3. Viable material of endangered species can be preserved by  
a) Gene bank b) Gene library c) Gene pool d) Herbarium
4. Which group of vertebrates comprises the highest number of endangered species?  
a) Mammals b) Fishes c) Birds d) Reptiles
5. When did World Wild Fund for Nature-India (WWF-India) established?  
a) 1956 b) 1969 c) 1976 d) 1997
6. Which is the natural habitat of Indian lion?  
a) Western Ghats b) Sunderban delta c) Gir forest d) Himalayas
7. What is called for a scheme to protect and conserve biodiversity?  
a) Biosphere b) Bio-reserve c) Biotechnology d) Bio-ecology
8. Which lake in Northeast India has the world's only floating National Park?  
a) Dal Lake b) Loktak Lake c) Lake Tsomgo d) Shilloi Lake
9. Bandipur National park is located in which of the given states?  
(a) Andhra Pradesh , (b) Rajasthan , (c) Assam , (d) Karnataka
10. Which one of the given options was the first National Park established in India?  
(a) Kanha National park , (b) Dudhwa National park , (c) Jim Corbett National park , (d) None of these



2018/ Add on Course/ Examination

**Answer the following SAQ questions:**

**10x2=20**

1. What do you mean by habitat analysis?
2. What is ecological perturbation?
3. Define carrying capacity?
4. What is ecological footprint?
5. What do you mean by community reserve?
6. State the difference between national park & sanctuary.
7. Write down the difference between ex-situ & in-situ conservation?
8. What do you mean by eco-tourism?
9. What are the difficulties faced in habitat restoration?
10. What do you mean by quarantine?

**Answer the following questions:**


**10x2=20**

1. Illustrate the different aspects of GIS in wildlife conservation & management.
2. Briefly describe the salient features of wildlife protection act.





↓ SAMPLE CERTIFICATE OF COURSE COMPLETION



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

Sankhadeep Acharya

has successfully completed the **Add-on Course** on *Wildlife Ecology and Conservation*  
held during 2018-19 academic year at Mahishadal Raj College.

Suklaunoy D.                      Jayadev R.                      S.P.

Course Co-ordinator                      IQAC Co-ordinator                      Principal

DATE: 19.09.2018



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

Samarpita Bhowmik

has successfully completed the **Add-on Course** on *Wildlife Ecology and Conservation*  
held during 2018-19 academic year at Mahishadal Raj College.

Suklaunoy D.                      Jayadev R.                      S.P.

Course Co-ordinator                      IQAC Co-ordinator                      Principal

DATE: 19.09.2018





## MAHISHADAL RAJ COLLEGE

(Govt. Sponsored)

NAAC Accredited 'A' Grade College

DST (FIST) Govt. Of India approved College, NSDC Training Partner

Estd. : 1946

Mahishadal : Purba Medinipur

Phone STD 03224 No. 240220

Ref. No. MRC/ADDON/03/2018-19

Date: 24.12.2018

### **ADD ON COURSE 2018-19**

**Organised by Department Zoology & Nutrition**

**Topic: Induced breeding and seed production of *Anabas* and *Heteropneustes*.**

Add on course summary:

#### **REPORT:**

**Name of the course-** Induced breeding and seed production of *Anabas* and *Heteropneustes*.

**Course coordinator:** *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)

**Date of commencement:** 20.11.2018

**Date of completion:** - 06.12.2018

**Number of participant enrolled:** 30

**Total duration day:** 15

**Total duration hour:** 30

**Evaluation method:-** Paper pen MCQ and practical work

#### **RESULT DETAILS:-**

**Number of student participate in this program:** 30

**Number of student completes this program:** 29

**Number of student got certificate in this program:** 29

**Name of the course:** Induced breeding and seed production of *Anabas* and *Heteropneustes*.

**Course coordinator:** *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)



Principal

MAHISHADAL RAJ COLLEGE



## **Induced breeding and seed production of *Anabas* and *Heteropneustes***

### **✦ About the course:**

Induced breeding and seed production are essential aspects of aquaculture that involve controlled reproduction of fish for commercial purposes. These practices help ensure a steady and reliable supply of fish for food and other purposes. Induced breeding is a technique that involves manipulating environmental conditions and employing hormonal treatments to stimulate fish to spawn under controlled conditions. These courses on these topics typically cover the theoretical aspects of fish reproductive biology, practical techniques for induced breeding, and the management of hatchery and nursery operations. They are valuable for individuals involved in aquaculture, fisheries management, and related fields. These courses of induced breeding and seed production in fish are indispensable components of modern aquaculture practices. Through the manipulation of environmental conditions and advanced reproductive techniques, fish farmers can ensure a consistent and reliable supply of fish for various purposes. Despite the challenges, ongoing research and innovations continue to enhance these courses, contributing to the sustainability and growth of the aquaculture industry.

### **✦ Learning outcomes:**

This course of induced breeding and seed production in fish aquaculture not only contributes to meeting the global demand for fish but also opens a diverse array of career opportunities. From hands-on technical roles to managerial positions, entrepreneurial ventures, and research-focused careers, individuals with expertise in these specialized areas are well-positioned to make meaningful contributions to the sustainable development of the aquaculture industry. As the world looks towards innovative solutions for food security, the job opportunities in induced breeding and seed production are set to grow, offering a promising and fulfilling career path for those passionate about aquatic sciences and environmental sustainability. This course opens different job opportunities such as aquaculture technician, hatchery manager, research scientist, aquaculture consultant, Entrepreneurs in Aquaculture, Fisheries and Aquaculture Extension Officers, and Quality Control Specialists.

### **✦ Target audience:**

Any branch of life sciences students (UG and PG), research scholars, and faculties who have interest in fishery and industrial fishery. Fish farmers who have very much interest may join the programme.

### **✦ Course content overview:**

Induced breeding is a technique where by ripe fish breeders are stimulated by pituitary hormone or any other synthetic hormone introduction to breed in captive condition. Then the carps being excited lay eggs in the pond water and the process is called induced breeding. This process of breeding is also known as hypophysation. Major carps are most important species from the point of view of their high food and nutritive values. Hence they have kept attention of scientists and aqua farmers. They have peculiar habit of breeding in running waters of rivers and streams where they have large space for movement. The breeding technique in which the breeders use hormones to ripe the fish artificially is known as induced breeding. This leads to the release of eggs and sperms from the fish at a specific time interval. As induced breeding is an artificial technique it is also known as artificial breeding. The hormone used during induced breeding is gonadotrophin. Gonadotrophin comprises that follicle-stimulating hormone (FSH) which induces early gametogenesis in fish.



#### ✚ Schedule: Total 30 hours

DAY	SCHEDULE
Day 1	Introduction to fish breeding (T) (2 hours)
Day 2	Natural and induced breeding of fish (T) (2 hours)
Day 3	Brood fish collection and rearing(T+P) (2 hours)
Day 4	Different types of pond or concrete tank preparation (T+P) (2 hours)
Day 5	Soil quality management in <i>Anabas</i> and <i>Heteropneustes</i> . (T+P) (2 hours)
Day 6	Water quality management in <i>Anabas</i> and <i>Heteropneustes</i> . (T+P) (2 hours)
Day 7	Induced breeding of <i>Anabas</i> (P) (2 hours)
Day 8	Induced breeding of <i>Heteropneustes</i> . (P) (2 hours)
Day 9	Rearing of hatchlings of <i>Anabas</i> and <i>Heteropneustes</i> (T+P) (2 hours)
Day 10	Planning and designing of fish farm.(T)) (2 hours)
Day 11	Entrepreneurship development through <i>Anabas</i> and <i>Heteropneustes</i> aquaculture and marketing.(T) (2 hours)
Day 12	Feeding and rearing of hatchlings (P) (2 hours)
Day 13	Plankton culture (2 hours)
Day 14	Common disease and its management. (2 hours)
Day 15	Discussions & Evaluation. (2 hours)

#### ✚ Detail Work Schedule

Date	Day	Contents	Time	Duration	Experts	Designation
20.11.18	1	Introduction to fish breeding (T)	12 to 2pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
21.11.18	2	Natural and induced breeding of fish (T)	1 to 3 pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
22.11.18	3	Brood fish collection and rearing(T+P)	3 to 5pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
23.11.18	4	Different types of pond or concrete tank preparation (T+P)	03 to 05pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
24.11.18	5	Soil quality management in <i>Anabas</i> and <i>Heteropneustes</i> .	02 to 04pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
26.11.18	6	Water quality management in <i>Anabas</i> and <i>Heteropneustes</i> .	01 to 03pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
27.11.18	7	Induced breeding of <i>Anabas</i> (P)	03 to 05pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College



28.11.18	8	Induced breeding of <i>Heteropneustes</i> . (P)	02 to 04pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
29.11.18	9	Rearing of hatchlings of <i>Anabas</i> and <i>Heteropneustes</i> (T+P)	02 to 04pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
30.11.18	10	Planning and designing of fish farm.(T)	01 to 03pm	2	Prof. Manik Das	SACT Mahishadal Raj College
01.12.18	11	Entrepreneurship development through <i>Anabas &amp; Heteropneustes</i> aquaculture and marketing.	02 to 04pm	2	Prof. Moumita Jana	SACT Mahishadal Raj College
03.12.18	12	Feeding and rearing of hatchlings (P)	02 to 04pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
04.12.18	13	Plankton culture	01 to 03pm	2	Prof. Sagnik Manadal	SACT Mahishadal Raj College
05.12.18	14	Common disease and its management.	01 to 03pm	2	Prof. Saheli Maiti	SACT Mahishadal Raj College
06.12.18	15	Discussions, Evaluation, valediction, feedback	12 to 2 pm	2	Dr. Subhamoy Day, Dr. Rajkumar Guchhait, Prof. Sagnik Manadal, Prof. Manik Das and Prof. Moumita Jana.	HOD & SACT., Zoology; Principal,
				30 hours		

✚ **Course structure and examination scheme:**

Course name	Theory classes (hr.)	Practical classes (hr.)	Continuous assessment		Total marks
			Theory	Practical	
Induced breeding and seed production in <i>Anabas</i> and <i>Heteropneustes</i> .	12	18	40	10	50



Participant's Details and attendance:

Enrolment Details of Students

Sl no.	Class	Roll no.	Name	Signature
1.	B. Sc., 3 <sup>rd</sup> Year	2160027	AMINA KHATUN	Amina khatun
2.	PG 3 <sup>rd</sup> Sem	170062	Sanchita Maiti	Sanchita Maiti
3.	PG 1 <sup>st</sup> Sem	5180038	Monoj Shee	Monoj shee
4.	B. Sc., 3 <sup>rd</sup> Year	2160030	SANJAY MAJI	Sanjay Maji
5.	PG 3 <sup>rd</sup> Sem	170080	Swagata Das	Swagata Das
6.	PG 1 <sup>st</sup> Sem	5180039	Suchanda Maity	Suchanda Maity
7.	B. Sc., 3 <sup>rd</sup> Year	2160541	DEEPNATH HAZRA	Deepnath Hazra
8.	PG 3 <sup>rd</sup> Sem	170068	Kanchan Singha Mahapatra	Kanchan Singha Mahapatra
9.	PG 1 <sup>st</sup> Sem	5180040	Sabyasachi Barman	Sabyasachi Barman
10.	B. Sc., 3 <sup>rd</sup> Year	2160520	MOUMITA PATRA	Moumita Patra
11.	PG 3 <sup>rd</sup> Sem	170079	Barun Maity	Barun Maity
12.	B. Sc., 3 <sup>rd</sup> Year	2160010	TUHIN KANTI SAMANTA	Tuhin kanti Samanta
13.	B.Sc 4 <sup>th</sup> sem Generic	2170376	Amrita Sharma	Amrita Sharma
14.	PG 3 <sup>rd</sup> Sem	170076	Mahuya Maiti	Mahuya Maiti
15.	B.Sc 4 <sup>th</sup> sem Generic	2170409	Jayeeta Pramanik	Jayeeta Pramanik
16.	B. Sc., 3 <sup>rd</sup> Year	2160194	SOURAV DOLAI	Sourav dolai
17.	PG 1 <sup>st</sup> Sem	5180062	Sk. Sayantina Banu	Sk. Sayantina Banu
18.	PG 3 <sup>rd</sup> Sem	170063	Binapani Sahoo	Binapani Sahoo



19.	B.Sc 4 <sup>th</sup> sem Generic	2170469	Shrabanti Maji	Shrabanti Maji
20.	B. Sc., 3 <sup>rd</sup> Year	2160457	RIKTA SANTRA	Rikta Santra
21.	PG 1 <sup>st</sup> Sem	5180079	Sunetra Das	Sunetra Das
22.	PG 3 <sup>rd</sup> Sem	170066	Sourav Mondal	Sourav Mondal
23.	B. Sc., 3 <sup>rd</sup> Year	2160105	SHRABANTI MONDAL	Shrabanti Mondal
24.	B.Sc 4 <sup>th</sup> sem Generic	2170540	Keya Maity	Keya Maity
25.	PG 1 <sup>st</sup> Sem	51800102	Indranath Giri	Indranath Giri
26.	B. Sc., 3 <sup>rd</sup> Year	2160051	TANUSHREE GIRI	Tanushree Giri
27.	B. Sc., 3 <sup>rd</sup> Year	2160452	PUJA CHAKRABARTY	Puja Chakrabarty
28.	PG 3 <sup>rd</sup> Sem	170082	Tuhin Patra	Tuhin Patra
29.	PG 1 <sup>st</sup> Sem	5180091	Biswarupa Panda	Biswarupa Panda
30.	B. Sc., 3 <sup>rd</sup> Year	2160050	MAITRI SAU	Maitri Sau



Add on course- 2018-2019

Organized by Department Zoology & Nutrition

Topic: - Induced breeding and seed production of Anabas and Heteropneustes

Attendance Record (Day1-Day 8)

Sl. No.	Name of Students	20.11.18	21.11.18	22.11.18	23.11.18	24.11.18	26.11.18	27.11.18	28.11.18
1.	AMINA KHATUN	AK	AK	AK	AK	AK	AK	AK	AK
2.	SANCHITA MAITI	S.Maiti	S.Maiti		S.Maiti	S.Maiti		S.Maiti	S.Maiti
3.	MONOJ SHEE	M.Shee		M.Shee	M.Shee	M.Shee	M.Shee	M.Shee	M.Shee
4.	SANJAY MAJI	S.Maji	S.Maji	S.Maji		S.Maji	S.Maji	S.Maji	
5.	SWAGATA DAS	S.Das		S.Das	S.Das	S.Das	S.Das	S.Das	S.Das
6.	SUCHANDA MAITY	S.M	S.M	S.M	S.M		S.M	SM	SM
7.	DEEPNATH HAZRA	D.Hazra	D.Hazra	D.Hazra		D.Hazra	D.Hazra	D.Hazra	D.Hazra
8.	KANCHAN SINGHA MAHAPATRA.	K.S.M.	K.S.M.	K.S.M.	K.S.M.		K.S.M.	K.S.M.	K.S.M.
9.	SABYASACHI BARMAN	S.Ban.	S.Ban.	S.Ban.		S.Ban.	S.Ban.	S.Ban.	S.Ban.
10.	MOUMITA PATRA	M.Patra	M.Patra	M.Patra	M.Patra	M.Patra	M.Patra	M.Patra	M.Patra
11.	BARUN MAITY	B.Maity	B.Maity		B.Maity	B.Maity	B.Maity	B.Maity	B.Maity
12.	TUHIN KANTI SAMANTA	T.K.S	T.K.S	T.K.S	T.K.S	T.K.S	T.K.S	T.K.S	T.K.S
13.	AMRITA SHARMA	A.Sharma	A.Sharma	A.Sharma		A.Sharma	A.Sharma	A.Sharma	A.Sharma
14.	MAHUYA MAITY	M.Maity	M.Maity		M.Maity	M.Maity	M.Maity	M.Maity	M.Maity
15.	JAYEETA PRAMANIK	J.Pranik	J.Pranik	J.Pranik	J.Pranik		J.Pranik	J.Pranik	J.Pranik
16.	SOURAV DOLAI	S.Dolai	S.Dolai	S.Dolai		S.Dolai	S.Dolai	S.Dolai	S.Dolai
17.	SK. SAYANTINA BANU	S.Banu	S.Banu	S.Banu	S.Banu	S.Banu	S.Banu	S.Banu	S.Banu
18.	BINAPANI SAHOO	B.Sahoo	B.Sahoo		B.Sahoo	B.Sahoo		B.Sahoo	
19.	SHRABANTI MAJI	S.Maji	S.Maji	S.Maji		S.Maji	S.Maji	S.Maji	S.Maji
20.	RIKTA SANTRA	R.Santra	R.Santra		R.Santra	R.Santra	R.Santra		R.Santra
21.	SUNETRA DAS	S.Das		S.Das	S.Das	S.Das	S.Das		S.Das





22.	SOURAV MONDAL	S. Mondal	S. Mondal		S. Mondal	S. Mondal		S. Mondal	S. Mondal
23.	SHRABANTI MONDAL	S.M	S.M	S.M	S.M	S.M	SM	SM	SM
24.	KEYA MAITY	K. Maity	K. Maity	K. Maity	K. Maity	K. Maity	K. Maity		K. Maity
25.	INDRANATH GIRI	I. Giri	I. Giri	I. Giri	I. Giri		I. Giri	I. Giri	I. Giri
26.	TANUSHRE GIRI	T. Giri	T. Giri	T. Giri		T. Giri	T. Giri		T. Giri
27.	PUJA CHAKRABORTY				INCOMPLETE				
28.	TUHIN PATRA	Patra.		Patra.	Patra.	Patra.	Patra.	Patra.	Patra.
29.	BISWARUPA PANDA	B. Panda	B. Panda	B. Panda		B. Panda	B. Panda		B. Panda
30.	MAITRI SAHOO.	M. Sahu.	M. Sahu.		M. Sahu.	M. Sahu.		M. Sahu.	M. Sahu.



### Attendance Record (Day9-Day 15)

Sl. No.	Name of Students	29.11.18	30.11.18	01.12.18	03.12.18	04.12.18	05.12.18	06.12.18	
1.	AMINA KHATUN	AK	AK		AK	AK		AK	
2.	SANCHITA MAITY	SMaiti		SMaiti	SMaiti	SMaiti	SMaiti	SMaiti	
3.	HONOJ SHEE	M. Shee	M. Shee	M. Shee		M. Shee	M. Shee	M. Shee	
4.	SANJAY MAJI	S. Maji		S. Maji	S. Maji	S. Maji		S. Maji	
5.	SWAGATA DAS	S. Das	S. Das	S. Das	S. Das	S. Das	S. Das	S. Das	
6.	SUCHANDA MAITY	SM	SM	S.M	S.M		S.M	S.M	
7.	DEEPNATH HAZRA	D. Hazra		D. Hazra	D. Hazra	D. Hazra		D. Hazra	
8.	KANCHAN SINGHA MAHAPATRA	K.S.M	K.S.M	K.S.M		K.S.M	K.S.M	K.S.M	
9.	SABYASACHI BARMAN	SBar	SBar		SBar	SBar	SBar	SBar	
10.	MOUMITA PATRA	M. Patra		M. Patra	M. Patra	M. Patra	M. Patra	M. Patra	
11.	BARUN MAITY	B. Maity	B. Maity	B. Maity	B. Maity		B. Maity	B. Maity	
12.	TUHIN KANTI SAMANTA	T.K.S	T.K.S		T.K.S	T.K.S	T.K.S	T.K.S	
13.	AMRITA SHARMA	A. Sharma	A. Sharma	A. Sharma	A. Sharma	A. Sharma	A. Sharma	A. Sharma	
14.	MAHUYA MAITY	M. Maity	M. Maity	M. Maity	M. Maity	M. Maity		M. Maity	
15.	JAYEETA PRAMANIK		JPranik	JPranik		JPranik	JPranik	JPranik	
16.	SOURAV DOLAI	S. Dolai	S. Dolai		S. Dolai	S. Dolai	S. Dolai	S. Dolai	
17.	SK. SAYANTINABANU		SBanu	SBanu			SBanu	SBanu	
18.	BINAPANI SAHOO	B. Sahoo		B. Sahoo		B. Sahoo	B. Sahoo	B. Sahoo	
19.	SHRABANTI MAJI	S. Maji	S. Maji	S. Maji	S. Maji	S. Maji	S. Maji	S. Maji	
20.	RIKTA SANTRA	R. Santra		R. Santra		R. Santra		R. Santra	
21.	SUNETRA DAS	S. Das	S. Das		S. Das		S. Das	S. Das	
22.	SOURAV MONDAL	S. Mondal		S. Mondal		S. Mondal		S. Mondal	
23.	SHRABANTI MONDAL	S.M	S.M	SM	SM		SM	SM	



24.	KEYA MAITY	K.Maity		K.Maity		K.Maity	K.Maity	K.Maity	
25.	INDRANATH GIRI		I. Giri	I. Giri	I. Giri	I. Giri	I. Giri	I. Giri	
26.	TANUSHREE GIRI	T. Giri		T. Giri		T. Gir.		T. Giri	
27.	PUJA CHAKRABORTY		Incomplete						
28.	TUHIN PATRA	Patra.	Patra		Patra.		Patra.	Patra.	
29.	BISWARUPA PANDA	B. Panda		B. Panda	B. Panda	B. Panda		B. Panda	
30.	MAITRI SAHOO		M. Saha	M. Saha	M. Saha		M. Saha	M. Saha	



Sample Question of Examination

2018/Add On Course/ Examination

**ADD ON COURSE**  
**Department of Zoology & Nutrition, Mahishadal Raj College**  
**Induced breeding and seed production of *Anabas* and *Heteropneustes***  
**Full Marks: 50** **Time: 2 hrs**

*The figures in the right-hand margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable. Illustrate the answers wherever necessary.*

**A. Answer the following MCQ : 15x2=30**

1. Which of the following is used for induced breeding in fishes?
  - a) MOET
  - b) ART
  - c) Hypophysation
  - d) Artificial insemination
2. An advantage of induced breeding in fishes is to
  - a) have more seeds
  - b) have more fish
  - c) earn more money
  - d) have all of the above three
3. In India peak breeding season of common carp is -----.
  - a) Summer
  - b) Winter
  - c) Monsoon
  - d) None of the above
4. Pituitary extract is preserved with -----.
  - a) Absolute alcohol
  - b) Glycerine
  - c) Acetone
  - d) Freezing
5. Measurement of carbonate and bicarbonate ions is a—
  - a) Hardness
  - b) Alkalinity
  - c) Transparency
  - d) Turbidity
6. Which chemical is used to control aquatic insect?
  - a) Hi-oxide
  - b) Bleaching powder
  - c) Lime
  - d) Formalin
7. The book Classic of Fish Culture was written by—
  - a) H.B. Wilson
  - b) Fan Lei
  - c) T.V.R. Pillay
  - d) V.G. Zingram



2018/Add On Course/ Examination

8. Fishes feeding on single type of feed are known as
- Stenophagic
  - Monophagic
  - Euryphagic
  - Carnivorous
9. Major nitrogenous waste products excreted by fish
- Urea
  - Ammonia
  - Uric acid
  - Amino acid
10. Each milliliter of ovaprim, a synthetic hormonal preparation contains ----- sGnRH and ---  
----- domperidone.
- 20 mg, 10 $\mu$ g
  - 0.2 mg, 10 $\mu$ g
  - 20  $\mu$ g, 10 mg
  - 2.0 mg, 10 $\mu$ g
11. ----- is a leading country in export of ornamental fishes.
- USA
  - UK
  - Singapore
  - India
12. First scientific fish farm in India was constructed under the guidance of –
- H. B. Vora
  - H. B. Wilson
  - G. E. Fogg
  - Lo-Chai Chen
13. Two or more species culture in the same pond is known as –
- Polyculture
  - Monoculture
  - Raceway culture
  - Pen culture
14. The average fish consumption in urban part of India is
- 1 to 2 kg/person/year
  - 3 to 5 kg/person/year
  - 6 to 8 kg/person/year
  - 8 to 10 kg/person/year
15. Polyculture of fishes were first developed in—
- India
  - China
  - Thailand
  - Taiwan

**B. Answer the following questions:**

**2x10=20**

- What is induced breeding? What are the various stages of induced breeding technique?
- Describe the role of quality of water in aquaculture.



↓ **SAMPLE CERTIFICATE OF COURSE COMPLETION**



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

Swagata Das

has successfully completed the **Add-on Course** on *Induced breeding and seed production* held during 2018-19 academic year at Mahishadal Raj College.

Subhansu Das  
Course Co-ordinator

Jayadev R.  
IQAC Co-ordinator

[Signature]  
Principal

DATE: 06.12.2018



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

Kanchan Singha Mahapatra

has successfully completed the **Add-on Course** on *Induced breeding and seed production* held during 2018-19 academic year at Mahishadal Raj College.

Subhansu Das  
Course Co-ordinator

Jayadev R.  
IQAC Co-ordinator

[Signature]  
Principal

DATE: 06.12.2018





## MAHISHADAL RAJ COLLEGE

(Govt. Sponsored)

NAAC Accredited 'A' Grade College

DST (FIST) Govt. Of India approved College, NSDC Training Partner

Estd. : 1946

Mahishadal : Purba Medinipur

Phone STD 03224 No. 240220

Ref. No. MRC/ADDON/04/2018-19

Date: 05.01.2019

### **ADD ON COURSE 2018-19** **Organised by Department Zoology** **Topic: Popular Science Writing**

Add on course summary:

#### **REPORT:**

Name of the course- Popular Science Writing

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)

Date of commencement: 10/12/18

Date of completion: - 18/12/18

Number of participant: 31

Total duration day: 08

Total duration hour: 32

Evaluation method:- Paper pen MCQ and practical field work

#### **RESULT DETAILS:-**

Number of student participate in this program: 22

Number of student completes this program: 21

Number of student got certificate in this program: 21

Name of the course: Popular Science Writing

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)



Principal

MAHISHADAL RAJ COLLEGE



## Popular science writing

### ✦ Aims of the course:

To familiarise students with a range of perspectives on the value and purposes of science writing to explore a range of styles and techniques for writing about science, with a focus on writing narrative non-fiction books and essays to develop students' skills as effective and engaging science writers

### ✦ Learning outcomes:

As a result of the course, within the constraints of the time available, students should be able to:

1. Critique science writing and recognise what makes science writing appropriate to particular audiences and aims
2. Develop ideas for, and draft, of a piece of non-fiction writing (a book chapter or a long feature, of approximately 5,000 words), using elements of narrative storytelling.
3. Develop a proposal and pitch for a popular science book
4. Edit their work to enhance their writing for particular readerships and production contexts.

### ✦ Target audience:

Students who aren't necessarily practicing scientists or trained in science, but who are interested in communicating science to the general public. Students who are academics at any stage of their careers and are keen to write effectively about their science for a wide audience, beyond their peers. Students who are keen to write popular science books or long features for journals and magazines.

The student specially Zoology, Botany, Physiology, Nutrition Physics, Chemistry Mathematics and Computer science are entitled in the course. Irrespective general generic and honours all the students who have scientific attitude and temperament and the student who are willing to established in the field of writing they can attend the courses.

### ✦ Course content overview:

This course introduces the craft of writing about science for non-specialist readerships, also known as popular science writing. Students will learn how to read, analyse and critique the work of other science writers, to develop their own skills in effectively communicating science to non-specialist publics. Students will each develop an idea and draft text for a long piece of narrative non-fiction writing of their choice, most likely a chapter for book or a long feature. Students will practise their own science writing, with short writing exercises alongside their own work to produce a long feature or a chapter for a book. Feedback from tutors will be available throughout the course. Students will learn how to get their writing published.





➤ **Schedule:** Total 32 hours

DAY	SCHEDULE
Day 1	Orientation (4hours)
Day 2	What makes good science writing? (4 hours)
Day 3	Shaping a structure and telling a story (4 hours)
Day 4	Editing: how to write better (4 hours)
Day 5	Publishing your book (4 hours)
Day 6	Managing information (4 hours)
Day 7	What Next? (4 hours)
Day 8	Valediction, feedback (4 hours)

➤ **Detail Work Schedule**

Date	Day	Contents	Time	Duration	Experts	Designation
10.12.18	1	Orientation	12 to 1pm	1	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
10.12.18	1	What is science? History of science writing	1 to 4 pm	3	Dr. Suman Pratihar	Assit Prof Keshpur College
11.12.18	2	What makes good science writing?(4 hours)	1 to 5pm	4	Arif Iqbal Khan	Eminent Journalist
12.12.18	3	Shaping a structure and telling a story(4 hours)	01 to 05pm	4	Subhamoy Das	HOD DEP. of ZOOLOGY
13.12.18	4	Editing: how to write better(4 hours)	01 to 05pm	4	Pathik Guha	Eminent Journalist
14.12.18	5	Publishing your book(4 hours)	01 to 05pm	4	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
15.12.18	6	Managing information (4 hours)	01 to 05pm	4	Sagnik Mondal	SACT Mahishadal Raj College
17.12.18	7	What Next? (4 hours)	01 to 05pm	4	Dr.Subikash Mukherjee	HOD , Economics, MRC
18.12.18	8	Evaluation, valediction, feedback(4 hours)	12 to 4 pm	4	Manik Das, DR.Asim Kr Bera	SACT., Zoology; Principal, MRC
				32 hours		



Course structure and examination scheme:

Course name	Theory classes (hr.)	Practical Classes (hr.)	Internal Marks	External Marks			Total Marks
				Theory	Practical	Field work	
Popular science writing	20	12	20	50	20	10	100



✦ Participant's Details and attendance:

Enrolment Details of Students

Sl. No.	Class	Roll No.	Name	Signature
1.	B. Sc. General	2180404	RITTIK CHAKRABORTY	Rittwik Chakraborty.
2.	B. Sc. Generic	21800142	INDRANI SEN	Indrani Sen
3.	B.Sc.,(HONS)	2170610	TAMALIKA DAS	Tamaliika Das.
4.	B. Sc.(HONS)	2170025	MAMPA DAS	Mampa Das
5.	B.Sc.,(HONS)	2170032	SANGITA ADHIKARY	Sangita Adhikary
6.	B.Sc.,(HONS)	2170278	AMIT PRAMANIK	Amit Pramanik
7.	B. Sc. General	2180447	NAIMA AKTAR	Naima Aktar
8.	B. Sc. Generic	2180198	SOUYATTAM BERA	Soumyattam Bera
9.	B.Sc.,(HONS)	2170280	SK. MUSTANGIR	SK. Mustangir
10.	B.Sc.,(HONS)	2170285	SUDIP DAS	Sudip Das
11.	B.Sc.,(HONS)	2170287	BITHI BERA	Bidhi Bera
12.	B.Sc.,(HONS)	2170289	SRABANTI MISTRI	Srabanti Mistri
13.	B.Sc.,(HONS)	2170298	NAMITA BERA	Namita Bera
14.	B. Sc. General	2180458	SOUYADIP PANDA	Soumyadip Panda
15.	B. Sc. Generic	2180531	SUTALIKA MAITY	sutalika Maity
16.	B.Sc.,(HONS)	2170300	RAHUL ROY	Rahul Roy
17.	B. Sc. General	2180474	PAPIYA MAITY	Papiya Maity
18.	B. Sc. Generic	2180333	SHUVASIS KUNDU	Shuvasis Kundu
19.	B.Sc.,(HONS)	2170302	TINA JANA	Tina Jana
20.	B.Sc.,(HONS)	2170303	MOUSUMI GHORAI	Mousumi Ghorai
21.	B. Sc. General	2180475	JAYASHREE BHOWMIK	Jayashree Bhowmik
22.	B. Sc. Generic	2180543	PARAMITA MAJI	Paramita Maji



23.	B.Sc.,(HONS)	2170304	ARNAB DAS	Arnab Das
24.	B.Sc.,(HONS)	2170307	RESHMA KHAN	Reshma Khan
25.	B.Sc.,(HONS)	2170311	PABITRA PATRA	Pabitra Patra
26.	B.Sc.,(HONS)	2170312	SHRABANTI PRAMANIK	Shrabanti Pramanik
27.	B.Sc.,(HONS)	2170322	SUPRIYA GIRI	Supriya Giri
28.	B.Sc.,(HONS)	2170342	SUVENDU DAS	Suvendu Das
29.	B.Sc.,(HONS)	2170347	RESHMA KHATUN	Reshma Khatun
30.	B.Sc.,(HONS)	2170348	TRISHA MANDAL	Trisha Mandal



Add on course- 2018-2019

Organized by Department Zoology

Topic: - Popular Science Writing

Attendance Record

Sl. No.	Name of Students	10.12.18	11.12.18	12.12.18	13.12.18	14.12.18	15.12.18	17.12.18	18.12.18
1.	RITTIK CHAKRABORTY	Rhakra borty	Rhakra borty	Rhakra borty	Rhakra borty	Rhakra borty	Rhakra borty	Rhakra borty	Rhakra borty
2.	INDRANI SEN	I.Sen	I.Sen	I.Sen	I.Sen	I.Sen	I.Sen	I.Sen	I.Sen
3.	TAMALIKA DAS	Das	Das	Das	Das	Das	Das	Das	Das
4.	MAMPA DAS	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das	M.Das
5.	SANGITA ADHIKARY							Incomplete	
6.	AMIT PRAMANIK							Incomplete	
7.	NAIMA AKTAR	N.Aktar	N.Aktar	N.Aktar	N.Aktar	N.Aktar	N.Aktar	N.Aktar	N.Aktar
8.	SOUFYATTAM BERA	S.Bera	S.Bera	S.Bera	S.Bera	S.Bera	S.Bera	S.Bera	S.Bera
9.	SK . MUSTANGIR				Incomplete				
10.	SUDIP DAS	S.Das	S.Das	S.Das	S.Das	S.Das	S.Das	S.Das	S.Das
11.	BITHI BERA	B.Bera	B.Bera	B.Bera	B.Bera	B.Bera	B.Bera	B.Bera	B.Bera
12.	SRABANTI MISTRI	S.Mistri	S.Mistri	S.Mistri	S.Mistri	S.Mistri	S.Mistri	S.Mistri	S.Mistri
13.	NAMITA BERA	N.Bera	N.Bera	N.Bera	N.Bera	N.Bera	N.Bera	N.Bera	N.Bera
14.	SOUFYADIP PANDA	S.Panda	S.Panda	S.Panda	S.Panda	S.Panda	S.Panda	S.Panda	S.Panda
15.	SUTALIKA MAITY				Incomplete				
16.	RAHUL ROY	R.Roy	R.Roy	R.Roy	R.Roy	R.Roy	R.Roy	R.Roy	R.Roy
17.	PAPIYA MAITY				Incomplete				
18.	SHUVASIS KUNDU	S.Kundu	S.Kundu	S.Kundu	S.Kundu	S.Kundu	S.Kundu	S.Kundu	S.Kundu
19.	TINA JANA	T.Jana	T.Jana	T.Jana	T.Jana	T.Jana	T.Jana	T.Jana	T.Jana
20.	MOUSUMI GHORAI	M.Ghorai	M.Ghorai	M.Ghorai	M.Ghorai	M.Ghorai	M.Ghorai	M.Ghorai	M.Ghorai
21.	JAYASHREE BHOWMIK				Incomplete				



22.	PARAMITA MAJI	P. Maji	P. Maji	P. Maji	P. Maji	P. Maji	P. Maji	P. Maji	P. Maji
23.	ARNAB DAS	A. Das	A. Das	A. Das	A. Das	A. Das	A. Das	A. Das	A. Das
24.	RESHMA KHAN	R. Khan	R. Khan	R. Khan	R. Khan	R. Khan	R. Khan	R. Khan	R. Khan
25.	PABITRA PATRA	P. Patra	P. Patra	P. Patra	P. Patra	P. Patra	P. Patra	P. Patra	P. Patra
26.	SHIRABANTI PRAMANIK	S. Pramanik	S. Pramanik	S. Pramanik	S. Pramanik	S. Pramanik	S. Pramanik	S. Pramanik	S. Pramanik
27.	SUPRIYA GIRI	S. Giri	S. Giri	S. Giri	S. Giri	S. Giri	S. Giri	S. Giri	S. Giri
28.	SUVENDU DAS	S. Das	S. Das	S. Das	S. Das	S. Das	S. Das	S. Das	S. Das
29.	RESHMA KHATUN	R. Khatun	R. Khatun	R. Khatun	R. Khatun	R. Khatun	R. Khatun	R. Khatun	R. Khatun
30.	TRISHA MANDAL	T. Mandal	T. Mandal	T. Mandal	T. Mandal	T. Mandal	T. Mandal	T. Mandal	T. Mandal

### Sample Question of Examination

2018/Add On Course/ Examination

#### ADD ON COURSE

Department of Zoology, Mahishadal Raj College  
Popular Science Writing

Full Marks: 50

Time: 2 hrs

The figures in the right-hand margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

A. Answer the following MCQ :

2.5x4=10

1. What is the best description of scientific writing?

- A) Scientific writing reports experiments using prose and metaphors.
- B) Scientific writing is how scientists communicate the results of their experiments and work accurately and collaboratively.
- C) Scientific writing is written for the layman using mainstream media as a source.
- D) Scientific writing shares results of experiments that are neither peer reviewed nor edited.

2. What are some of the ways scientific writing is used?

- A) Academics (scientific literature and curricula), social media (opinion blogs), theoretical modelers (knowledge)
- B) Academics (scientific literature and curricula), medical and pharmaceutical fields (treatments), social media (opinion blogs)
- C) Academics (scientific literature and curricula), medical and pharmaceutical fields (treatments), theoretical modelers (knowledge)
- D) Social media (opinion blogs), medical and pharmaceutical fields (treatments), theoretical modelers (knowledge)

3. All the following are examples of ways the current style of scientific writing differs from other writing EXCEPT?

- A) Scientific writing uses many metaphors.
- B) Scientific writing uses some terms (like 'significant' or 'correlation') differently and with specific mathematical or scientific meaning.
- C) Scientific writing is clear, concise, and precise.
- D) Scientific writing uses active voice and is written from the author's perspective.

4. What are some of the ways scientific writing is used?

- A) Academics (scientific literature and curricula), social media (opinion blogs), theoretical modelers (knowledge)
- B) Academics (scientific literature and curricula), medical and pharmaceutical fields (treatments), social media (opinion blogs)
- C) Academics (scientific literature and curricula), medical and pharmaceutical fields (treatments), theoretical modelers (knowledge)
- D) Social media (opinion blogs), medical and pharmaceutical fields (treatments), theoretical modelers (knowledge)




**B. Answer any ten of the following questions:**

**10x4=40**

- A) How can taxonomy be made a popular science again?
- B) How important are visualizations for popular science?
- C) Is videoconferencing a good instrument for popularizing science over the Internet?
- D) What is the best place to publish feasibility studies and popular science articles?
- E) What is the reason for the Saturn's hexagon?
- F) Popular science research or problem solving research ???
- G) What are the main requirements to write a good article in translation studies?
- H) Source criticism in scientific literature?
- U) Why, when simile and metaphor are so often discussed in popular science translation as closely related, there is only so much research on metaphor ?
- J) What is science communication?
- K) Why do we need science communication?
- L) What are the different kinds of science communication?
- M) What is popular science writing?
- N) Write different objectives of popular science writing.
- O) Who can popularized science?
- P) Explain popular hands writing is art.
- Q) What are the different media for science popularisations?
- R) What is science blog?
- S) Write the features of language for science popularisations.
- T) Give an example of science population simplicity.
- U) Example the clarity of ideas in science popularisation.
- V) How you should avoid technical terms in science writing
- W) Describe with example about use of analogy
- X) How you should avoid information overload?
- Y) Give example use of avoidance of technical words
- Z) Right different ethical points regarding popular science writing



✦ **SAMPLE CERTIFICATE OF COURSE COMPLETION**



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

Mousumi Ghorai


has successfully completed the **Add-on Course** on *Popular Science Writing*  
held during 2018-19 academic year at Mahishadal Raj College.

Subhansu Das  
Course Co-ordinator

Jayadev R.  
IQAC Co-ordinator

S.P.R.  
Principal

DATE: 18.12.2018



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

Arnab Das


has successfully completed the **Add-on Course** on *Popular Science Writing*  
held during 2018-19 academic year at Mahishadal Raj College.

Subhansu Das  
Course Co-ordinator

Jayadev R.  
IQAC Co-ordinator

S.P.R.  
Principal

DATE: 18.12.2018







## MAHISHADAL RAJ COLLEGE

(Govt. Sponsored)

NAAC Accredited 'A' Grade College

DST (FIST) Govt. Of India approved College, NSDC Training Partner

Estd. : 1946

Mahishadal : Purba Medinipur

Phone STD 03224 No. 240220

Ref. No. MRC/ADD ON/05/2018-19

Date: 02.03.2019

### **ADD ON COURSE 2018-19**

**Organised by Department Zoology & Physiology**

**Topic: Gel electrophoresis**

Add on course summary:

#### **REPORT:**

Name of the course- Gel electrophoresis

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)

Date of commencement: 04.02.2019

Date of completion: - 22.02.2019

Number of participant enrolled: 30

Total duration day: 15

Total duration hour: 30

Evaluation method:- Paper pen MCQ and practical work

#### **RESULT DETAILS:-**

Number of student participate in this program: 30

Number of student completes this program: 28

Number of student got certificate in this program: 28

Name of the course: Gel electrophoresis

Course coordinator: *Dr. Shubhamoy Das*, (Associate Professor, HOD, Department of Zoology , Mahishadal Raj College)



Principal

MAHISHADAL RAJ COLLEGE



## Gel electrophoresis

### ✦ About the course:

Gel electrophoresis is a laboratory technique used in molecular biology and biochemistry to separate and analyze macromolecules such as DNA, RNA, or proteins based on their size and charge. It is a fundamental tool for various applications, including DNA profiling, gene expression analysis, and protein characterization. Courses on gel electrophoresis may be part of broader molecular biology, biochemistry, or biotechnology curricula, and they often involve a combination of theoretical lectures, hands-on laboratory experiments, and data analysis sessions. Practical experience is crucial for mastering gel electrophoresis techniques.

### ✦ Learning outcomes:

Completing a course on gel electrophoresis can open up various job opportunities in the fields of molecular biology, genetics, biotechnology, and biochemistry. This course opens up various job opportunities in both the public and private sectors. The potential job opportunities of this course are research assistant or technician, biomedical scientist, biotechnologist, quality control analyst, forensic scientist, academic research, pharmaceuticals research associate, biological data analyst, clinical research coordinator, environmental scientist and laboratory manager.

### ✦ Target audience:

Any branch of life sciences students (UG and PG), research scholars, and faculties.

### ✦ Course content overview:

This course introduces the basic idea about Gel Electrophoresis Technique. Gel electrophoresis is a laboratory method used to separate mixtures of DNA, RNA, or proteins according to molecular size. In gel electrophoresis, the molecules to be separated are pushed by an electrical field through a gel that contains small pores. The molecules travel through the pores in the gel at a speed that is inversely related to their lengths. This means that a small DNA molecule will travel a greater distance through the gel than will a larger DNA molecule.

As gel electrophoresis involves an electrical field; in particular, this field is applied such that one end of the gel has a positive charge and the other end has a negative charge. Because DNA and RNA are negatively charged molecules, they will be pulled toward the positively charged end of the gel. Proteins, however, are not negatively charged; thus, when researchers want to separate proteins using gel electrophoresis, they must first mix the proteins with a detergent called sodium dodecyl sulfate. This treatment makes the proteins unfold into a linear shape and coats them with a negative charge, which allows them to migrate toward the positive end of the gel and be separated. Finally, after the DNA, RNA, or protein molecules have been separated using gel electrophoresis, bands representing molecules of different sizes can be detected.



✚ **Schedule: Total 30 hours**

DAY	SCHEDULE
Day 1	Introduction to molecular biology technique (T) (2 hours)
Day 2	Gel electrophoresis (T) (2 hours)
Day 3	Agarose gel electrophoresis for DNA (T+P) (2 hours)
Day 4	DNA sample preparation (T+P) (2 hours)
Day 5	Sample loading and gel run (T+P) (2 hours)
Day 6	Visualization and results interpretation (T+P) (2 hours)
Day 7	Agarose gel electrophoresis for RNA and sample preparation (T+P) (2 hours)
Day 8	RNA sample loading, gel run, visualization and data interpretation. (T+P) (2 hours)
Day 9	SDS PAGE (T) (2 hours)
Day 10	Sample preparation for SDS PAGE (T+P) (2 hours)
Day 11	Protein sample load and gel run (2 hours)
Day 12	Visualization of band and data interpretation. (2 hours)
Day 13	Native PAGE and Sample preparation. (2 hours)
Day 14	Gel run, visualization, and data interpretation. (2 hours)
Day 15	Doubts clear and revision

✚ **Detail Work Schedule**

Date	Day	Contents	Time	Duration	Experts	Designation
04.02.19	1	Orientation & Introduction to molecular biology technique (T)	12 to 2pm	2	Dr. Subhamoy Das	HOD DEP. of ZOOLOGY
05.02.19	2	Gel electrophoresis (T)	1 to 3 pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
06.02.19	3	Agarose gel electrophoresis for DNA (T+P)	3 to 5pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
07.02.19	4	DNA sample preparation (T+P)	03 to 05pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
08.02.19	5	Sample loading and gel run (T+P)	02 to 04pm	2	Dr. Rajkumar Guchhait	SACT Mahishadal Raj College
11.02.19	6	Visualization and results interpretation (T+P)	01 to 03pm	2	Dr Rajkumar Guchhait	SACT Mahishadal Raj College
12.02.19	7	Agarose gel electrophoresis for RNA and sample preparation (T+P)	03 to 05pm	2	Prof. Sagnik Mandal	SACT Mahishadal Raj College
13.02.19	8	RNA sample loading, gel run, visualization and data interpretation. (T+P)	02 to 04pm	2	Prof. Sagnik Mandal	SACT Mahishadal Raj College



14.02.19	9	SDS PAGE (T)	02 to 04pm	2	Prof. Manik Das	SACT Mahishadal Raj College
15.02.19	10	Sample preparation for SDS PAGE (T+P)	01 to 03pm	2	Prof. Manik Das	SACT Mahishadal Raj College
18.02.19	11	Protein sample load and gel run	02 to 04pm	2	Prof. Manik Das	SACT Mahishadal Raj College
19.02.19	12	Visualization of band and data interpretation.	02 to 04pm	2	Prof. Manik Das	SACT Mahishadal Raj College
20.02.19	13	Native PAGE and Sample preparation.	01 to 03pm	2	Prof. Moumita Jana	SACT Mahishadal Raj College
21.02.19	14	Gel run, visualization, and data interpretation. Doubts clear and revision	01 to 03pm	2	Prof. Moumita Jana	SACT Mahishadal Raj College
22.02.19	15	Evaluation, valediction, feedback	12 to 2 pm	2	Dr. Subhamoy Day, Dr. Rajkumar Guchhait, Prof. Sagnik Manadal, Prof. Manik Das and Prof. Moumita Jana. DR.Asim Kr Bera	HOD & SACT., Zoology; Principal, MRC
				30 hours		

✚ **Course structure and examination scheme:**

Course name	Theory classes (hr.)	Practical classes (hr.)	Internal marks	External marks		Total marks
				Theory	Practical	
Gel electrophoresis	7	23	20	40	40	100



Participant's Details and attendance:

Enrolment Details of Students

Sl. No.		Roll No.	Name	Signature
1.	B. Sc. (HONS)	2180118	Aditi Bhunia	Aditi Bhunia
2.	B. Sc. (HONS)	2180217	Arpita Ghorai	Arpita Ghorai
3.	M. Sc. 1 <sup>st</sup> Sem	5180029	Baishali Pal	Baishali Pal
4.	B. Sc. (HONS)	2180185	Chayanika Bera	Chayanika Bera
5.	B. Sc. (Generic)	2170465	Dipika Sahoo	Dipika Sahoo
6.	M. Sc. 1 <sup>st</sup> Sem	5180036	Ipsita Maji	Ipsita Maji
7.	B. Sc. (HONS)	2180182	Mahadeb Pramanik	Mahadeb Pramanik
8.	B. Sc. (Generic)	2170273	Mihir Mondal	Mihir Mondal
9.	M. Sc. 1 <sup>st</sup> Sem	5180038	Monoj Shee	Monoj Shee
10.	M. Sc. 1 <sup>st</sup> Sem	5180037	Moumita Pramanik	Moumita Pramanik
11.	B. Sc. (HONS)	2180157	Mushlema Khatun	Mushlema Khatun
12.	B. Sc. (Generic)	2170369	Nabanita Das	Nabanita Das
13.	B. Sc. (Generic)	2170316	Nabanita Pal	Nabanita Pal
14.	B. Sc. (Generic)	2170284	Nasrin Nahar	Nasrin Nahar
15.	B. Sc. (Generic)	2170352	Parbati Sana	Parbati Sana
16.	B. Sc. (HONS)	2180196	Poulami Kar	Poulami Kar
17.	B. Sc. (HONS)	2170370	Premesh Kr. Das	Premesh Kr. Das
18.	B. Sc. (HONS)	2180159	Priyanka Das	Priyanka Das
19.	B. Sc. (Generic)	2170330	Rini Rani Mondal	Rini Rani Mondal
20.	B. Sc. (HONS)	2180321	Rinku Rani Samanta	Rinku Rani Samanta
21.	B. Sc. (Generic)	2170317	Sabari Mondal	Sabari Mondal
22.	B. Sc. (HONS)	2180205	Shreya Dinda	Shreya Dinda
23.	B. Sc. (HONS)	2180117	Snehasis Das	Snehasis Das
24.	B. Sc. (HONS)	2180206	Subhashree Mondal	Subhashree Mondal

25.	B. Sc. (HONS)	2180313	Subinita Adhikary	Subinita Adhikary
26.	M. Sc. 1 <sup>st</sup> Sem	5180039	Suchanda Maity	Suchanda Maity
27.	B. Sc. (HONS)	2180216	Suchitra Maity	Suchitra Maity
28.	M. Sc. 1 <sup>st</sup> Sem	5180031	Suman Ghosh	Suman Ghosh
29.	M. Sc. 1 <sup>st</sup> Sem	5180030	Susmita Bhowmik	Susmita Bhowmik
30.	B. Sc. (Generic)	2170314	Tanushree Guchhait	Tanushree Guchhait



**Add on course- 2018-2019**  
**Organized by Department Zoology**  
**Topic: - Gel electrophoresis**

**Attendance Record (Day1-Day 8)**

Sl. No.	Name of Students	04.02.19	05.02.19	06.02.19	07.02.19	08.02.19	11.02.19	12.02.19	13.02.19
1.	ADITI BHUNIA	A. Bhunia		A. Bhunia	A. Bhunia	A. Bhunia	A. Bhunia		A. Bhunia
2.	ARPITA GHORAI	A. Ghorai		A. Ghorai		A. Ghorai	A. Ghorai	A. Ghorai	
3.	BATSHALI PAL	B. Pal		B. Pal		B. Pal	B. Pal	B. Pal	
4.	CHAYANIKA BERA	C. Bera		C. Bera	C. Bera	C. Bera			C. Bera
5.	DIPIKA SAHOO								
6.	IPSITA MAJI	I. Maji	I. Maji		I. Maji	I. Maji	I. Maji		
7.	MAHADEB PRAMANIK	M. Pramanik		M. Pramanik	M. Pramanik		M. Pramanik	M. Pramanik	M. Pramanik
8.	MIHIR MONDAL	M. Mondal	M. Mondal		M. Mondal	M. Mondal	M. Mondal		M. Mondal
9.	HONDJ SHEE	M. Shee	M. Shee	M. Shee		M. Shee	M. Shee		M. Shee
10.	MOUMITA PRAMANIK	M. Pramanik	M. Pramanik		M. Pramanik	M. Pramanik		M. Pramanik	
11.	MUSHLEMA KHATUN	M. Khatun	M. Khatun		M. Khatun	M. Khatun		M. Khatun	M. Khatun
12.	NABANITA DAS	N. Das	N. Das		N. Das	N. Das		N. Das	N. Das
13.	NABANITA PAL	N. Pal	N. Pal		N. Pal	N. Pal		N. Pal	
14.	NASRIN NAHAR.	N. Nahar	N. Nahar	N. Nahar			N. Nahar	N. Nahar	N. Nahar
15.	PARBATI SANA	P. Sana		P. Sana	P. Sana	P. Sana		P. Sana	
16.	PAULAMI KAR	P. Kar	P. Kar	P. Kar		P. Kar	P. Kar	P. Kar	
17.	PREMESH KR. DAS								
18.	PRIYANKA DAS	P. Das		P. Das	P. Das	P. Das	P. Das		P. Das
19.	RINJI RANI MONDAL	R. Mondal	R. Mondal	R. Mondal		R. Mondal	R. Mondal		R. Mondal
20.	RINKU RANI SAMANTA	R. Samanta	R. Samanta		R. Samanta	R. Samanta			R. Samanta
21.	SABARI MONDAL	S. Mondal		S. Mondal		S. Mondal		S. Mondal	S. Mondal



22.	SHREYA DINDA	S. Dinda		S. Dinda	S. Dinda	S. Dinda		S. Dinda	S. Dinda
23.	SNEHASIS DAS	S. Das	S. Das		S. Das		S. Das	S. Das	S. Das
24.	SUBHASHREE MONDAL	S. Mondal	S. mondal	S. mondal	S. mondal		S. Mondal	S. Mondal	S. Mondal
25.	SUBINITA ADHIKARY	S. Adhikary	S. Adhikary			S. Adhikary		S. Adhikary	
26.	SUCHANDA MAITY	S. Maity		S. Maity		S. Maity	S. Maity	S. Maity	S. Maity
27.	SUCHITRA MAITY	S. Maity	S. maity	S. maity		S. Maity	S. maity		S. Maity
28.	SUMAN GHOSH	S. GHash	S. GHash	S. Ghash		S. Ghash	S. Ghash		S. Ghash
29.	SUSMITA BHOWMIK	S. Bhowmik	S. Bhowmik		S. Bhowmik		S. Bhowmik	S. Bhowmik	
30.	TANUSHREE GUCHHAIT.	T. Guchhait		T. Guchhait	T. Guchhait	T. Guchhait		T. Guchhait	T. Guchhait



### Attendance Record (Day9-Day 15)

Sl. No.	Name of Students	14.02.19	15.02.19	18.02.19	19.02.19	20.02.19	21.02.19	22.02.19	
1.	ADITI BHUNIA	A. Bhunia	A. Bhunia	A. Bhunia		A. Bhunia		A. Bhunia	
2.	ARPITA GHORAI	A. Ghorai	A. Ghorai	A. Ghorai		A. Ghorai		A. Ghorai	
3.	BAISHALI PAL	B. Pal	B. Pal	B. Pal		B. Pal		B. Pal	B. Pal
4.	CHAYANIKA BERA	C. Bera	C. Bera		C. Bera		C. Bera		C. Bera
5.	DIPIKA SAHOO								
6.	IPSITA MAJI	I. Maji	I. Maji		I. Maji		I. Maji		I. Maji
7.	MAHADER PRAMANIK	M. Pramanik	M. Pramanik		M. Pramanik		M. Pramanik		M. Pramanik
8.	MIHIR MONDAL	M. Mondal	M. Mondal		M. Mondal		M. Mondal		M. Mondal
9.	MONOJ SHEE	M. Shee	M. Shee		M. Shee		M. Shee	M. Shee	M. Shee
10.	MOUMITA PRAMANIK	M. Pramanik		M. Pramanik	M. Pramanik		M. Pramanik	M. Pramanik	
11.	MUSHLEMA KHATUN	M. Khatur		M. Khatur	M. Khatur		M. Khatur	M. Khatur	M. Khatur
12.	NABANITA DAS	N. Das	N. Das		N. Das	N. Das		N. Das	N. Das
13.	NABANITA PAL	N. Pal	N. Pal		N. Pal	N. Pal		N. Pal	N. Pal
14.	NASRIN NAHAR	N. Nahar	N. Nahar		N. Nahar		N. Nahar		N. Nahar
15.	PARBATI SANJA	P. Sana		P. Sana	P. Sana		P. Sana	P. Sana	P. Sana
16.	POULAMI KAR	P. Kar		P. Kar	P. Kar		P. Kar		P. Kar
17.	PREMESH KR. DAS	P. Das	P. Das		P. Das		P. Das	P. Das	P. Das
18.	FRIYANKA DAS								
19.	RINI RANI MONDAL	R. Mondal	R. Mondal		R. Mondal		R. Mondal	R. Mondal	R. Mondal
20.	RINKU RANI SAMANTA	R. Samanta			R. Samanta		R. Samanta		R. Samanta
21.	SABARI MONDAL	S. Mondal	S. Mondal		S. Mondal		S. Mondal		S. Mondal
22.	SHREYA DINDA	S. Dinda	S. Dinda		S. Dinda		S. Dinda	S. Dinda	S. Dinda





23.	SNEHASIS DINDA	S. Dinda		S. Dinda	S. Dinda	S. Dinda		S. Dinda	S. Dinda
24.	SUBHASHREE MONDAL	S. Mondal	S. Mondal		S. Mondal	S. Mondal		S. Mondal	S. Mondal
25.	SUBINITA ADHIKARY	S. Adhikary	S. Adhikary		S. Adhikary	S. Adhikary		S. Adhikary	S. Adhikary
26.	SUCHANDA MAITY	S. Maity	S. Maity		S. Maity	S. Maity	S. Maity		S. Maity
27.	SUCHITRA MAITY	S. Maity		S. Maity		S. Maity	S. Maity	S. Maity	S. Maity
28.	SUMAN GHOSH	S. Ghosh	S. Ghosh	S. Ghosh		S. Ghosh		S. Ghosh	S. Ghosh
29.	SUSMITA BHOWMIK	S. Bhowmik	S. Bhowmik		S. Bhowmik		S. Bhowmik	S. Bhowmik	
30.	JANUSAREE GUCHHAIT.	T. Guchhait		T. Guchhait	T. Guchhait	T. Guchhait		T. Guchhait	T. Guchhait



## Sample Question of Examination

2019 / Add On Course / Examination

**ADD ON COURSE**  
**Department of Zoology, Mahishadal Raj College**  
**Gel Electrophoresis**

**Full Marks: 50**

**Time: 2 Hrs**

*The figures in the right-hand margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable. Illustrate the answers wherever necessary.*

**A. Answer the following MCQ type questions:**

**1x10=10**

1. In an SDS-PAGE
  - a. proteins are denatured by the SDS
  - b. proteins have the same charge-to-mass ratio
  - c. smaller proteins migrate more rapidly through the gel
  - d. all of the above
2. Proteins can be visualized directly in gels by
  - a. staining them with the dye
  - b. using electron microscope only
  - c. measuring their molecular weight
  - d. none of these
3. In SDS-PAGE, the protein sample is first
  - a. treated with a reducing agent and then with anionic detergent followed by fractionation by electrophoresis
  - b. fractionated by electrophoresis then treated with an oxidizing agent followed by anionic detergent.
  - c. treated with an oxidizing agent and then with anionic detergent followed by fractionation by electrophoresis
  - d. none of the above
4. Electrophoresis of histones and myoglobin under non-denaturing conditions (pH = 7.0) results in
  - a. both proteins migrate to the anode
  - b. histones migrate to the anode and myoglobin migrates to the cathode
  - c. histones migrate to the cathode and myoglobin migrates to the anode
  - d. both proteins migrate to the cathode
5. In isoelectric focusing, proteins are separated on the basis of their
  - a. relative content of positively charged residue only
  - b. relative content of negatively charged residue only
  - c. size
  - d. relative content of positively and negatively charged residue
6. Proteins are separated in an SDS-PAGE experiment on the basis of their
  - a. positively charged side chains
  - b. molecular weight
  - c. negatively charged side chains
  - d. different isoelectric points
7. The subunit molecular weight as well as the number of subunits in the quaternary structure can be determined by
  - a. SDS-PAGE electrophoresis
  - b. gel filtration chromatography
  - c. combining information from (a) and (b)
  - d. isoelectric focusing
8. For the separation of DNA by electrophoresis, which of the following method is commonly used?
  - a. Agarose - vertical
  - b. Agarose - horizontal
  - c. PAGE - vertical
  - d. PAGE - horizontal



2019 /Add On Course. / Examination

9. Sodium dodecyl sulfate (SDS) used in SDS PAGE is

- a. An anionic detergent
- b. A cationic detergent
- c. A non-ionic detergent
- d. An anion exchanger

10. Function of  $\beta$ -mercaptoethanol in SDS-PAGE is

- a. To give negative charges to amino acids in the proteins
- b. For the oxidation of disulfide bonds in the proteins
- c. For the reduction of disulfide bonds in the proteins
- d. For breaking hydrogen bonds in the proteins

**Answer the following questions**

**10x3=30**

1. Write the principle of agarose gel electrophoresis. Write the application of it.
2. Write the principle of SDS PAGE. Write the application of it.
3. Write the differences between SDS PAGE and Native PAGE. Write the application of native PAGE.



✦ **SAMPLE CERTIFICATE OF COURSE COMPLETION**



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

**Aditi Bhunia**

has successfully completed the **Add-on Course on Gel electrophoresis**  
held during 2018-19 academic year at Mahishadal Raj College.

*[Signature]*

Course Co-ordinator

*[Signature]*

IQAC Co-ordinator

Date: 22.02.2019

*[Signature]*

Principal



# CERTIFICATE OF COURSE COMPLETION

THIS IS TO CERTIFY THAT

**Snehasis Das**

has successfully completed the **Add-on Course on Gel electrophoresis**  
held during 2018-19 academic year at Mahishadal Raj College.

*[Signature]*

Course Co-ordinator

*[Signature]*

IQAC Co-ordinator

Date- 21.02.2019

*[Signature]*

Principal

