RKSD COLLEGE, KAITHAL

The following students had successfully completed project work in Zoology in the session 2021-22

Sr. No	Class	NAME	TOPIC
1	B.Sc. I (MEDICAL)	MAMTA	Invertebrate Survey and Report
2	B.Sc. I (MEDICAL)	ANNU	Invertebrate Survey and Report
3	B.Sc. I (MEDICAL)	ARSHITA	Invertebrate Survey and Report
4	B.Sc. I (MEDICAL)	PAYAL	Invertebrate Survey and Report
5	B.Sc. I (MEDICAL)	MONIKA	Invertebrate Survey and Report
6	B.Sc. I (MEDICAL)	SHIVANI	Invertebrate Survey and Report
7	B.Sc. I (MEDICAL)	VANDANA	Invertebrate Survey and Report
8	B.Sc. I (MEDICAL)	AVNEET KAUR	Invertebrate Survey and Report
9	B.Sc. I (MEDICAL)	ANJALI	Invertebrate Survey and Report
10	B.Sc. I (MEDICAL)	SUJATA	Invertebrate Survey and Report
11	B.Sc. I (MEDICAL)	SRISHTI	Invertebrate Survey and Report
12	B.Sc. I (MEDICAL)	JASLEEN KAUR	Invertebrate Survey and Report
13	B.Sc. I (MEDICAL)	RAVEENA	Invertebrate Survey and Report
14	B.Sc. I (MEDICAL)	SHEETAL	Invertebrate Survey and Report
15	B.Sc. I (MEDICAL)	OMISHA	Invertebrate Survey and Report
16	B.Sc. I (MEDICAL)	ANKITA	Invertebrate Survey and Report
17	B.Sc. I (MEDICAL)	KOMAL	Invertebrate Survey and Report
18	B.Sc. I (MEDICAL)	SHRUTI	Invertebrate Survey and Report
19	B.Sc. I (MEDICAL)	SIMRAN	Invertebrate Survey and Report
20	B.Sc. I (MEDICAL)	NAVDEEP KAUR	Invertebrate Survey and Report
21	B.Sc. I (MEDICAL)	GARIMA	Invertebrate Survey and Report
22	B.Sc. I (MEDICAL)	RAMAN SHARMA	Invertebrate Survey and Report
23	B.Sc. I (MEDICAL)	NEHA SHARMA	Invertebrate Survey and Report
24	B.Sc. I (MEDICAL)	SHIVANI	Invertebrate Survey and Report
25	B.Sc. I (MEDICAL)	ARVIND	Invertebrate Survey and Report
26	B.Sc. I (MEDICAL)	SIDHARTH BARDWAJ	Invertebrate Survey and Report
27	B.Sc. I (MEDICAL)	NEHA SHARMA	Invertebrate Survey and Report
28	B.Sc. I (MEDICAL)	AKANSHA	Invertebrate Survey and Report

29	B.Sc. I (MEDICAL)	ANJU	Invertebrate Survey and Report
30	B.Sc. I (MEDICAL)	MUSKAN	Invertebrate Survey and Report
31	B.Sc. I (MEDICAL)	HIMANSHI	Invertebrate Survey and Report
32	B.Sc. I (MEDICAL)	SARIKA	Invertebrate Survey and Report
33	B.Sc. II (MEDICAL)	RIYA DUTT	Visit to Zoo and Report
34	B.Sc. II (MEDICAL)	HARSH KUMAR	Visit to Zoo and Report
35	B.Sc. II (MEDICAL)	AASHISH	Visit to Zoo and Report
36	B.Sc. II (MEDICAL)	JYOTI	Visit to Zoo and Report
37	B.Sc. II (MEDICAL)	SHEETAL	Visit to Zoo and Report
38	B.Sc. II (MEDICAL)	SHUBHAM	Visit to Zoo and Report
39	B.Sc. II (MEDICAL)	MANISHA	Visit to Zoo and Report
40	B.Sc. II (MEDICAL)	SHIVANGI	Visit to Zoo and Report
41	B.Sc. II (MEDICAL)	AJAY KUMAR	Visit to Zoo and Report
42	B.Sc. II (MEDICAL)	ANKIT	Visit to Zoo and Report
43	B.Sc. II (MEDICAL)	GURPREET KAUR	Visit to Zoo and Report
44	B.Sc. II (MEDICAL)	KHUSHI	Visit to Zoo and Report
45	B.Sc. II (MEDICAL)	JYOTI	Visit to Zoo and Report
46	B.Sc. II (MEDICAL)	RAHUL	Visit to Zoo and Report
47	B.Sc. II (MEDICAL)	AYUSHI	Visit to Zoo and Report
48	B.Sc. II (MEDICAL)	NEHA	Visit to Zoo and Report
49	B.Sc. II (MEDICAL)	MEENA	Visit to Zoo and Report
50	B.Sc. II (MEDICAL)	NEHA RANI	Visit to Zoo and Report
51	B.Sc. II (MEDICAL)	INDU	Visit to Zoo and Report
52	B.Sc. II (MEDICAL)	PRIYANKA	Visit to Zoo and Report
53	B.Sc. II (MEDICAL)	TANU	Visit to Zoo and Report
54	B.Sc. II (MEDICAL)	SONIA	Visit to Zoo and Report
55	B.Sc. II (MEDICAL)	SAHIL	Visit to Zoo and Report
56	B.Sc. II (MEDICAL)	SUNDER DEVI	Visit to Zoo and Report
57	B.Sc. II (MEDICAL)	PUSHP KUMAR	Visit to Zoo and Report
58	B.Sc. II (MEDICAL)	ASHUTOSH	Visit to Zoo and Report
59	B.Sc. II (MEDICAL)	DEEPAK KUMAR	Visit to Zoo and Report
60	B.Sc. II (MEDICAL)	KAJAL	Visit to Zoo and Report
61	B.Sc. II (MEDICAL)	PREETI	Visit to Zoo and Report
62	B.Sc. II (MEDICAL)	ANJALI	Visit to Zoo and Report

63	B.Sc. II (MEDICAL)	AASHIMA	Visit to Zoo and Report
64	B.Sc. II (MEDICAL)	RAMANSHU	Visit to Zoo and Report
65	B.Sc. II (MEDICAL)	KESHAV KUMAR	Visit to Zoo and Report
66	B.Sc. II (MEDICAL)	ABHISHEK	Visit to Zoo and Report
67	B.Sc. II (MEDICAL)	YUVRAJ	Visit to Zoo and Report
68	B.Sc. II (MEDICAL)	PURNIMA JAIN	Visit to Zoo and Report
69	B.Sc. II (MEDICAL)	MANSI SHARMA	Visit to Zoo and Report
70	B.Sc. II (MEDICAL)	KUSUM	Visit to Zoo and Report
71	B.Sc. II (MEDICAL)	PARVEEN KUMAR	Visit to Zoo and Report
72	B.Sc. II (MEDICAL)	MANISHA	Visit to Zoo and Report
73	B.Sc. II (MEDICAL)	NEHA SAINI	Visit to Zoo and Report
74	B.Sc. II (MEDICAL)	SUBHAM	Visit to Zoo and Report
75	B.Sc. II (MEDICAL)	PALLAVI	Visit to Zoo and Report
76	B.Sc. II (MEDICAL)	RUBAL	Visit to Zoo and Report
77	B.Sc. II (MEDICAL)	HARSHIT	Visit to Zoo and Report
78	B.Sc. II (MEDICAL)	TANU	Visit to Zoo and Report
79	B.Sc. II (MEDICAL)	GEETA	Visit to Zoo and Report
80	B.Sc. II (MEDICAL)	MANJU RANI	Visit to Zoo and Report
81	B.Sc. II (MEDICAL)	ABHISHEK	Visit to Zoo and Report
82	B.Sc. II (MEDICAL)	TAMANNA DEVI	Visit to Zoo and Report
83	B.Sc. II (MEDICAL)	RAHUL	Visit to Zoo and Report
84	B.Sc. II (MEDICAL)	SHUBHAM	Visit to Zoo and Report
85	B.Sc. II (MEDICAL)	ANKIT	Visit to Zoo and Report
86	B.Sc. II (MEDICAL)	SAHIL	Visit to Zoo and Report
87	B.Sc. II (MEDICAL)	ANKIT	Visit to Zoo and Report
88	B.Sc. III (MEDICAL)	SAMIKSHA	Visit to Fish Farm and Report
89	B.Sc. III (MEDICAL)	GURJEET SINGH	Visit to Fish Farm and Report
90	B.Sc. III (MEDICAL)	ABHISHEK	Visit to Fish Farm and Report
91	B.Sc. III (MEDICAL)	SOURABH	Visit to Fish Farm and Report
92	B.Sc. III (MEDICAL)	NAVDEEP	Visit to Fish Farm and Report
93	B.Sc. III (MEDICAL)	MOHIT	Visit to Fish Farm and Report
94	B.Sc. III (MEDICAL)	SACHIN	Visit to Fish Farm and Report
95	B.Sc. III (MEDICAL)	DEEPAK KUMAR	Visit to Fish Farm and Report
96	B.Sc. III (MEDICAL)	SAHIL	Visit to Fish Farm and Report

97	B.Sc. III (MEDICAL)	ANKIT	Visit to Fish Farm and Report
98	B.Sc. III (MEDICAL)	RAHUL KUMAR	Visit to Fish Farm and Report
99	B.Sc. III (MEDICAL)	ANKIT	Visit to Fish Farm and Report
100	B.Sc. III (MEDICAL)	AJAY KUMAR	Visit to Fish Farm and Report
101	B.Sc. III (MEDICAL)	VINAY RANA	Visit to Fish Farm and Report
102	B.Sc. III (MEDICAL)	SATYAM	Visit to Fish Farm and Report
103	B.Sc. III (MEDICAL)	AAKASH	Visit to Fish Farm and Report
104	B.Sc. III (MEDICAL)	SAHIL KUMAR	Visit to Fish Farm and Report
105	B.Sc. III (MEDICAL)	AMAN	Visit to Fish Farm and Report
106	B.Sc. III (MEDICAL)	HIMANSHU	Visit to Fish Farm and Report
107	B.Sc. III (MEDICAL)	AKSHAY	Visit to Fish Farm and Report
108	B.Sc. III (MEDICAL)	VIJE KUMAR	Visit to Fish Farm and Report
109	B.Sc. III (MEDICAL)	MANDEEP	Visit to Fish Farm and Report
110	B.Sc. III (MEDICAL)	ANKUSH	Visit to Fish Farm and Report
111	B.Sc. III (MEDICAL)	SUNNY	Visit to Fish Farm and Report
112	B.Sc. III (MEDICAL)	RAJESH	Visit to Fish Farm and Report
113	B.Sc. III (MEDICAL)	ANJALI	Visit to Fish Farm and Report
114	B.Sc. III (MEDICAL)	TANNU	Visit to Fish Farm and Report
115	B.Sc. III (MEDICAL)	ANJALI RANI	Visit to Fish Farm and Report
116	B.Sc. III (MEDICAL)	NANCY DEVI	Visit to Fish Farm and Report
117	B.Sc. III (MEDICAL)	MANVI	Visit to Fish Farm and Report
118	B.Sc. III (MEDICAL)	SIMRAN	Visit to Fish Farm and Report
119	B.Sc. III (MEDICAL)	KAJAL	Visit to Fish Farm and Report
120	B.Sc. III (MEDICAL)	SHEETAL	Visit to Fish Farm and Report
121	B.Sc. III (MEDICAL)	KOMAL	Visit to Fish Farm and Report
122	B.Sc. III (MEDICAL)	KIRTI	Visit to Fish Farm and Report
123	B.Sc. III (MEDICAL)	SALONI	Visit to Fish Farm and Report
124	B.Sc. III (MEDICAL)	KAJAL	Visit to Fish Farm and Report
125	B.Sc. III (MEDICAL)	KAJAL DEVI	Visit to Fish Farm and Report
126	B.Sc. III (MEDICAL)	TAMANNA	Visit to Fish Farm and Report
127	B.Sc. III (MEDICAL)	RAVEENA	Visit to Fish Farm and Report
128	B.Sc. III (MEDICAL)	DIVYA SAINI	Visit to Fish Farm and Report
129	B.Sc. III (MEDICAL)	AASTHA DHIMAN	Visit to Fish Farm and Report
130	B.Sc. III (MEDICAL)	PARVEEN	Visit to Fish Farm and Report

131	B.Sc. III (MEDICAL)	SANGEETA	Visit to Fish Farm and Report
132	B.Sc. III (MEDICAL)	RITA RANI	Visit to Fish Farm and Report
133	B.Sc. III (MEDICAL)	SONIA	Visit to Fish Farm and Report
134	B.Sc. III (MEDICAL)	KHUSHBOO	Visit to Fish Farm and Report
135	B.Sc. III (MEDICAL)	RITIKA	Visit to Fish Farm and Report
136	B.Sc. III (MEDICAL)	ANU	Visit to Fish Farm and Report

DR GAGAN MITTAL
CONVENER

DR S.K. GOYAL
PRINCIPAL

Principal
R.K.S.D. College
KAITHAL

SCHEME OF EXAMINATION FOR B.SC. SEMESTER SYSTEM

Scheme of B.Sc. I

Semester-I					
Sr. No.		**Paper**	**Marks**	**Exam. Duration**	
			Internal Assessment*	External Marks	
1.	Paper-I	Life and Diversity from Protozoa to Porifera and Cell Biology-I	10	40	3 hrs.
2.	Paper-II	Life and Diversity from Coelentrata to Helminthes and Cell Biology-II	10	40	3 hrs.
Semester-II					
3.	Paper-I	Life and Diversity from Annelida to Arthropoda and Genetics-I	10	40	3 hrs.
4.	Paper-II	Life and Diversity from Molluaska to Hemichordata and Genetics-II	10	40	3 hrs.
5.	Paper-III	Practical	--	100	6 hrs. (Two session) Morning & Evening
Total Semester I & II			40	260	

Scheme of B.Sc. II

Semester-III					
Sr. No.		**Paper**	**Marks**	**Exam. Duration**	
			Internal Assessment*	External Marks	
1.	Paper-I	Life and Diversity of Chordates-I	10	40	3 hrs.
2.	Paper-II	Mammalian Physiology-I	10	40	3 hrs.
Semester-IV					
3.	Paper-I	Life and Diversity of Chordates-II	10	40	3 hrs.
4.	Paper-II	Mammalian Physiology-II	10	40	3 hrs.
5.	Paper-III	Practical	--	100	6 hrs. (Two session)

					Morning & Evening
Total Semester III & IV			40	260	

Scheme of B.Sc. III

Semester-V					
Sr. No.		**Paper**	**Marks**	**Exam. Duration**	
			Internal Assessment*	External Marks	
1.	Paper-I	Environmental Biology	10	40	3 hrs.
2.	Paper-II	Evolution and Developmental Biology	10	40	3 hrs.
Semester-VI					
3.	Paper-I	Aquaculture and Pest Management-I	10	40	3 hrs.
4.	Paper-II	Aquaculture and Pest Management-II	10	40	3 hrs.
5.	Paper-III	Practical	--	100	6 hrs. (Two session) Morning & Evening
Total Semester V & VI	40	260			
Grand Total Semester I – VI			**900**		

*** 10 Percent on the basis of two hand written assignments, 5 percent on the basis of one class test and 5 percent on the basis of attendance of the student.**

Scheme of B.Sc. I

Semester-I					
Sr. No.		**Paper**	**Marks**	**Exam. Duration**	
			Internal Assessment*	External Marks	
1.	Paper-I	Life and Diversity from Protozoa to Porifera and Cell Biology-I	10	40	3 hrs.
2.	Paper-II	Life and Diversity from Coelentrata to Helminthes and Cell Biology-II	10	40	3 hrs.
Semester-II					
3.	Paper-I	Life and Diversity from Annelida to Arthropoda and Genetics-I	10	40	3 hrs.
4.	Paper-II	Life and Diversity from Molluaska to Hemichordata and Genetics-II	10	40	3 hrs.
5.	Paper-III	Practical	--	100	6 hrs. (Two session) Morning & Evening
Total Semester I & II			40	260	

*** 10 Percent on the basis of two hand written assignments, 5 percent on the basis of one class test and 5 percent on the basis of attendance of the student.**

SYLLABUS

Life and Diversity from Protozoa to Porifera & Cell Biology – I

External Marks: 40
Internal Assessment : 10 **Time allotted : 3 Hours**

Note : Nine questions are to be set in all and the candidate are required to attempt five questions including compulsory question.

1. Question 1 is compulsory consisting of 10 parts (1.0 marks each) converting the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidate is required to attempt four questions, two from each section

1. **Protozoa:**
   - i) General characters and classification up to order level
   - ii) Biodiversity and economic importance
   - iii) Type study of *Plasmodium;*
   - iv) Parasitic protozoans: Life history, mode of infection and pathogenecity of *Entamoeba, Trypanosoma, Leishmania* and *Giardia.*

2. **Porifera:**
   - i) General characters and classification up to order level
   - ii) Biodiversity and economic importance
   - iii) Type study – *Sycon*
   - iv) Canal system in sponges
   - v) Spicules in sponges

1. Ultrastructure of different cell organelles of animal cell.
2. **Plasma Membrane:** Fluid mosaic model, various modes of transport across the membrane, mechanism of active and passive transport, endocytosis and excytosis.
3. **Endoplasmic reticulum (ER) :** types, role of ER in protein synthesis and transportation in animal cell.
4. **Golgi complex:** Structure, Associated enzymes and role of golgi-complex in animal cell.
5. **Ribosomes**: Types, biogenesis and role in protein synthesis.
6. **Lysosomes:** Structure, enzyme and their role; polymorphism
7. **Mitochondria:** Mitochondrial DNA; as semiautonomous body, biogenesis, mitochondrial enzymes (only names), role of mitochondria.
8. **Cytoskeleton:** Microtubules, microfilaments, centriole and basal body.
9. Cilia and Flagella

SYLLABUS

Life and Diversity from Coelentrata to Helminths & Cell Biology – II

External Marks: 40
Internal Assessment : 10 **Time allotted : 3 Hours**

Note :

1. Nine questions are to be set in all and the candidate are required to attempt five questions including compulsory question.
2. Question 1 is compulsory consisting of 10 parts (1.0 marks each) converting the entire syllabus. Answer to each part should not exceed 20 words.
3. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidate is required to attempt four questions, two from each section

1. **Phylum – Coelentrata :**
   - i) General characters and classification up to order level
   - ii) Biodiversity, economic importance
   - iii) Type Study - *Obelia*
   - iv) Corals and coral reefs
   - v) Polymorphism in Siphonophores

2. **Phylum – Helminths :**
   - i) General characters and classification up to order level
   - ii) Biodiversity, economic importance
   - iii) Type study – *Fasciola hepatica;*
   - iv) Helminths parasites : Brief account of life history, mode of infection and pathogenesity of *Schistosoma, Ancylostoma, Trichinella, Wuchereria* and *Oxyuris.*

1. Ultrastructure and functions of Nucleus : Nuclear membrane, nuclear lamina, nucleolus, fine structure of chromosomes, nucleosome concept and role of histones, euchromatin and heterochromatin, lampbrush chromosomes and polytene chromosomes.
2. Mitosis and Meiosis (Cell reproduction)
3. Brief account of causes of cancer.
4. An elementary idea of cellular basis of Immunity.

SYLLABUS

Life and Diversity from Annelida to Arthropoda & Genetics - I

External Marks: 40
Internal Assessment : 10 **Time allotted : 3 Hours**

Note : ***Nine questions are to be set in all and the candidate are required to attempt five questions including compulsory question.***

1. Question 1 is compulsory consisting of 10 parts (1.0 marks each) converting the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates is required to attempt four questions, two from each section

1. **Phylum – Annelida :**
   - i) General characters and classification up to order level
   - ii) Biodiversity and economic importance of Annelida
   - iii) Type study – *Pheretima* (Earthworm)
   - vi) Metamerism in Annelida
   - v) Trochophore larva

2. **Phylum – Arthropoda :**
   - i) General characters and classification up to order level
   - ii) Biodiversity and economic importance of insects
   - vi) Type study – *Grasshopper*

3. Elements of **Heredity and variations.**
4. The varieties of **gene interactions**
5. **Linkage and recombination :** Coupling and repulsion hypothesis, crossing-over and chiasma formation; gene mapping.
6. **Sex determination and its mechanism :** male and female heterozygous systems, genetic balance system; role of Y-chromosome, male haploidy, cytoplasmic and environmental factors, role of hormones in sex determination.
7. **Sex linked inheritance :** Haemophilia and colour blindness in man, eye colour in Drosophila, Non-disjunction of sex-chromosome in Drosophila; Sex-linked and sex-influenced inheritance
8. **Extra chromocomal and cytoplasmic inheritance:**
   - i) Kappa particles in Paramecium
   - ii) Shell coiling in snails.
   - iii) Milk factor in mice.

SYLLABUS

Life and Diversity from Mollusca to Hemichordata & Genetics – II

External Marks: 40
Internal Assessment : 10 **Time allotted : 3 Hours**

Note : Nine questions are to be set in all and the candidate are required to attempt five questions including compulsory question.

1. Question 1 is compulsory consisting of 10 parts (1.0 marks each) converting the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates is required to attempt four questions, two from each section

1. **Phylum - Mollusca:**
   - i) General characters and classification up to order level
   - ii) Biodiversity and economic importance
   - iii) Type study of - *Pila*
   - iv) Torsion and detorsion in gastropoda
   - v) Respiration and foot

2. **Phylum – Enchinodermata :**
   - i) General characters and classification up to order level
   - ii) Biodiversity and economic importance
   - vii) Type study – *Asteries* (Sea Star)
   - viii) Echinoderm larvae
   - ix) Aristotle's Lantern

3. Phylum Hemichordate : General Character; Type Study of Ballanglosus

3. **Multiple alleslism :** Eye colour in Drosophila; A, B, O blood group in man.
4. **Human genetics :** Human karyotype, Chromosomal abnormalities involving autosomes and sex chromosomes, monozygotic and dizygotic twins.
5. **Inborn errors of metabolism** (Alcaptonuria, Phenylketonuria, Albinism, sickle-cell anaemia).
6. **Nature and function of genetic material :** Structure and type of nucleic acids; Protein synthesis.
7. Eugenics, euthenics and euphenics; spontaneous and induced (chemical and radiations) mutations; gene mutations; chemical basis of mutations; transition, transversion, structural chromosomal aberrations (deletion, duplication, inversion and translocation); Numerical aberrations (autoploidy, euploidy and polyploidy in animals)
8. **Applied genetics :** genetic counseling, pre-natal diagnostics, DNA-finger printing, transgenic animals.

B.SC. (SEMESTER I & II) PAPER –III (PRACTICAL)

Max. Marks: 100 Time allowed: 6 Hours
(2 Sessions M&E)

(A) **Classification up to orders with ecological note and economic importance of the following animals:**

1. Protozoa — Lamination of cultures of *Amoeba, Euglena* and *Parmecium;* permanent prepared slides: *Amoeba, Euglena, Trypanosoma, Noctiluca, Eimeria, Paramecium* (binary fission and conjugation), *Opalina, Verticella, Balantidium, Nyctotherus,* radiolarian and formaniferan ooze.
2. Parazoa (Porifera) — Specimens: *Sycon, Grantia, Euplectela, Hyalonema, Spongilla, Euspongia*
3. Coelenterata — Specimens: *Porpita, Valella, Physalia, Aurelia, Rhyzostoma, Metridium, Millipora, Alcyonium, Tubipora, Zoanthus, Madrepora, Favia, Fungia,* and *Astrea.* Permanent prepared slides: *Hydra* (W.M.), *Hydra* with buds, *Obelia* (colony and medusa), *Sertularia, Plumularia, Tubularia, Bougainvillea, Aurelia* (sense organs and stages of life history).
4. Playhelminthes — Specimens: *Dugesia, Fasciola, Taenia, Echinococus.* Permanent prepared slides: *Miracidium, sporocyst, redia, cercaria, scolex* and *proglotttids of Taenia* (mature and gravid).
5. Aschelminthes — *Ascaris* (male and female), *Trichinella, Ancylostoma, Meloidogyne*
6. Annelida — Specimens : *Pheretima, Heteronereis, Polynoe, Aphrodite, Chaetopterus, Arenicola, Tubifex* and *Pontobdella*
7. Arthropoda — Specimens : *Peripatus, Palaemon* (Prawn), *Lobster, Cancer* (crab), *Sacculina, Eupagurus* (hermit crab), *Lepas, Balanus,Cyclops, Daphnia, Lepisma, Periplaneta* (cockroach), *Schistocerca* (locust), *Poecilocerus* (ak-hopper), *Gryllus* (cricket), *Mantis* (praying mantis), *Cicada, Forticula* (earwig), Dragon fly, termite queen, bug, moth, beetle, *Polistes* (wasp), *Apis* (honey bee), *Bombyx* (silk moth), *Cimex* (beg bug), *Pediculus* (body louse), *Millipedes, Scolopendra* (centipedes), *Palamnaeus* (scorpion), *Aranea* (spider), *Limulus* (king crab)
8. Mollusca — Specimens: *Mytilus, Ostrea, Cardium, Pholas, Solen* (razor Fish), *Pecten, Holiotis, Patella, Aplysia, Doris, Limax, Loligo, Sepia, Octopus, Nautilus* (complete and T.S.), *Chiton* and *Dentalium*
9. Echinodermata — Specimens: *Asterias, Echinus, Cucumara, Ophiothrix, Antedon a*nd *Asterophyton*
10. Hemichordata — *Balanglossus*

(B) Study of the following permanent stained preparations:

1. L.S. and T.S. *Sycon;* gemmules, spicules and sponging fibres of *Sycon,* canal system of sponges
2. T.S. *Hydra* (testis and ovary region)
3. T.S. *Fasciola* (different regions)
4. T.S. *Ascaris* (male and female)
5. T.S. *Pheretima* (pharyngeal and typhlosolar regions), Setae, septal nephridia and spermathecae of *Pheretima.*
6. Trachea and mouthparts of cockroach.
7. Statocyst of *Palaemon.*
8. Glochidium larva of *Anodonta;* radula and osphradium of *Pila.*
9. T.S. Star fish (arm).

10. T.S. *Balanoglossus* (through various regions).

(C) Preparation of the following slides:

1. Temporary preparation of *Volvos, Paramecium,* Gemmules and spicules of *Sycon;* mouth parts and trachea of *Periplanata* (cockroach).
2. Preparation of permanent stained whole mounts of *Hydra, Obelia, Sertularia, Plumularia* and *Bougainvillea.*
3. Preparation of mouth parts of Mosquito, House fly and cockroach.

(D) Study of Internal Anatomy

1. Computer, simulated study/ model of :
   (i) *Earthworm* : Digestive, reproductive and nervous systems
   (ii) *Pila* : Pallial complex, digestive and nervous system
2. Demonstration of internal anatomy of cockroach : Digestive, reproductive and nervous systems

(E) Cell biology and Genetics:

1. Cell division : Prepared slides of stages of mitosis and meiosis.
2. Salivary gland and polytene chromosomes of Drosophila/ Chironomus.
3. Temporary squash preparations of onion root tip / grasshopper testis for the study of mitosis using acetocarmine stain.

ANNEXURE-IV

B.SC. PART – I
GUIDELINES / INSTRUCTIONS FOR PRACTICAL (PAPER – III)

Max. Marks : 100 Time allowed : 6 Hours
(2 Sessions M&E)

Note : Following exercises will be set in the examination as per marks assigned for each.

	Exercise	**Marks allotted**
1.	Internal Anatomy – One (Labeled diagram)	12
2.	Permanent Slide Preparation - one (Staining, identification, sketch)	06
3.	Museum specimens – eight (identification and classification)	24 (8x3)
4.	Ecological note – One specimen	05
5.	Permanent slides – Two (identification with reasons)	08 (2x4)
6.	Preparation of chromosome slide (root tip / gasshopper testis)	10
7.	Invertebrate survey and report	10 (5+5)
8.	Practical record and slides	10
9.	Viva-voce	15

Scheme of B.Sc. II

Semester-III					
Sr. No.		**Paper**	**Marks**	**Exam. Duration**	
			Internal Assessment*	External Marks	
1.	Paper-I	Life and Diversity of Chordates-I	10	40	3 hrs.
2.	Paper-II	Mammalian Physiology-I	10	40	3 hrs.
Semester-IV					
3.	Paper-I	Life and Diversity of Chordates-II	10	40	3 hrs.
4.	Paper-II	Mammalian Physiology-II	10	40	3 hrs.
5.	Paper-III	Practical	--	100	6 hrs. (Two session) Morning & Evening
Total Semester III & IV			40	260	

*** 10 Percent on the basis of two hand written assignments, 5 percent on the basis of one class test and 5 percent on the basis of attendance of the student.**

SYLLABUS

B.Sc. Part-II (Semester III & IV)

SEMESTER III

Paper-I : Life and Diversity of Chordates - I

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question.

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

Functional morphology of the types included with special emphasis on the adaptations to their modes of life and environment. General characters and classification of all phyla upto orders with examples emphasizing their biodiversity, economic importance and conservation measures where required.

1. **Chordates**: Origin and Evolutionary tree.
2. **Protochordates**: Systematic position, distribution, ecology, morphology and affinities
   Urochordata *Herdmania* - type study
   Cephalochordata, *Amphioxus* – type study

SECTION-B

3. **Cyclostomes**: Type study of *Petromyzon.*
4. **Pisces**: Scales & Fins, Parental care in fishes, fish migration.
   Types study of Labeo

SEMESTER – III

Paper-II : Mammalian Physiology-I

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. Introduction, Classification, Structure, function and general properties of proteins, carbohydrates and lipids.
2. Nomenclature, Classification and mechanisms of enzyme action.
3. Transport through biomembranes (Active and Passive), buffers

SECTION-B

4. **Nutrition**: Nutritional components; Carbohydrates, fats, lipids, Vitamins and Minerals. Types of nutrition & feeding, Digestion of dietary constituents, viz. lipids, proteins, carbohydrates & nucleic acids; symbiotic digestion. Absorption of nutrients & assimilation; control of enzyme secretion.

5. **Muscles:** Types of muscles, ultra-structure of skeletal muscle. Bio-chemical and physical events during muscle contraction; single muscle twitch, tetanus, muscle fatigue muscle, tone, oxygen debt., Cori's cycle, single unit smooth muscles, their physical and functional properties.

6 **Bones:** Structure and types, classification, bone growth and resorption, effect of ageing on Skeletal system and bone disorders.

SEMESTER – IV

Paper-I : Life and Diversity of Chordates - II

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. **Amphibia**: Origin, Evolutionary tree. Type study of frog (*Rana tigrina),* Parental Care in Amphibia
2. **Reptilia:** Type study of Lizard (Hemidactylus), Origin, Evolutionary tree. Extinct reptiles; Poisonous and non-poisonous snakes; Poison apparatus in snakes.

SECTION-B

3. **Aves:** Type study of Pigeon (*Columba livia)*; Flight adaptation, Principles of aerodynamics in Bird flight, migration in birds.
4. **Mammals:** Classification, type study of Rat; Adaptive radiations of mammals dentition.

Note: Type study includes detailed study of various systems of the animal.

SEMESTER – IV

Paper-II : Mammalian Physiology-II

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: ***Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question***

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. **Circulation**: Origin, conduction and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac output, fluid pressure and flow pressure in closed and open circulatory system; Composition and functions of blood & lymph; Mechanism of coagulation of blood, coagulation factors; anticoagulants, haempoiesis.

2. **Respiration**: Exchange of respiratory gases, transport of gases, lung air volumes, oxygen dissociation curve of hemoglobin, Bohr's effect, Haburger's phenomenon (Chloride shift), control / regulation of respiration.

3. **Excretion:** Patterns of excretory products viz. Amonotelic, ureotlic uricotelic, ornithine cycle (Kreb's – Henseleit cycle) for urea formation in liver. Urine formation, counter-current mechanism of urine concentration, osmoregulation, micturition.

SECTION-B

4. **Neural Integration:** Nature, origin and propagation of nerve impulse alongwith meddullated & non-medullated nerve fibre, conduction of nerve impulse across synapse.

5. **Chemical integration of Endocrinology:** Structure and mechanism of hormone action; physiology of hypothalamus, pituitary, thyroid, parathyroid, adrenal, pancreas and gonads.

6. **Reproduction:** Spermatogenesis, Capacitation of spermatozoa, ovulation, formation of corpus luteum, oestrous-anoestrous cycle, Menstrual cycle in human; fertilization, implantation and gestation.

B.Sc. Part-II

Paper-III : PRACTICAL

Max. Marks : 100
Time allowed : 6 Hours
(2 Sessions M&E)

1. Classification upto orders, habit, habitats, external characters and economic importance (if any) of the following animals:-

Protochordata : *Molqula, Hetryllus, Pyrosoma, Doliolum, Olikopleura,* and *Amphioxus.*

Cyclostomata : *Myxine, Petromyzon* and *Ammocoetus larva*.

Chondrichthyes : *Zygaena, Pristis, Narcine* (electric ray), *Trygon, Rhinobatus, Raja* and *Chimaera.*

Osteichthyes : *Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Syngnathus Exocoetus, Anabas, Diodon, Ostraczion, Tetradon, Echinus, Lophius, Solea* and *Polypterus.* Any of the Lung Fishes.

Amphibia : *Necturus, Proteus, Amphiuma, Salamandra, Amblystoma, Axolotie larva, Alytes, Bufo, Rana.*

Reptilia : *Hemidactylus, Calotes, Draco, Varanus, Phrynosoma, Chamaeleon, Typhops, Python, Eryx, Ptyas, Bungarus, Naja, Hydrus, Viper, Crocodilus, Gavialis, Chelone* (Turtle) and *Testudo* (Tortoise).

Aves : *Casuarius, Arden, Anas, Milvus, Pavo, Eudynamis, Tyto* and *Alcedo, Halcyon*

Mammalia : *Ornithorphynchus, Echidna, Didelphis, Macropus, Loris, Macaque, Hystrix, Funambulus, Telix, Panthera, Canis, Herpestes, Capra, Pteropus.*

2. Internal anatomy of the following animals:

(i) Computer simulated model/study of :

(a) *Herdmania* : General anatomy

(b) *Rat* : Digestive, arterial, venous and urinogenital systems.

(c) *Hemidactylus* : Digestive, arterial, venous and urinogenital systems

(ii) Demonstration & Study of Internal Anatomy of locally available fish (*Labeo)*. Digestive and reproductive systems: cranial nerves, Ear ossicle

3. Study of the skeleton of *Scoliodon, Labeo, Rana* (Frog), *Varanus,* Pigeon or Gallus and *Orcyctolagus*/rat, Palates of birds, skulls of dog & rabbit.

4. Study of the following prepared slides:

Tornaria larva, T.S. *Amphioxus* (through different regions). Oikopleura, Histology of rat (compound tissues), different types of scales.

5. Make permanent stained preparations of the following:
Salpa, Spicules, and Pharynx of *Herdmania, Amphioxus*, Cycloid scales, Zoological excursion and its report is compulsory in the practical examination.

PHYSIOLOGY PRACTICALS:

1. Qualitative tests for identification of simple sugars, disaccharides and polysaccharides.
2. Study of human salivary amylase activity: Effect of temperature, pH, Concentration.
3. Estimation of abnormal constituents of urine (Albumin, sugar, ketonebodies).
4. Use of Kymograph unit & respirometer.
5. Haematein crystal preparation.
6. Estimation of Hb.
7. DLC of Man/RBC count/WBC count.

B.Sc. Part-II

Paper-III :

Guidelines/instructions for practical

Max. Marks : 100 Time allowed : 6 Hours
(2 Sessions M&E)

Note : Following exercises will be set in the examination as per marks assigned for each.

1.	Internal Anatomy – One (exposition, labeled diagram)	:	12
2.	Temporary Mountign – One (staining, identification, sketch)	:	06
3.	Museum specimens – five (identification, classification)	:	15
4.	Ecological note – one specimen	:	05
5.	Permanent slides – Three (identification with reasons)	:	09
6.	Bone – Two pieces (Identification & sketch)	:	10
7.	Physiology (Two exercises)	:	10
8.	Field excursion and report	:	08
9.	Practical record & slides	:	10
10.	Viva-voce	:	15

Scheme of B.Sc. III (Zoology)

Semester-V					
Sr. No.		**Paper**	**Marks**	**Exam. Duration**	
			Internal Assessment*	External Marks	
1.	Paper-I	Environmental Biology	10	40	3 hrs.
2.	Paper-II	Evolution and Developmental Biology	10	40	3 hrs.
Semester-VI					
3.	Paper-I	Aquaculture and Pest Management-I	10	40	3 hrs.
4.	Paper-II	Aquaculture and Pest Management-II	10	40	3 hrs.
5.	Paper-III	Practical	--	100	6 hrs. (Two session) Morning & Evening
Total Semester V & VI			40	260	

*** 10 Percent on the basis of two hand written assignments, 5 percent on the basis of one class test and 5 percent on the basis of attendance of the student.**

SYLLABUS

B.Sc. Part-III (Semester V & VI)

SEMESTER - V

Paper-I : Environmental Biology

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question.

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. **Basic concepts of ecology**: Definition, signification. Concepts of habitat and ecological niche.
2. **Factors affecting environment**: Abiotic factors (light-intensity, quality and duration), temperature, humidity, topography; edaphic factors; Biotic factors.
3. Introduction to major ecosystemt of the world.
4. **Ecosystem:** Concept, components, properties and functions; Ecological energetics and energy flow-food chain, food web, trophic structure; ecological pyramids concept of productivity.
5. **Biogeochemical cycles:** Concept, reservoir pool, gaseous cycles and sedimentary cycles.

SECTION-B

6. **Population**: Growth and regulation.
7. Concept of biodiversity and conservation of natural resources.
8. Migration in fishes and birds.
9. Parental care in animals.
10. **Population interactions:** Competition, predation, parasitism, commensalisms and mutualism.
11. **Environmental Pollution:** Air, water, soil and management strategies.

SEMESTER – V

Paper-II : Evolution and Developmental Biology

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: ***Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question***

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. Origian of life.
2. Concept and evidences of organic evolution.
3. Theories of organic evolution.
4. Concept of micro, macro-and mega-evolution.
5. Concept of species
6. Phylogeny of horse.
7. Evolution of man.

SECTION-B

8. Historical perspectives, aims and scope of developmental biology.
9. Generalized structure of mammalian ovum & sperm, spermatogenesis and Oogenesis, fertilization, parthenogenesis, different types of eggs and patterns of cleavage.
10. Proces of blastulation and fate-map construction in grog and chick.
11. Gastrulation in frog and chick upto the formation of three germinal layers.
12. Elementary knowledge of primary organizers.
13. Elementary knowledge of extra embryonic membranes.
14. Concepts of competence, determination and differentiation.
15. Concept of regeneration.

SEMESTER – VI

Paper-I : Aquaculture and Pest Management-I

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. **Introduction to world fisheries**: Production, utilization and demand.
2. **Fresh Water fishes of India:** River system, reservoir, pond, tank fisheries; captive and culture fisheries, cold water fisheries.
3. Fishing crafts and gears.
4. Fin fishes, Crustaceans, Molluscs and their culture.

SECTION-B

Study of important insect pests of crops and vegetables:

5. **Sugercane:**
   - (a) Sugercane leaf-hopper *(Pyrilla perpusilla)*
   - (b) Sugercane Whitefly *(Aleurolobus barodensis)*
   - (c) Sugercane top borer *(Sciropophaga nivella)*
   - (d) Sugercane root borer *(Emmalocera depresella)*
   - (e) Gurdaspur borer *(Bissetia steniellus)*

With their systematic position, habits and nature of damage cause. Life cycle and control of *Pyrilla perpusilla* only.

6. **Cotton:**
   - (a) Pink bollworm (*Pestinophora gossypfolla)*
   - (b) Red cotton bug *(Dysdercus Cingulatus)*
   - (c) Cotton grey weevil (*Myllocerus undecimpustulatus)*
   - (d) Cotton Jassid (*Amrasca devastans)*

With their systematic position, habits and nature of damage caused. Life cycle and control of *Pectinophore gossypiella.*

7. **Wheat**:

Wheat stem borer (*Sesamia inferens)* with its systematics position, habits, nature of damage caused. Life cycle and control.

8. **Paddy:**

(a) Gundhi bug (*Leptocorisa acuta)*
(b) Rice grasshopper *(Hieroglyphus banian)*
(c) Rice stem borer *(Scirpophaga incertullus)*
(d) Rice Hispa *(Diceladispa armigera)*

With their systematic position, habits and nature of damage caused. Life cycle and control of *Loptocorisa acuta.*

9. **Vegetables:**

(a) *Raphidopalpa faveicollis* – The Red pumpkin beetle.
(b) *Dacus cucurbitas* – The pumpkin fruit fly.
(c) *Tetranychus tecarius* – The vegetable mite.
(d) *Epilachna* – The Hadda beetle

Their systematics position, habits and nature of damage caused. Life cycle and control of *Aulacophora faveicollis.*

SEMESTER – VI

Paper-II : Aquaculture and Pest Management-II

External Marks : 40
Internal Assessment: 10 **Time allowed : 3 Hours**

Note: ***Nine questions are to be set in all and the candidates are required to attempt five questions including the compulsory question***

1. Question 1 is compulsory consisting of 10 parts (1.5 marks each) covering the entire syllabus. Answer to each part should not exceed 20 words.
2. Out of remaining eight, four questions are to be set from each section A & B, possibly splitting them in parts. Candidates are required to attempt four questions, two from each section.

SECTION-A

1. **Seed production**: Natural seed resources – its assessment, collection, Hatchery production

2. **Nutrition**: Sources of food (Natural, Artificial) and feed composition (Calorie and Chemical ingredients).

3. **Field Culture:** Ponds-running water, recycled water, cage, culture; poly culture.
4. **Culture technology:** Biotechnology, gene manipulation and cryopreservation of gametes.

SECTION-B

5. **Stored grains:**
   (a) Pulse beetle *(Callosobruchus maculatus)*
   (b) Rice weevil *(Sitophilus oryzae)*
   (c) Wheat weevil *(Trogoderma granarium)*
   (d) Rust Red Flour beetles *(Tribolium castaneum)*
   (e) Lesser grain borer *(Rhizopertha dominica)*
   (f) Grain & Flour moth *(Sitotroga cerealella)*

Their systematic position, habits and nature of damage caused. Life cycle and control of *Trogoderma granarium*.

6. **Insect control:** Biological control, its history, requirement and precautions and feasibility of biological agents for control.

7. **Chemical control:** History, Categories of pesticides. Important pesticides from each category to pests against which they can be used. Insect repellants and attractants.
8. Integrated pest management.
9. Important bird and rodent pests of agriculture & their management.
10.

B.Sc. Part-III

Paper-III : PRACTICAL

Max. Marks : 100
Time allowed : 6 Hours
(2 Session M&E)

1. External morphology, identification marks, nature of damage and host of the following pests:-

   (i) **Sugarcane** : Sugarcane leaf-hopper, Sugarcance whitefly, Sugarcance top borer, Sugarcane root borer, Gurdaspur borer (any two).
   (ii) **Cotton**: Red Cotton bug
   (iii) **Wheat** : Wheat stem borer
   (iv) **Paddy** : Gundhi bug, Rice grasshopper, Rice stem borer, Rice hispa (any one).
   (v) **Vegetables**: *Aulocophora faveicollis, Dacus cucurbitas, Tetranychus tecarious, Epilachna* (any three).
   (vi) **Pests of stored grains:** Pulse beetle, Rice weevil, Grain & Flour moth, Rust-red flour beetle, lessergrain borer (any three).

2. Stages of life history of silk moth and honey bee.

3. Identification of *Catle, Labeo rohita, L. calbasu, Cirrhius, mrigala Puntius sarana, Channa punctatus, C. marulius, C. stariatus, Trichogaster fasciata, Mystus seenghala, M. cavasius, M. tengra, Callichrous pabola, C. bimaculatus, Wallago attu, Prawns, Crabs, Lobsters, Calms, Mussles & Oysters.*

4. Chemical analysis of pond water and soil for pH, dissolved oxygen, free CO_2 nitrates, phosphates and chlorides.

5. A study of the slides of fish parasites.

6. A study of the different types of nets, e.g., cast net, gill net, drift net and drag net.

7. A visit to lake/reservoir/fish breeding centre.

8. Adaptative modifications in feet and breaks of birds.

9. Preparation of permanent/temporary slides of developmental stages of frog/mosquito.

10. Study of permanent slides of WM of chick embryo (13-18h, 24-36h, 36-48h, 48-72h).

11. Window preparation and identification of stages of development in chick egg.

12. **Histology:** Preparation of permanent histological slides of testis, ovary, kidney, intestine, live of rat (H and E staining).

B.Sc. Part-III

Guidelines/instructions for practical (Paper-III)

Max. Marks : 100
Time allowed : 6 Hours
(2 Sessions M&E)

1.	Chemical analysis of water/soil	:	10 marks
2.	Identification and Classification of specimens (Eight)	:	16 marks
3.	Ecological note on economically important specimen (two)	:	10 marks
4.	Identification of histological and embryological slides with Reasons of identification (Two): feet and beaks of birds	:	8 marks
5.	Identification with reason feet/beaks of birds	:	3 marks
6.	Permanent preparation of histological slides (a) Section cutting and stretching (b) Staining, mounting, (c) identification & sketch	:	18 marks (6,6)
7.	Field Report	:	10 marks
8.	Practical note book	:	10 marks
9.	Viva-voce	:	15 marks

Note: Field report to be submitted alongwith answer books.

Name - Sujata

Class - B.Sc - Med. [1st yr]

University Roll no. - 21003461 3

Class Roll no. - 12119820300 12

Phylum - Arthropoda

Class - Insecta

Order - Dictyoptera

Genus - Periplaneta

Cockroach

Habitat and Habit →

They are cosmopolitan.
It is common nocturnal omnivorous household pest which also act as scavenger.

External features →

→ The body of cockroach is narrow, dorso-ventrally flattened, elongated and reddish brown in colour.

→ Body is divided into head, thorax and abdomen.

→ The head bears a pair of compound eyes, a pair of antennae and mouth parts.

→ Thorax bears three pairs of walking legs and two pairs of wings.

Economic Importance →

→ It is used as food in certain countries.

→ It causes nuisance in house.

→ They act as serious pest and cause disease and damage food.

Phylum – Arthropoda

Class – Insecta

Order – Diptera

Genus – Anopheles

Mosquito

Habit and Habitat →

→ Preferred hot, humid environment are most amenable to mosquito growth and survival.

→ The habitat include river flood plains, tidal salt marshes, snow melt pools, irrigation water etc.

Morphology →

→ Body is divided into head, thorax and abdomen.

→ Head is the sensory centre, where compound eyes and antennae are located.

→ Thorax is composed of three body segments and each segment has one pair of legs.

Economic Importance →

→ Mosquito larvae are a food source for other kinds of larvae.

Phylum - Arthropoda

Class - Insecta

Order - Lepidoptera

Genus - Danaus

Butterfly.

Habit and Habitat →

→ They are coomopolitan and can be found anywhere.

→ Most butterflies prefer flower nectar, but others may feed on the liquid found in rotting fruits.

External features →

→ Body is divided into head, thorax (chest or mid section) and abdomen (tail end).

→ They have compound eyes.

Economic Importance →

→ They pollinate over 75% of the world's flowering plants.

→ They are indicators of a healthy environment and healthy ecosystem.

Phylum - Arthropoda

Class - Insecta

Order - Hymenoptera

Genus - Tridomyrmex

Ant

Habit and Habitat →

→ They are cosmopolitan.
→ They have colonised almost every landmass on earth.

External features →

→ Body is divided into three main parts - head, thorax and abdomen.
→ They have two large compound eye.
→ They have a hard, waterproof exoskeleton.

Economic Importance →

→ They turn and aerate the soil, allowing water and oxygen to reach plant roots.
→ They participate in dicomposition and disperse the seed of plants.

Phylum - Arthropoda

Class - Insecta

Order - Anoplura

Genus - Pediculus

Bed bugs

Habit and Habitat →

→ These ectoparasite live in close association with man and are cosmopolitan.

→ It is nocturnal.

→ It has legs which end in claws.

External features →

→ Reddish brown in colour.

→ Abdomen is flat and contain eight distinct segments.

→ Paired compound eyes and a pair of four-jointed antennae.

Economic Importance →

No. of diseases i.e. anthrax, leprosy, parathyroid oriental sore are believed to be caused by Cimex (bed bugs).

Phylum - Arthropoda

Class - Insecta

Order - Hymenoptera

Genus - Polistes

Wasp

Habit and Habitat →

→ Commonly known as yellow wasp.

→ It is social, economical, polymorphic, diurnal and omnivorous.

External features →

→ Body is divisible into head, thorax and abdomen.

→ Head bears paired jointed antennae and large compound eyes.

→ They have two pairs of membranous and transparent wings.

Economic Importance →

→ They are considered to be pest in various countries.

→ They uses their sting to numb the prey.

→ Its sting contains a toxic and is highly painful.

Phylum - Arthropoda

Class - Insecta

Order - Orthopetera

Genus - Gryllus

House Cricket

Habit and Habitat →

→ It is quite common and abundant in India, Sri Lanka and Burma.
→ They have jumping type of locomotion.
→ They are nocturnal and omnivorous.

External features →

→ Body is divided into head, thorax and abdomen.
→ Head bears a pair of compound eyes and elongated paired antennae.
→ Forewings are rigid and leathery.

Economic Importance →

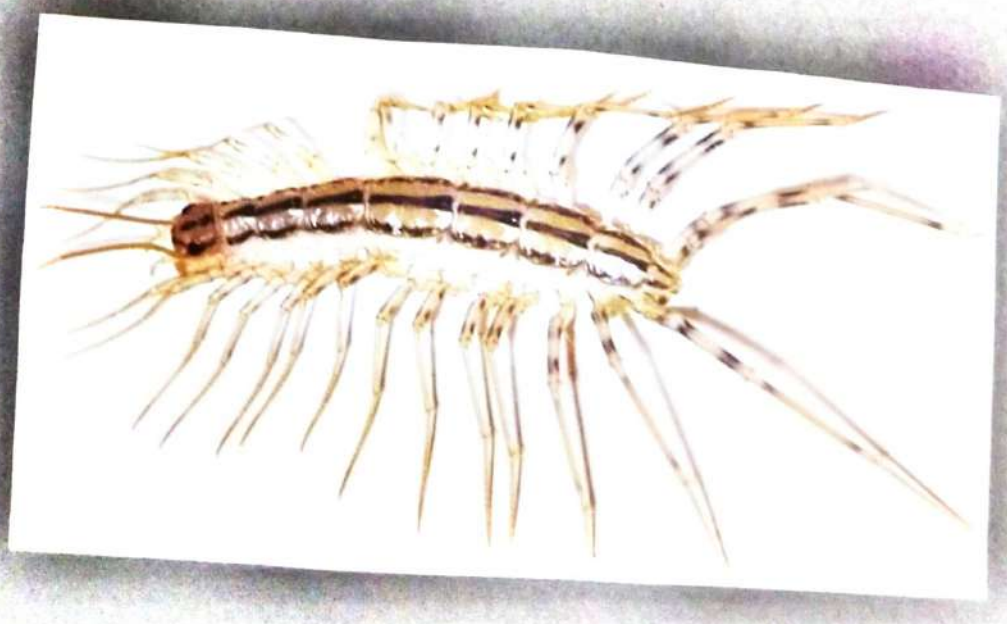
→ They are pests in house.
→ In few countries they are used as food.
→ They are used as live food for various zoo and pet animals.

Phylum - Arthropoda

Class - Insecta

Order - Julida

Genus - Scolopendra



Centipede

Habit and Habitat →

→ Poisonous in nature.

→ They are nocturnal and omnivorous.

External features →

→ Body is elongated and flattened dorsoventrally.

→ Body is divisible into head and trunk.

→ The segment just behind the head bears a pair of four jointed claws.

Economic Importance →

→ It is harmful and it is poisonous.

→ Each maxilliped is made up of five pieces of which the terminal one bears a sharp claw through which opens the poison gland.

A Visit To Zoo

Submitted to:-
Department
Of Zoology

Submitted by:-
Neha Goel
B.Sc. IInd yr.
5364402

SHOOT US WITH CAMERAS

NOT GUNS...

Acknowledgement

Myself Neha (5364402) of B.Sc. 2nd year at the outset of presenting my project. I would personally like to acknowledge the help rendered to me in doing this project. My endeavor Stands incomplete without dedicating my gratitude to a few people who have contributed a lot towards the successful completion of my project work.

I am thankful to our Principal Sh. O.P. Garg as well as my teachers Dr Anil Jindal and Mrs. Sarita Sood who gave me a golden opportunity to visit a Pipli zoo, which helped me in doing this Project. Without their Proper orientation and guidance, the project would have not come into this shape.

Secondly, I would like to thanks my Parents and friends who helped me a lot in finishing this project within limited time.

Visiting to a zoo not only helped in making my Project but also helped in increasing my Knowledge.

Thanks again to all who helped me...

Introduction

A visit to zoo is very interesting.

Last wednesday, 8 March 2017, I alongwith my teachers and some of my friends went to see the zoo at Pipli

It was around 10.00 Am we reached there and started making our trip by a group pic with classmates and our respective teachers Mrs. Sarita Sood and Mr. Anil Jindal.

After capturing this moment we went inside the zoo which is spread in a well designated area of each and every animal. The zoo is beautifully maintained by different plants and trees. We saw ghariyal and crocodile in a pond. Hyena was running here and there in a nearby garden. We also saw many birds like White browed wagtail, rose-ringed parakeet and many more. We also saw Langur Jumping in their cages. Then we heard a roar of Lions and we proceded to their cage.

We were very happy to see all this. Then it was lunch time for which we went to a Resturant. Then for a moral knowledge we were taken to Drohar, Kurukshetra We came back home around 5.00pm. It was really a wonderful experience.


ZOO
IN
OUT

Classification:-

Phylum:- Chordata

Class:- Mammalia

Order:- Carnivora

Genus:- Panthera

Panthera pardus (Indian Leopard)

General characters:-

① Habitat:- Indian leopard is widely distributed leopard subspecies that inhabits tropical rainforests, dry deciduous forest, temperate forest but doesn't occur in mangrove forests of Sundarbans.

② Habits:-

(i) Leopards are elusive, solitary and largely nocturnal.

(ii) These are carnivorous and feed upon monkeys, rodents and many more

(iii) Their movement includes walking, running, crawling, leaping, pouncing, swimming & climbing.

③ Morphology:-

(i) Sexsual dimorphism is present. Males are larger and heavier than females

(ii) Presence of patchy rosette forming a unique pattern on the body. The spots on leopards are known as rosettes because they look so much like black roses.

(iii) Usually the dominant colour of coat varies with the region, like desert leopards are pale yellow, jungle dwelling leopards have a much darker golden coat, etc.

(iv) The fur under skin of stomach is soft and downy in texture and lightly coloured and spots in this area as well as on face and limbs are solid, rather than patchy rosette found on body.

General characters :-

1) Habitat :- Asiatic lion inhabits tropical broadleaf forest.

2) Habits :-

(i) These are highly social animals.

(ii) These are carnivorous and feeds on ungulates available in their range, namely deer, antelope, buffaloes and wild boar. They are active only for about 4 hrs. a day, spending remainder in sleep or at rest

3) Morphology :-

i) Its fur ranges in colour from ruddy - tawny, heavily speckled with black, to sandy or buffish grey, sometimes with a silvery sheen in certain lights.

ii) There is a longitudinal fold of skin running along its belly. The claws are retractile and very sharp. Each paw is equipped with soft pads.

4) Economic Importance :-

* Lions plays a key role in food chain by helping to control the herbivore population.

Classification:-

Phylum:- Chordata

Class:- Mammalia

Order:- Carnivora

Genus:- Panthera

Panthera leo (Asiatic lion)

Classification:-

Phylum:- Chordata
Class:- Mammalia
Order:- Primates
Genus:- Semnopithecus

Semnopithecus entellus (Langur)

General characters

1) Habitat: Langurs adopt habitats such as desert areas, dry open scrub, mountain forest etc They live in densely populated cities like Jodhpur, which have over a million Habitat.

2) Habits :-

i) They are diurnal.
(ii) They are herbivorous.
(iii) Locomotion: It moves through the forest and on the ground. It also uses a leaping gait through the forest.
(iv) The langur gives birth to single offspring.

3) Morphology:-

(i) These langurs are largely gray, with a black face and ears.
(ii) Externally, the various species mainly differ in darkness of hands and feet
(iii) All north Indian gray langurs have their tail tips looping towards their head during a casual walk whereas all South Indian and gray langurs have an inverted U-shape or S-shape tail
(iv) Variation in size depending upon the sex with the male always large than female.
(v) The average weight of gray langur is 18 kg in the males and 11 kg in the females.

General characters:-

1) Habitat:- It is a terrestrial and shy game bird generally found in the forest but is also seen in the fields.

2) Habits:-

i) Slow flier and running type locomotion.

(ii) It is omnivorous and feed upon grains as well as insects and reptiles.

(iii) Sexes are dioecious and show a well marked sexsual dimorphism

(iv) Male is with crest on head, bright coloured sheen, long ocellated tail feathers and a bony spur on legs. Male is polygamous and shows a peculiar dance during rainy season. (breeding)

3) Morphology:-

(i) Body is bright-coloured in peacock while is dull coloured in Peahen. Body is divideded into head, neck, trunk and tail.

(ii) Head is with eyes, nostril and mouth bounded by strong and curved beak. Male has crest on head.

(iii) Neck is with shining multi-coloured sheen.

(iv) Tail feathers are long, ocellated and erectile

4) Economic Importance:-

- It is the national bird of India.
- Its feathers have decorative Importance.

Classification

Phylum:- Chordata
Class:- Aves
Order:- Galliformes
Genus: Pavo

Pavo cristatus (Male Peafowl → Peacock)

Classification:-

Phylum:- Chordata

Class:- Aves

Order:- Galliformes

Genus:- Pavo

Pavo cristatus (female Peafowl → Peahen)

General characters:-

* Habitat: They are mainly include two Asiatic bird species, The blue of indian peafowl originally of India and sri lanka. and green peafowl of myanmar, Indochina and Java.

* Habits:-

i) They are omnivorous and eat mostly plant parts, flower petals, seed heads, insects and other arthropods, reptiles and amphibians

(ii) Female (Peafowl) lays 3-5 eggs. Young bird will hatch after 28 days

(ii) Female Peafowls are oviparous. and only Peafowls (female Peafowl) incubates the eggs.

* Morphology:-

① Head is with eyes, nostril and mouth bounded by strong and curved beak.

② Tail feathers are long, ocellated and erectile.

③ Peahen does not has a crest on head and bony spur in leg. which is present in male peafowl

PROJECT REPORT

ON

"FISH REARING"

SUBMITTED TO

Prof. Gagan Mittal
H.O.D. Zoology deptt.
R.K.S.D. College (P.G.)
Kaithal

SUBMITTED BY

Sakshi Aggarwal
3702
B.Sc. III (Medical)

ACKNOWLEDGEMENT

A project report on fish seed farm has been specified in our syllabus of B.Sc. III yr. The accomplishment of this project would have been impossible without the invaluable help and advice of Prof. Gagan mittal. I am greatly thankful for their advice cooperation, guidance and encouragement.

I am also thankful to lab attention Ram Kumar for their cooperation, in due to appreciation and gratitude. I thank them and declare my sincere and indebtness.

I am grateful to Dr. S.K. Garg, principal of our college for permitting me to visit necessary spots to prepare project report works by encouraging us with high morale + affection at every step during this project which enabled me bring my project work to great heights.

Pulling of net by workers in pond fisheries

INTRODUCTION

It is a project work on a visit to a fish farm for fish culture. An educational tour was organised to sultan fish farm at village Butana near Nilokheri in Haryana along with our respected teachers to increase our knowledge about various aspects of fisheries. This farm belong to Mr. Sultan Singh. This farm is spread over an area of 26 acres. This farm is famous for producing fish seeds. This seeds sold to farmers. The farmer has self sufficient water resources, planktons and area. The ponds are well maintained. The normal size of pond is around 18-20m and depth around 5-10 feet. These were artificial ponds for artificial breeding.

Various stages of fishes collicted by chat net.

FISH SEED

Fish Seed is the term used to include various developing stages of a fish, required for stocking ponds for culture. This includes the following :→

1) Spawn :→ developing fertilized ova.
2) Hatchlings :→ stage immediately after hatching.
3) Sac-fry :→ newly hatched larvae with yolk sac.
4) Fry :→ young larvae after yolk sac is absorbed.
5) Juveniles :→ young ones resembling adult fish.
6) Fingerlings :→ young ones of large fishes, resembling the adult fish but only 4-12cms in length.
7) Yearlings :→ young ones that are one year old.

labourers handling the chat net.

KINDS OF FISH CULTURE

Fish culture practices can be divided into the following categories :—

1 **Extensive fish culture** :- The fish farm consists of large sized ponds but the yield is modest, as no attempt is made to increase the production. The total yield is based on natural food available in pond, no artificial food or fertilizers are used.

2 **Intensive fish culture** :— In this case the ponds are of small size, but the total yield is very high and all the resources are utilised to obtain maximum production of fish. Artificial food and fertilizers are used. By selecting first, selected fish species are cultured. This ensures high profit to the farmer.

Fish culture can also be of the following types depending upon the special technique used :—

1) **Monoculture** :→ Only one species of a fish is cultured in a pond.

2) **Polyculture** :→ More than one compatible species of fish are cultured simultaneously in a pond so as to utilise all the available niches.

3) **Mono-sex culture** :→ Only one sex, male or female of a species is cultured. Sex having fast growth rate is selected for culture eg. Tilapia.

4) **Cage culture** :→ Fish is cultured in large cages, made of bamboo or steel, which are lowered into the river. eg Carnivorous species.

5) **Integrated fish culture** → fish culture is practised along with some agricultural crop such as paddy & also near the poultry or piggery & excreta of these animals used as food in ponds.

TYPE OF PONDS FOR CULTURE

several kinds of ponds are required for fish culture depending upon the function performed by each :-

1. **HATCHING POND** :- These are small tanks that are used for hatching of fertilized eggs. and are provided with continuous slow flowing water for aeration. Each tank is usually of 2.5m x 1.25m x 0.6m size. However small cloth tanks called 'hapas' made of coarse cloth or mosquito curtain cloth (2.0 x 1.0 x 0.50m) is also used for hatching.
2. **SPAWNING POND** :- This a small pond in which brood fish was placed for spawning. and also placed in Hapas for spawning.
3. **NURSERY POND** :- These are larger ponds for newly hatche fry. Usually it is 15 x 15 x 1.2m and is seasonal which dries up during summer.
4. **REARING POND** :- These are larger ponds of (30m x 10m x 1.25m) and used for rearing of advanced fry till they grow into fingerling. They may be seasonal or perennial.
5. **GROWING OR STOCKING POND** :- This is a large perennial pond, more than 2m deep. and used for growth of fish to marketable size.

2-3 marketing ponds are also constructed in a fish farm.

Cirrhina mrigala

Cirrhina mrigala

CLASSIFICATION

Phylum → chordata
Class → Teleostomi
Order → Cypriniformes
Family → Cyprinidae
Genus → Cirrhina
Species → mrigala

Habitat :→ It is a indigenous carps. This species is usually cultured along with rohu and catla and is a fast growing fish. It is commonly called mrigal.

Habits :→ The scales are absent. Caudal fin is sharply forked. **Growth :-** Hatchlings when stocked at 10-12.5 lakh/ha, grow to 25-30 mm in 15 days. These species grows to 1.8 kg, 2.6 kg and 4 kg by the end of first, second and third yr. respectively. (Fish)

- Fish becomes sexually mature when 2yr. old, but induced breed specimen are reported to become sexually mature in one year only.

FOOD :→ Fingerlings → Algae, vegetable, debris detritus, muds etc.

Adult :→ Algae, detritus, sand and mud, decayed leaves of aquatic plants, algae.

Cyprinus carpio (Golden fish)

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Cyprinus carpio

CLASSIFICATION

Phylum → chordata
Class → Teleostomi
Order → Cypriniformes
Family → Cyprinidae
Genus → Cyprinus
Species → carpio

Habitat :→ It is a common carp. It is cultivated in several countries and cultured all over the world and has a fast growth rate.

Habits :→ In India, it grows to about 1kg in one year. It becomes sexually mature at different times depending on the climatic conditions and spawns 4-5 times in a year in tropical countries, but only once in a year in temperate countries.

Food :→ Food for fry and fingerlings is mostly Nauplius larval.

→ Food for adults is Cyclops, rotifers, Nauplius, Euglena, Diatoms, Volvox, chironomous larval, insects.

Catla Catla

Catla catla

CLASSIFICATION

Phylum → chordata
Class → Teleostomi
Order → cypriniformes
Family → cyprinidae
Genus → Catla
Species → catla

Habitat :→ Catla is the fastest growing fish among all the major carps of India. It is fresh water carp. It is rather scarce to south of Krishna river.

Habits :→ Catla feeds on surface and higher algae, phytoplankton and throughout water column.

Growth :→ It has been found that fry stocked at the rate of 10-12.5 lakh per hectare in nursery pond grow to 20-25 mm length in 15 days, and 38-46 cms by the end of one year, attaining a weight of 900 gms.

- By the end of second year it grows to 4-5 kg and by third year to 6-7 kg.
- It becomes sexually mature when two years old, and a female fish of 5 kg weight has about 400,000 ova in the ovary.

Food :→ For fingerlings :→ water fleas, algae and vegetable debris.

For adult → algae, crustaceans, some plants, rotifers, insects etc.

Labeo rohita

Labeo rohita

CLASSIFICATION

Phylum → chordata
Class → Teleostomi
Order → Cypriniformes
Family → Cyprinidae
Genus → Labeo
Species → rohita

Habitat :→ It is a fastest growing fish but the rate is less than that of catla. It is commonly known as 'rohu'. It is found all over Northern and Central India. It is found in Godavari and Krishna rivers.

Habits :→ The newly hatched fry when stocked at the rate of 10–12.5 lakh/ha, grow to 25–30mm size in 15 days.

- By the end of second year, the fish attains a weight of 2–3 kg, and 5kg by the third year.
- Rohu is sexually mature at 2yrs. of age and its fecundity was found to be 271 ova/g body weight.

Food :→ For fingerlings → Plants, microscopic in size and vegetable debris.

For adults → Plants microscopic in size, decaying higher plants, detritus and mud.

Drag net

Pond Fisheries

Labourers collecting fishes by drag net.

Types of Nets

Nets are main fishing gears made up of cotton yarns, hemp or other special yarns. there are three types of nets which we have seen:-

1. Cast net.
2. Purse net.
3. Drag net.

1) **Cast net:** → It is commonly called 'ghagaria jal'. It is almost bell shaped and made up of nylon or cotton. on its lower circular margin are present weights called as sinkers, to make it heavier. The net spreads like an umbrella in water. The number of meshes at apex is 50 and at margins are around 1000.

2) **Purse net:** → These nets are used to capture migratory fishes. It has wide mouth supported by two flexible bamboo rods. These rods are attached at two angles forming upper and lower lip. The net is hanging in backward direction. Its posterior end is closed and attached to boat.

3) **Drag net:** → This net is commonly used for fishing in ponds. This net is a long as width of pond and as wide as height of the pond. It requires 20-30 persons to move drag net from one end of pond to another end.

ARTIFICIAL FERTILIZATION

It is method of collection of ova or sperms and mixing them for fertilisation by mechanical means.

* METHOD OF INDUCING IN THE POND BREEDING FISHES :-

1. By changing old water of pond by fresh water.
2. By introducing the specific fishes in Breeding ponds.
3. By keeping specific light and temp. conditions.
4. By providing specific sites for egg laying and for attachment of eggs.

* METHODS OF INDUCING IN NON-POND BREEDING fishes

TWO METHODS TO INTRODUCE BREEDING IN SUCH FISHES :-

1) Induced Bundh Breeding :→ In bundhs, sometimes breeding is induced by the heavy showers of monsoon, temp. around 26°C, strong water currents and artificial thunder storms.

2) By Hypophysation :→ Fishes are given injection of 2-3 mg of pituitary extract containing gonadotrophin (FSH and LH). As a result, spawning occurs.

BRAZILIANS firstly use this technique successfully.

COLLECTION OF PITUITARY EXTRACT:-

- The pituitary gland in fishes is located in well protected depression called myodome on the floor of the skull. • To get pituitary, the upper part of the skull is removed by a knife.
- The brain is lifted to pick the gland.
- The pituitary is kept either in absolute alcohol in refrigeration or in acetone.
- In acetone, the gland gets harder and it dries on filter paper and stored in vials in refrigerator
- The gland retains potency for 6 months in acetone and 2-5 yrs. in alcohol method.

The following precautions should be taken to collect pituitary hormone:-

1) For induced breeding, the gland should be collected from fully mature fish.
2) The pituitary of Preferably some species should used.
3) The gland of fish of any of the sex can be used.

BREEDING HAPA:- These are rectangular structures, formed by cloth and supported by bamboo sticks from all sides.

→ The cloth used is mainly close meshed mosquito net or nylon net cloth.
→ The meshes of cloth should be small enough to prevent the escape of eggs and spermatozoa.
→ This hapa is fixed in pond or at near banks of rivers.
→ The rejected bred is held in hand net and introduced in hapa.

SPAWNING :- The spawning occurs 5-7 hrs. after injection. The eggs swell up in water. The fertilized eggs are transparent and look like pearl whereas unfertilized eggs look opaque and whitish. The successful induced breeding shall release fertilized eggs. If eggs released are unfertilized, the process may be repeated.

MAINTAINANCE OF SPAWNS AND STOCKS :-

- The fertilized eggs are kept in round plastic tanks of 0.5 to 1.0 tonne capacity.
- The stagnant water tanks are kept well aerated and in the flowing water type tanks, two to three conical hatching nets are hung in the water and
- their tail ends are connected with plastic pipes to supply a continuous upward flow of fresh sea water.

* The precautions taken at this stage are :-

▲ The hatching should occur in tanks with aerated water.
▲ These should not be transferred immediately after hatching
▲ Seasoned and stable sea water should be used for rearing.
▲ Extreme changes in water temp. and quality shall be avoided.
▲ To different developmental stages, the suitable food should be supplied.

CONCLUSION

Sultan singh's fish farm is located in Butana was well organised and mainly specialised in the production of fish and fries. which are sold all over India. When the fishes grown at an age of about 5yrs. They are sold as they are not much importance for breeding season. It was very interesting to gather all the knowledge about fish culture from the farm. It was well organised and self sufficient in explaining the technique and procedure of fish culture. Thus, in conclusion we can say that the makings of this project report after visiting Sultan fish farm has been very interesting and educative.