

Name of Paper	Title of paper	Max. Marks			Minimum Marks			Total Marks
		Theory	CCE	Practical/ Internship	Theory	CCE	Practical	
First	Animal Behaviour and Neurophysiology	40	10		15	4	-	50
Second	Gamete Biology, Development and Differentiation in Vertebrates	40	10		15	4	-	50
Third	Ichthyology (Fish) Structure and Function	40	10		15	4	-	50
Fourth	Pisciculture and Economic Importance of Fishes (Ichthyology)	40	10		15	4	-	50
Practical - I st	Practicals related to Paper I & II	-	-	50			20	50
Practical - II nd	Practicals related to Paper III & IV	-	-	50			20	50
Project	Internship			100			40	100
							Total	400

Board of Studies :

I. Chairman -

II. Subject Expert -

1. Dr. R.K. Srivastava Prof

2. Dr. P.K. Mishra Asst

3. Dr. V.K. Krishna Asst

4. Dr. Sunil Singh Asst

5. Dr. M.S. Marlam Asst

6.

7.

CHHINDWARA UNIVERSITY, CHHINDWARA

M.Sc Zoology

Semester-IV

Paper- I (Compulsory)

ANIMAL BEHAVIOUR AND NEUROPHYSIOLOGY

Unit-1

1. Introduction:
 - Ethology as a branch of biology.
 - Animal psychology, classification of behavioural patterns, analysis of behaviour (ethogram)
2. Reflexes and complex behaviour.
3. Perception of the environment: mechanical, electrical, chemical, olfactory, auditory and visual.
4. Evolution and ultimate causation: Inheritance behaviour and relationships.

Unit-2

1. Neural and hormonal control of behaviour.
2. Genetic and environmental components in the development of behaviour.
3. Motivation: Drive, timing and interaction of drives, physiological basis of motivation, hormones and motivation, aggregation.
4. Communication: Chemical, visual, light and audio, evolution of language (primates).

Unit-3

1. Ecological aspects of behaviour: Habitat selection, food selection, optimal foraging theory, anti-predator defences, aggression, homing territoriality, dispersal, host parasite relations.
2. Biological rhythms: Circadian and circannual rhythms, orientation and navigation, migration of fishes, turtles and birds.
3. Learning and memory: Conditioning, habituation, insight learning, association learning and reasoning.

Unit-4

1. Reproductive behaviour. Evolution of sex and reproductive strategies, mating systems, courtship, sexual selection, parental care.
2. Social behaviour. aggregations, schooling in fishes, flocking in birds, herding in mammals, group selection, kin selection, altruism, reciprocal altruism, inclusive fitness, social organization in insects and primates.


Unit-5


1. Thermoregulation: Homoeothermic animals, poikilotherms & Hibernation.
2. Receptor physiology a comparative study –
 - Mechano receptor
 - Photo receptor
 - Phono receptor
 - Chemo receptor
 - Equilibrium receptor
3. Bioluminescence

Suggested Reading Materials:

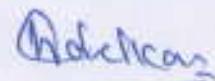
1. Eibl-Eibesfeldt, I. Ethology. The biology of Behaviour. Holt, Rinehart & Winston, New York.
2. Gould, J.L. The mechanism and Evolution of Behaviour.
3. Kerbs, J.R. and N.B. davies : Behaviourable Ecology. Blackwell Oxford, U.K.
4. Hinde, R.A. Animal Behaviour : A Synthesis of Ethology and Comparative Psychology. McGraw Hill, New York.
5. Alcock, J. Animal Behaviour : An Evolutionary approach. Sinauer Assoc. Sunderland, Massachsets, USA.
6. Bradbury, J.W. and S.L. Vehrencamp. Principles of Animal Communication. Sinauer Assoc. Sunderland, Massachsets, USA.

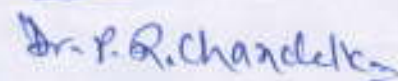

Dr. R.K. Shrivastava.


(Dr. Sunita Singh)


Dr. P.R. Chandel


Dr. P.R. Chandel


Dr. P.R. Chandel


Dr. P.R. Chandel

CHHINDWARA UNIVERSITY, CHHINDWARA

M.Sc Zoology

Semester-IV

Paper- II(compulsory)

Gamete Biology, Development and
Differentiation in vertebrates

Unit-1

1. Comparative account of differentiation of gonads in mammals.
2. Spermatogenesis : Morphological basis in rodents.
Gamete specific gene expression and genomics
3. Biochemistry of Semen : Semen composition and formation, assessment of sperm function.
4. Fertilization: Prefertilization events Biochemistry of fertilization post fertilization events.

Unit-2

1. Ovarian follicular growth and differentiation: morphology, endocrinology, molecular biology oogenesis and vitellogenesis, ovulation and ovum transport in mammals
2. Biology of sex determination and sex differentiation a comparative account.
3. Multiple ovulation and embryo transfer technology : in vitro oocyte maturation, super ovulation.

Unit-3

1. Hormonal regulation of ovulation, pregnancy and parturition.
2. Hormonal regulation of development of mammary gland and lactation.
3. Endocrinology and Physiology of placenta.
4. Cryopreservation of gametes and Embryo.
5. Teratological effects of xenobiotics on gametes.

Unit-4

1. Cell commitment and differentiation.
2. Germ cell determinants and germ cell migration.
3. Development of gonads.
4. Melanogenesis.

Unit-5

1. Creating new cell types, the basic evolutionary mystery.
2. Cell diversification in early Amphibian embryo, totipotency and pluripotency.
3. Embryonic stem cells, renewal by stem cells, epidermis.
4. Connective tissue cell family
5. Haemopoietic stem cells : Blood cells formation, stem cell disorders.

Suggested Reading Materials:

1. Long J.A. Evan H.M. 1922 : the oestrous cycle in the Rat and its associated phenomenon.
2. Nalbandou. A.C. - Reproductive physiology
3. Prakash A.S. 1965-66 Marshall's, Physiology Reproduction (3 Vol.)
4. Gilbert, S.F. Developmental Biology, Sinauer Associated Inc. Massachusetts.
5. Ethan Bier, the cold Spring. The cold spring Harbor laboratory Press, New York.
6. Balinsky B.I. Introduction to Embryology sanders, Philadelphia.
7. Berril N.J. and Karp. G. Development Biology. McGraw Hill New York.
8. Davidson, E.H. Gene Activity During Early Development. Academic Press, New York.

Dr. R.K. Shrivastava

Dr. Smita Ghosh

Dr. P.K. Mishra

Dr. P.K. Mishra

Dr. P.K. Mishra

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CHHINDWARA UNIVERSITY, CHHINDWARA

M.Sc Zoology
Semester-IV

Paper- IV (Optional) ~~B~~

Pisci Culture and Economic Importance of Fishes (Ichthyology)

Unit-1

1. Collection of fish seed from natural resources.
2. Dry bundh breeding of carps.
3. Wet bundh breeding of carps.
4. Hypophysation and breeding of Indian major ~~carps~~ Carps.

Unit-2

1. Drugs useful in induced breeding of fish
2. Types of ponds required for fish culture farms
3. Management of hatcheries, nurseries and rearing ponds
4. Management of stocking ponds

Unit-3

1. Composite fish culture
2. Prawn culture and pearl industries in India.
3. Fisheries resources of MP
4. Riverine fisheries.

Unit-4

1. Costal fishries in India
2. Offshore and deep sea fishery's in India
3. Role of fishries in rural development
4. Sewage fed fishries

Unit-5

1. Methods of fish preservation
2. Marketing of fish in India.
3. Economic importance and by product of fishes
4. Shark liver oil industry in India

5. Transport of live fish & fish seed

Suggested Reading Materials : Paper III A & IV A

1. JR. Norman - The History of fishes.
2. Nagaraja Rao - An introduction to fisheries.
3. Lagler Ichthyology.
4. Herclen Jones Fish migration.
5. Marshal The life of fishes.
6. Thomas - Diseases of fish.
7. Greenwood - Inter relationship of fishes.
8. Gopalji, Srivastava - Freshwater fishes of U.P. and Bihar.
9. Brown - Physiology of fishes Vol. I & II.
10. Hoar and Randall - Fish physiology of fishes Vol. I & IX.
11. Gunther Sterba C.N.H.-Freshwater fishes of the world
12. W. Lanham - The Fishes.
13. G.V. Nikolsky - The ecology of Fishes.
14. Borgstram - Fish as food Vol. I & II.
15. Nilsson - Fish physiology - Recent Advances.
16. P.B. Myle and J.J. Cech Fishes An Introduction to Ichthyology.
17. Carl E. Bond - Biology of fishes.
18. M. Jobling - Environmental Biology of fishes.
19. Santosh Kumar & Manju Tembhe - Fish and Fisheries
20. S.K. Gupta - Fish and Fisheries
21. K.P. Vishwas - Fish and Fishries.
22. Jhingaran - Fish and Fishries.

Chandekar

Dr. P. R. Chandekar

Dr. Smita Singh

Dr. Smita Singh

V-1

Sem IV - practical

I → II

Department of Higher Education, Govt. of M.P.
Post Graduate Semester wise Syllabus
as recommended by Central Board of Studies and approved by the Governor of M.P.

उच्च शिक्षा विभाग, म.प्र. शासन
स्नातकोत्तर स्तरों के लिये सेमेस्टर अनुसार पाठ्यक्रम
केंद्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित

Session - 2010-2011

Subject - Zoology

Class : M.Sc
Semester : IV
Subject : Zoology
Title of Subject Group : General Practical-I
Paper No. : Paper- I & II (Compulsory)
Animal behavior and gamete biology

M.M. : 50

1. Exercise on Animal behavior

- a. Taxes
- b. Reflexes
- c. Biological clocks
- d. Social behavior
- e. Learning behavior
- f. Reproductive behavior

2. Developmental Biology

- > Study of embryological slides
- > Study of gametes of frog and chick
- > Study of fate maps
- > Study of different stages of spermatogenesis and oogenesis

Adhikari

P.T.O.

(Dr. R.K. Srivastava) (Dr. Smita Singh)

V →

Dr. P. C. Singh

[Signature]

Laboratory - VI part

IIA I

Department of Higher Education, Govt. of M.P.
Post Graduate Semester wise Syllabus
as recommended by Central Board of Studies and approved by the Governor of M.P.

उच्च शिक्षा विभाग, म.प्र. शासन
स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम
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Session - 2010-2011

Subject - Zoology

Class : M.Sc
Semester : IV
Subject : Zoology
Title of Subject Group : **General Practical-I**
Paper No. : Paper- I & II (Compulsory)
Animal behavior and gamete biology
Max Marks : 50

Scheme for Practical Examination

1.	Exercise based on animal behavior	20
2.	Exercise based on developmental biology	16
3.	Practical record	05
4.	Viva Voce	04
5.	Collection	05
Total		50 Marks

(Dr. R. K. Srivastava)
Dr. S. S. Mishra

Dr. P. R. Chandelkar

Dr. P. R. Chandelkar

Dr.

Chhindwara University chhindwara

M.Sc. IV sem (zoology) 2020-21

Practical 2nd (special paper)

Ichthyology (III & IV)

M.M. 50

1. Demonstration Nervous system of Walago, Mystus, Labeo, Torpedo	10
2. Demonstration of internal ear, accessory, respiratory, organ, pituitary glands, Weberian ossicles.	3
3. Mounting preparation of permanent slides.	3
4. Age determination of fish with the help of scales.	3
5. Identification of fish.	08
6. Spotting of museum specimen slides and bones.	08
7. Viva Voice.	05
8. practical record, collection.	(5+5) 10

Total marks 50

Dr. Smita Singh
Dr. R. S. Chandella

Dr. R. K. Shrivastava

By

Dr. Smita Singh

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2. Nagaraja Rao - An introduction to fisheries.
3. Lagler Ichthyology.
4. Herclen Jones Fish migration.
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22. Jhingaran - Fish and Fishries.

(Dr. P.K. Srivastava)

Dr. Shweta Singh

Madhavi

Dr. P. K. Singh

Dr. P. K. Singh