

शहीद नंदकुमार पटेल विश्वविद्यालय, गढ़ उमरिया, ओड़िशा रोड, रायगढ़
SYLLABUS

Zoology
B.Sc. Part I 2018-19
Paper I
(Cell Biology and Non-chordata)

Unit:I

1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome).
3. Nucleus, Chromosomes, DNA and RNA

Unit:II

1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

Unit:III

- General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.
- 2. Protozoa: Type study - Paramecium,
- 2. Porifera: Type study - Sycon,
- 3. Coelenterata: Type study - Obelia

Unit: IV

- General characters and classification of Phylum Platyhelminthes, Nematelminthes, Annelida and Arthropoda up to order.
- 2. Platyhelminthes and Nematelminthes: Type Study – Fasciola, Ascaris
- 3. Annelida: Type Study - Pheretima.
- 4. Arthropoda: Type Study - Palaemone.

Unit:V

- General characters and classification of Phylum Mollusca and Echinodermata up to order.
- 2. Mollusca: Type Study - Pila.
- 3. Echinodermata- Type Study- Asterias (Starfish).

शहीद नंदकुमार पटेल विश्वविद्यालय, गढ़ उमरिया, ओड़िशा रोड, रायगढ़

SYLLABUS

Zoology

B.Sc. Part I 2018-19

Paper II

(Chordata and Embryology)

Unit:I

1. Classification of Hemichordata
2. Hemichordata- Type study-Balanoglossus
3. Classification of Chordates upto orders..
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Myxine.

Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

Unit:III

1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles.
2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.
3. Aquatic Mammals and their adaptations.

Unit:IV

1. **Fertilization**
2. Gametogenesis, Structure of gamete and Types of eggs
3. Cleavage
4. Development of Frog up to formation of three germ layers.
5. Parthenogenesis

Unit:V

1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals.

शहीद नंदकुमार पटेल विश्वविद्यालय, गढ़ उमरिया, ओड़िशा रोड, रायगढ़
SYLLABUS

Zoology
B.Sc. Part I 2018-19
Practical

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-

- Dissection of Earthworm, Cockroach, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/drawing/Model etc.)

- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology,

Scheme of Practical Exam	Time: 3hrs
1. Major Dissection	10 Marks
2. Minor Dissection	05 Marks
3. Comments on Exercise based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spots-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER – III Session: 2018-19 & 2019-20
ZOOLOGY

(Anatomy & Physiology)

Paper : Pass Course

Max. marks: 60

Pass marks: 21

Lectures: 45

Code - 19004

UNIT – 01

Comparative anatomy of various organs and systems –

1. Integument and its derivatives, structure of scales, hair and feathers.
2. Alimentary canal and digestive glands in vertebrates.
3. Respiratory organs : gills, lung, air sac in birds.

UNIT – 02

1. Endoskeleton – limbs, girdles and vertebrae.
2. Circulatory system – Evolution of heart, aortic arches.
3. Urinogenital system – kidney and excretory ducts.

UNIT – 03

1. Nervous system – general plan of brain and spinal cord.
2. Endocrine glands – classification and histology.
3. Gonads and genital ducts.

UNIT – 04

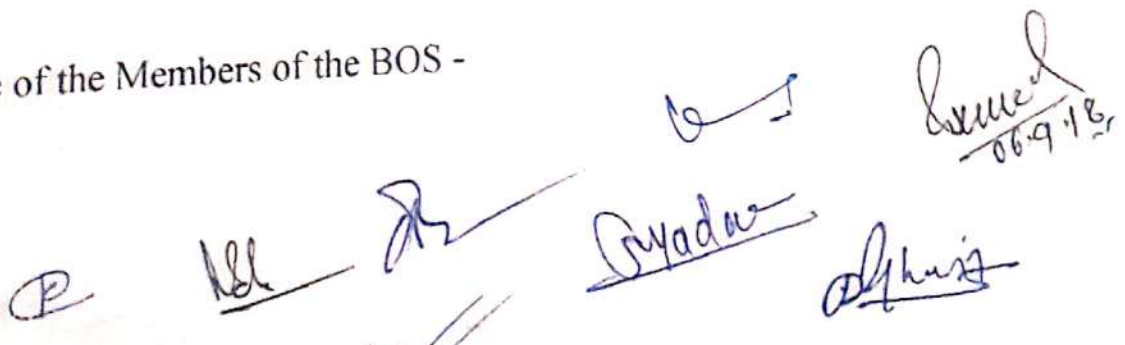
Physiology

1. Digestion and absorption of dietary components.
2. Physiology of heart, cardiac cycle and ECG.
3. Blood coagulation.
4. Respiration – mechanism.

UNIT – 05

1. Excretion – physiology of excretion, Osmoregulation.
2. Physiology of muscle contraction.
3. Physiology of nerve impulse.
4. Ear and eye – structure and function.

Signature of the Members of the BOS -

The image shows several handwritten signatures in blue ink. From left to right, there is a signature that looks like 'P', a signature that looks like 'Nbl', a signature that looks like 'R', a signature that looks like 'Suyadw', a signature that looks like 'Dhruv', and a signature that looks like 'Suyadw' with the date '06.9.18' written below it.

Code - 19005 -

(VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY, BEHAVIOUR,
EVOLUTION & APPLIED ZOOLOGY)

UNIT – 01

1. General characters of hormones.
2. Hormone receptor.
3. Biosynthesis and secretion of Thyroid, Adrenal, Ovarian and Testicular hormones.
4. Endocrine disorders due to hormones and other glands.

UNIT – 02

1. Reproductive cycle in vertebrate.
2. Menstruation, Lactation and Pregnancy.
3. Mechanism of Parturition.
4. Hormonal regulation of Gametogenesis.
5. Extra embryonic membrane.

UNIT – 03

1. Evidences of organic evolution.
2. Theories of organic evolution.
3. Variation, Mutation, Isolation and Natural selection.
4. Evolution of horse.

UNIT – 04

1. Introduction to Ethology.
2. Patterns of Behavior, Taxis, Reflexes, Drives and Stereotyped behavior.
3. Reproductive behavioral patterns.
4. Hormones, Drugs and Behavior.

UNIT – 05

1. Aquaculture.
2. Sericulture.
3. Apiculture.
4. Pisciculture.
5. Elements of Pest Control : i) Chemical control b) Biological control



K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

SCHEME OF ZOOLOGY PRACTICAL EXAM

SEMESTER III & IV 2018-19 & 2019-20

Duration – 2:30 Hours

Maximum marks – 50

Code- 19006

Pass marks : 17

-
- | | |
|---|----------|
| 1. Nervous system of Scoliodon by clay modeling - | 10 Marks |
| 2. Study of Homologous & Analogous organs - | 05 Marks |
| 3. Mounting – (Placoid, Cycloid, Ctenoid scales,) | 04 Marks |
| 5. Exercise based on Applied zoology - | 05 Marks |
| i) Identification of Labeo, Catla & Mrigal fish & fish seed | |
| ii) Life cycle of Silkworm, Silkworm diseases | |
| iii) Life cycle of Honeybee, Individuals of Honey bee. | |
| 6. Spots (slides-4, specimen-2, bones-2) | 16 Marks |
| 7. Viva - | 05 Marks |
| 8. Sessional (project work, Practical record) | 05 Marks |

Note – Virtual dissection in place of animal dissection.

Signature of the members of B.O.S-

Date : 06.9.2018

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Mandy

Syadav

Ar. K. R. Sahu

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Arjun

Soumit

06.9.18

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Code - 19007

(ECOLOGY, ENVIRONMENTAL BIOLOGY, TOXICOLOGY, MICROBIOLOGY
AND MEDICAL ZOOLOGY)

UNIT - 01 : ECOLOGY

1. Aims and scopes of Ecology.
2. Major ecosystem of the world – brief introduction.
3. Population – characters and regulation of densities.
4. Communities and Ecosystem.
5. Biogeochemical cycle.
6. Air and Water pollution.
7. Ecological succession.

UNIT - 02 : ENVIRONMENTAL BIOLOGY

1. Law of limiting factors.
2. Food chain in a freshwater ecosystem.
3. Energy flow in ecosystem – Trophic level.
4. Conservation of Natural resources.
5. Environmental Impact Assessment.

UNIT - 03 : TOXICOLOGY

1. Definition of Toxicity.
2. Classification of toxins.
3. Principle of systematic toxicology.
4. Toxic agents and their action – Metallic and inorganic agents.
5. Animal poison – Snake venom, Scorpion and Bee poisoning.
6. Food poisoning

UNIT - 04 : MICROBIOLOGY

1. General and Applied microbiology.
2. Microbiology of Domestic water and Sewage.
3. Microbiology of milk and milk products.
4. Industrial microbiology.

UNIT - 05 : MEDICAL ZOOLOGY

1. A brief introduction to pathogenic micro-viruses, Rickettsial, Spirochaetes and Bacteria.

PTO -

2. Brief account of life history, pathogenicity of the following pathogens with reference to Man, Prophylaxis and Treatment –
- Pathogens Protozoans – Entamoeba histolytica, Trypanosoma
 - Pathogenic helminthes – Schistosoma.
 - Pathogenic nematode parasites of man.
3. Vector insects.


SUGGESTED READINGS


- Colinvaux, P. A. (1993). *Ecology*. II Edition. Wiley, John and Sons, Inc.
- Krebs, C. J. (2001). *Ecology*. VI Edition. Benjamin Cummings.
- Odum, E.P., (2008). *Fundamentals of Ecology*. Indian Edition. Brooks/Cole
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Name of the members of the B.O.S.

- Dr. Ramesh Kumar Tamboli.
- Dr. Kanti Choubey
- Dr. Dhananjay Mishra
- Dr. K. R. Sahu
- Mr. Kamal Jindal
- Prof. Anita Pandey
- Prof. Vinita Pandey
- Prof. Ranjana Sahu
- Mr. Devendra Khandait
- Ms. Sangeeta Yadav

Signature


06.9.18











Date of Meeting
06.9.2018

Head of the department
Dr. Ramesh Kumar Tamboli

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER –VI Session: 2018-19& 2019-20

ZOOLOGY

Paper : Pass Course

Max. marks:80

Pass marks:21

Lectures:45

Code - 19008

(GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUE)

UNIT – 01 : GENETICS

1. Linkage and linkage maps.
2. Variation of gene expression – Multiple alleles; Lithogenesis; Pleiotropic genes; gene interaction; epistasis.
3. Sex chromosome systems and sex-linkage.
4. Mutation and chromosomal alterations, meiotic consequences.
5. Human genetics – chromosomal and single gene disorders (somatic cell genetics)

UNIT – 02 : CELL PHYSIOLOGY

1. General idea about pH and Buffer.
2. Transport across membranes – cell membrane; Mitochondria.
3. Active transport and its mechanism; active transport in Mitochondria and Endoplasmic reticulum.
4. Hydrolytic enzymes- their chemical nature, Activation and specificity.

UNIT – 03 : BIOCHEMISTRY

1. Amino acids and Peptides – Basic structure and biological function.
2. Carbohydrate and its metabolism- Glycogenesis, Glyconeogenesis, Glycolysis, Glycogenolysis, Cori cycle.
3. Lipid metabolism- Oxidation of glycerol, oxidation of fatty acid.
4. Protein metabolism- Deamination, Transamination, Transethylation. Biosynthesis of Protein.

UNIT – 04 : BIOTECHNOLOGY

1. Biotechnology – scope and importance.
2. Recombinant DNA and gene cloning.
3. Application of biotechnology in –
 - i) Pharmaceutical industry
 - ii) Food processing industry

PTO-

UNIT - 05 : BIOTECHNIQUES

1. Principle and technique of pH meter, Colorimeter.
2. Microscopy- Light microscopes, phase contrast and electron microscope.
3. Centrifuge.
4. Separation of biomolecules by chromatography and.
5. Histochemical methods for determination of Protein, Lipid and Carbohydrate.

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.
2. Dr. Kanti Choubey
3. Dr. Dhananjay Mishra
4. Dr. K. R. Sahu
5. Mr. Kamal Jindal
6. Prof. Anita Pandey
7. Prof. Vinita Pandey
8. Prof. Ranjana Sahu
9. Mr. Devendra Khandait
10. Ms. Sangeeta Yadav

Signature

Ramesh Kumar Tamboli
06.9.18

Kanti Choubey

Dhananjay Mishra

Anita Pandey

Ranjana Sahu

Devendra Khandait

Date of Meeting
06.9.2018

Head of the department
Dr. Ramesh Kumar

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

PRACTICAL WORK

SEMESTER - V & VI 2018-19 & 2019-20 Code - 19009

1. Estimation of population density, percentage frequency . Analysis of Producer & Consumer in Grassland.
2. Analysis of producers and consumers in grassland/aquatic Ecosystem.
3. Detection of gram positive and gram negative bacteria.
4. Haematological exercise -
 - i) Blood group detection (A,B,AB,O).
 - ii) R.B.C. count.
 - iii) W.B.C. count.
 - iv) Blood film preparation
 - v) Preparation of Heamatin crystals from blood.
 - vi) Haemoglobin %
6. Chromatography – paper or gel.
7. Biochemical detection of carbohydrate, protein and lipid.
10. Study of permanent slides of parasites based on theory paper.
(Entamoeba histolytica, Trypanosoma, Plasmodium, Georgia)
11. Working principles of colorimeter, centrifuge and microscopes.

Signature of the Members of the BOS –

Date : 06.9.2018






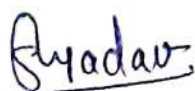

Dr. K. P. Sahu




06.9.18



Mrs Kanjana Sahu 





शहीद नंदकुमार पटेल विश्वविद्यालय, गढ़ उमरिया, ओड़िशा रोड, रायगढ़
SYLLABUS

Zoology
B.Sc. Part I 2018-19
Paper I
(Cell Biology and Non-chordata)

Unit:I

1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome).
3. Nucleus, Chromosomes, DNA and RNA

Unit:II

1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

Unit:III

- General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.
- 2. Protozoa: Type study - Paramecium,
- 2. Porifera: Type study - Sycon,
- 3. Coelenterata: Type study - Obelia

Unit: IV

- General characters and classification of Phylum Platyhelminthes, Nematelminthes, Annelida and Arthropoda up to order.
- 2. Platyhelminthes and Nematelminthes: Type Study – Fasciola, Ascaris
- 3. Annelida: Type Study - Pheretima.
- 4. Arthropoda: Type Study - Palaemone.

Unit:V

- General characters and classification of Phylum Mollusca and Echinodermata up to order.
- 2. Mollusca: Type Study - Pila.
- 3. Echinodermata- Type Study- Asterias (Starfish).

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SYLLABUS

Zoology

B.Sc. Part I 2018-19

Paper II

(Chordata and Embryology)

Unit:I

1. Classification of Hemichordata
2. Hemichordata- Type study-Balanoglossus
3. Classification of Chordates upto orders..
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Myxine.

Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

Unit:III

1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles.
2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.
3. Aquatic Mammals and their adaptations.

Unit:IV

1. **Fertilization**
2. Gametogenesis, Structure of gamete and Types of eggs
3. Cleavage
4. Development of Frog up to formation of three germ layers.
5. Parthenogenesis

Unit:V

1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals.

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SYLLABUS

Zoology
B.Sc. Part I 2018-19
Practical

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-

- Dissection of Earthworm, Cockroach, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/drawing/Model etc.)

- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology,

Scheme of Practical Exam	Time: 3hrs
1. Major Dissection	10 Marks
2. Minor Dissection	05 Marks
3. Comments on Exercise based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spots-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER – III Session: 2018-19 & 2019-20
ZOOLOGY

(Anatomy & Physiology)

Paper : Pass Course

Max. marks: 60

Pass marks: 21

Lectures: 45

Code - 19004

UNIT – 01

Comparative anatomy of various organs and systems –

1. Integument and its derivatives, structure of scales, hair and feathers.
2. Alimentary canal and digestive glands in vertebrates.
3. Respiratory organs : gills, lung, air sac in birds.

UNIT – 02

1. Endoskeleton – limbs, girdles and vertebrae.
2. Circulatory system – Evolution of heart, aortic arches.
3. Urinogenital system – kidney and excretory ducts.

UNIT – 03

1. Nervous system – general plan of brain and spinal cord.
2. Endocrine glands – classification and histology.
3. Gonads and genital ducts.

UNIT – 04

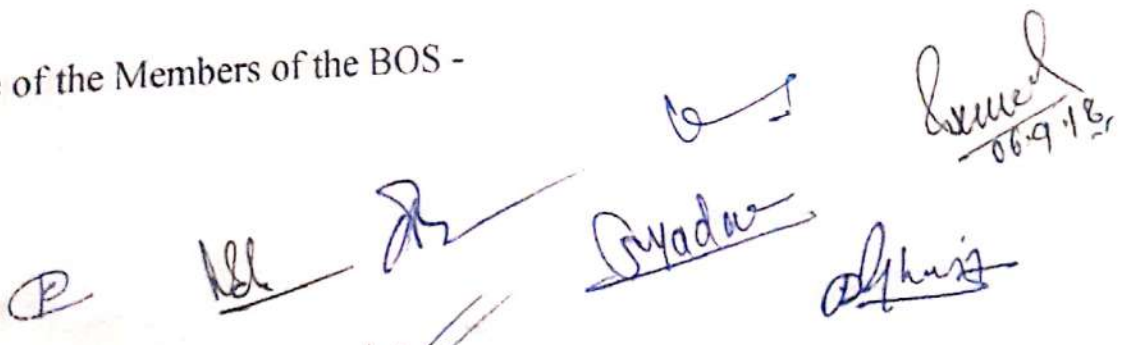
Physiology

1. Digestion and absorption of dietary components.
2. Physiology of heart, cardiac cycle and ECG.
3. Blood coagulation.
4. Respiration – mechanism.

UNIT – 05

1. Excretion – physiology of excretion, Osmoregulation.
2. Physiology of muscle contraction.
3. Physiology of nerve impulse.
4. Ear and eye – structure and function.

Signature of the Members of the BOS -

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Code - 19005 -

(VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY, BEHAVIOUR,
EVOLUTION & APPLIED ZOOLOGY)

UNIT – 01

1. General characters of hormones.
2. Hormone receptor.
3. Biosynthesis and secretion of Thyroid, Adrenal, Ovarian and Testicular hormones.
4. Endocrine disorders due to hormones and other glands.

UNIT – 02

1. Reproductive cycle in vertebrate.
2. Menstruation, Lactation and Pregnancy.
3. Mechanism of Parturition.
4. Hormonal regulation of Gametogenesis.
5. Extra embryonic membrane.

UNIT – 03

1. Evidences of organic evolution.
2. Theories of organic evolution.
3. Variation, Mutation, Isolation and Natural selection.
4. Evolution of horse.

UNIT – 04

1. Introduction to Ethology.
2. Patterns of Behavior, Taxis, Reflexes, Drives and Stereotyped behavior.
3. Reproductive behavioral patterns.
4. Hormones, Drugs and Behavior.

UNIT – 05

1. Aquaculture.
2. Sericulture.
3. Apiculture.
4. Pisciculture.
5. Elements of Pest Control : i) Chemical control b) Biological control



K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

SCHEME OF ZOOLOGY PRACTICAL EXAM

SEMESTER III & IV 2018-19 & 2019-20

Duration – 2:30 Hours

Maximum marks – 50

Code – 19006

Pass marks : 17

- | | |
|---|----------|
| 1. Nervous system of Scoliodon by clay modeling - | 10 Marks |
| 2. Study of Homologous & Analogous organs - | 05 Marks |
| 3. Mounting – (Placoid, Cycloid, Ctenoid scales,) | 04 Marks |
| 5. Exercise based on Applied zoology - | 05 Marks |
| i) Identification of Labeo, Catla & Mrigal fish & fish seed | |
| ii) Life cycle of Silkworm, Silkworm diseases | |
| iii) Life cycle of Honeybee, Individuals of Honey bee. | |
| 6. Spots (slides-4, specimen-2, bones-2) | 16 Marks |
| 7. Viva - | 05 Marks |
| 8. Sessional (project work, Practical record) | 05 Marks |

Note – Virtual dissection in place of animal dissection.

Signature of the members of B.O.S-

Date : 06.9.2018

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Wandy
Syadav
Ar. K. R. Sahu
Ar.
B.
Ar.
Ar.
06.9.18

Code - 19007

(ECOLOGY, ENVIRONMENTAL BIOLOGY, TOXICOLOGY, MICROBIOLOGY
AND MEDICAL ZOOLOGY)

UNIT - 01 : ECOLOGY

1. Aims and scopes of Ecology.
2. Major ecosystem of the world – brief introduction.
3. Population – characters and regulation of densities.
4. Communities and Ecosystem.
5. Biogeochemical cycle.
6. Air and Water pollution.
7. Ecological succession.

UNIT - 02 : ENVIRONMENTAL BIOLOGY

1. Law of limiting factors.
2. Food chain in a freshwater ecosystem.
3. Energy flow in ecosystem – Trophic level.
4. Conservation of Natural resources.
5. Environmental Impact Assessment.

UNIT - 03 : TOXICOLOGY

1. Definition of Toxicity.
2. Classification of toxins.
3. Principle of systematic toxicology.
4. Toxic agents and their action – Metallic and inorganic agents.
5. Animal poison – Snake venom, Scorpion and Bee poisoning.
6. Food poisoning

UNIT - 04 : MICROBIOLOGY

1. General and Applied microbiology.
2. Microbiology of Domestic water and Sewage.
3. Microbiology of milk and milk products.
4. Industrial microbiology.

UNIT - 05 : MEDICAL ZOOLOGY

1. A brief introduction to pathogenic micro-viruses, Rickettsial, Spirochaetes and Bacteria.

PTO -

2. Brief account of life history, pathogenicity of the following pathogens with reference to Man, Prophylaxis and Treatment –
- Pathogens Protozoans – Entamoeba histolytica, Trypanosoma
 - Pathogenic helminthes – Schistosoma.
 - Pathogenic nematode parasites of man.
3. Vector insects.


SUGGESTED READINGS


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- Prof. Vinita Pandey
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- Mr. Devendra Khandait
- Ms. Sangeeta Yadav

Signature


06.9.18











Date of Meeting
06.9.2018

Head of the department
Dr. Ramesh Kumar Tamboli

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER –VI Session: 2018-19& 2019-20

ZOOLOGY

Paper : Pass Course

Max. marks:80

Pass marks:21

Lectures:45

Code - 19008

(GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUE)

UNIT – 01 : GENETICS

1. Linkage and linkage maps.
2. Variation of gene expression – Multiple alleles; Lithogenesis; Pleiotropic genes; gene interaction; epistasis.
3. Sex chromosome systems and sex-linkage.
4. Mutation and chromosomal alterations, meiotic consequences.
5. Human genetics – chromosomal and single gene disorders (somatic cell genetics)

UNIT – 02 : CELL PHYSIOLOGY

1. General idea about pH and Buffer.
2. Transport across membranes – cell membrane; Mitochondria.
3. Active transport and its mechanism; active transport in Mitochondria and Endoplasmic reticulum.
4. Hydrolytic enzymes- their chemical nature, Activation and specificity.

UNIT – 03 : BIOCHEMISTRY

1. Amino acids and Peptides – Basic structure and biological function.
2. Carbohydrate and its metabolism- Glycogenesis, Glyconeogenesis, Glycolysis, Glycogenolysis, Cori cycle.
3. Lipid metabolism- Oxidation of glycerol, oxidation of fatty acid.
4. Protein metabolism- Deamination, Transamination, Transethylation. Biosynthesis of Protein.

UNIT – 04 : BIOTECHNOLOGY

1. Biotechnology – scope and importance.
2. Recombinant DNA and gene cloning.
3. Application of biotechnology in –
 - i) Pharmaceutical industry
 - ii) Food processing industry

PTO-

UNIT - 05 : BIOTECHNIQUES

1. Principle and technique of pH meter, Colorimeter.
2. Microscopy- Light microscopes, phase contrast and electron microscope.
3. Centrifuge.
4. Separation of biomolecules by chromatography and.
5. Histochemical methods for determination of Protein, Lipid and Carbohydrate.

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.
2. Dr. Kanti Choubey
3. Dr. Dhananjay Mishra
4. Dr. K. R. Sahu
5. Mr. Kamal Jindal
6. Prof. Anita Pandey
7. Prof. Vinita Pandey
8. Prof. Ranjana Sahu
9. Mr. Devendra Khandait
10. Ms. Sangeeta Yadav

Signature

Ramesh Kumar Tamboli
06.9.18

Kanti Choubey

Dhananjay Mishra

Anita Pandey

Ranjana Sahu

Devendra Khandait

Date of Meeting
06.9.2018

Head of the department
Dr. Ramesh Kumar

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

PRACTICAL WORK

SEMESTER - V & VI 2018-19 & 2019-20 Code - 19009

1. Estimation of population density, percentage frequency . Analysis of Producer & Consumer in Grassland.
2. Analysis of producers and consumers in grassland/aquatic Ecosystem.
3. Detection of gram positive and gram negative bacteria.
4. Haematological exercise -
 - i) Blood group detection (A,B,AB,O).
 - ii) R.B.C. count.
 - iii) W.B.C. count.
 - iv) Blood film preparation
 - v) Preparation of Heamatin crystals from blood.
 - vi) Haemoglobin %
6. Chromatography – paper or gel.
7. Biochemical detection of carbohydrate, protein and lipid.
10. Study of permanent slides of parasites based on theory paper.
(Entamoeba histolytica, Trypanosoma, Plasmodium, Georgia)
11. Working principles of colorimeter, centrifuge and microscopes.

Signature of the Members of the BOS –

Date : 06.9.2018






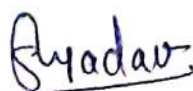

Dr. K. P. Sahu




06.9.18



Mrs Kanjana Sahu 





K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER – I Session: 2016-17 & 2017-18

ZOOLOGY

(Invertebrate & Cell Biology)

Paper : Pass Course

Max. marks:60

Pass marks:21

Lectures:45

code - 19001

UNIT – 01

1. Classification of non-chordates up to orders with examples.
2. Protozoa – type study Paramecium, Protozoa and diseases.
3. Porifera – type study Sycon.
4. Coelenterate – type study Obelia.

UNIT – 02

1. Helminthes – type study Fasciola .
2. Annelida – type study Earthworm.
3. Arthropoda – type study Palaemon.

UNIT – 03

1. Mollusca – type study Pila.
2. Echinodermata – type study Asterias (external features, water vascular system)
3. Hemichordata – type study Balanoglossus.

UNIT – 04

1. Study of principles and applications of light and electron microscope.
2. The Cell (Prokaryotic and eukaryotic).
3. Ultra structure and function of the following –
 - i. Plasma membrane
 - ii. Mitochondria
 - iii Endoplasmic reticulum
 - iv. Ribosomes
 - v. Golgi complex

UNIT – 05

1. Nucleus – with reference to nuclear membrane, nucleoplasm, nucleolus.
2. Chromosome – morphology, types, organization, giant chromosomes.
3. Cell reproduction – amitosis, mitosis, meiosis.
4. Elementary idea of cancer & its types, causative agents of cancer.

Name

Signature

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ZOOLOGY

(Vertebrate & Embryology)

Paper : Pass Course

Max. marks: 60

Pass marks: 21

Lectures: 45

code - 19002

UNIT – 01

1. Origin and classification of chordates up to orders with examples.
2. Cephalochordata – type study Amphioxus.
3. Comparison between Petromyzon & Myxine.

UNIT – 02

1. Fishes – scales, Migration, Parental care.
2. Amphibia – Parental care, Neoteny.
3. Reptilia – Poisonous & non-poisonous snakes of India, Biting mechanism, Snake venom.

UNIT – 03

1. Aves – Flight adaptation, Discus birds are glorified reptiles.
2. Mammals – Comparative account of Prototheria, Metatheria and Eutheria and affinities.

UNIT – 04

1. Gametogenesis.
2. Fertilization.
3. Parthenogenesis.
4. Development of frog up to formation of three germ layers.

UNIT – 05

1. Development of chick up to formation of three germ layers.
2. Extra embryonic membranes in chick.
3. Placenta in mammals.
4. Embryonic induction organizer and differentiation.

Members of the BOS -

Signature

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festo
Dr. R. Pandey
22/3/17

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

SCHEME OF ZOOLOGY PRACTICAL EXAM

SEMESTER I & II

code - 12003

Duration – 2:30 Hours

Maximum marks – 50

Pass marks : 17

1. Embryological exercise (blastodisc in hen's egg)	05 Marks
2. Study of parasitic protozoan	05 Marks
3. Mounting	04 Marks
4. Diagrammatic presentation	05 Marks
4. Cytological exercise	05 Marks
5. Spots (slides-4, specimen-2, bones-2)	16 Marks
6. Sessional (project work, Practical record)	10 Marks

Note – Virtual dissection in place of animal dissection.

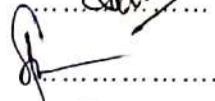
Name of the members of the B.O.S.

Signature

1. Dr. Ramesh Kumar Tamboli.



2. Dr. Sanjay Thiske



3. Dr. Dhananjay Mishra



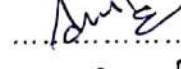
4. Prof. Rashmi Patel



5. Mr. Kamal Jindal



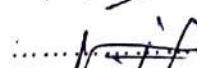
6. Prof. Anita Pandey



7. Prof. Vinita Pandey



8. Mr. Vijay Kante



9. Ms. Pooja Sao



Date of Meeting

Head of the department

08.12.2016

Name – Dr. Ramesh Kumar Tamboli





 22/3/17

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER – III Session: 2016-17 & 2017-18

ZOOLOGY

(Anatomy & Physiology)

Paper : Pass Course

Max. marks:80

Pass marks:21

Lectures:45

Code - 19004

UNIT – 01

Comparative anatomy of various organs and systems –

1. Integument and its derivatives, structure of scales, hair and feathers.
2. Alimentary canal and digestive glands in vertebrates.
3. Respiratory organs : gills, lung, air sac in birds.

UNIT – 02

1. Endoskeleton – limbs, girdles and vertebrae.
2. Circulatory system – Evolution of heart, aortic arches.
3. Urinogenital system – kidney and excretory ducts.

UNIT – 03

1. Nervous system – general plan of brain and spinal cord.
2. Endocrine glands – classification and histology.
3. Gonads and genital ducts.

UNIT – 04

Physiology

1. Digestion and absorption of dilatory components.
2. Physiology of heart, cardiac cycle and ECG.
3. Blood coagulation.
4. Respiration – mechanism.

UNIT – 05

1. Excretion – physiology of excretion, Osmoregulation.
2. Physiology of muscle contraction.
3. Physiology of nerve impulse.
4. Ear and eye – structure and function.

Signature of the Members of the BOS -

Handwritten signatures of the members of the BOS. The signatures are in various colors (black, blue, red) and some include dates like 01/12/16 and 22/3/17.

ZOOLOGY

Paper : Pass Course

Max. marks:80

Pass marks:21

Lectures:45

19005

(VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY, BEHAVIOUR, EVOLUTION & APPLIED ZOOLOGY)

UNIT – 01

1. General characters of hormones.
2. Hormone receptor.
3. Biosynthesis and secretion of Thyroid, Adrenal, Ovarian and Testicular hormones.
4. Endocrine disorders due to hormones and other glands.

UNIT – 02

1. Reproductive cycle in vertebrate.
2. Menstruation, Lactation and Pregnancy.
3. Mechanism of Parturition.
4. Hormonal regulation of Gametogenesis.
5. Extra embryonic membrane.

UNIT – 03

1. Evidences of organic evolution.
2. Theories of organic evolution.
3. Variation, Mutation, Isolation and Natural selection.
4. Evolution of horse.

UNIT – 04

1. Introduction to Ethology.
2. Patterns of Behavior, Taxis, Reflexes, Drives and Stereotyped behavior.
3. Reproductive behavioral patterns.
4. Hormones, Drugs and Behavior.

UNIT – 05

1. Aquaculture.
2. Sericulture.
3. Apiculture.
4. Pisciculture.
5. Elements of Pest Control : i) Chemical control b) Biological control

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K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

SCHEME OF ZOOLOGY PRACTICAL EXAM

SEMESTER III & IV 2016-17 & 2017-18

Duration – 2:30 Hours

Maximum marks – 50

19006

Pass marks : 17

-
1. Rate of Oxygen consumption in animals - 05 Marks
 2. Study of Homologous & Analogous organs - 04 Marks
 3. Blood exercise - 04 Marks
 - i) Hematin crystal (Fish, Fowl, Goat, Own)
 4. Mounting – (Placoid, Cycloid, Ctenoid scales, feather) 06 Marks
 5. Exercise based on Applied zoology - 05 Marks
 - i) Identification of Labeo, Catla & Mrigal fish & fish seed
 - ii) Life cycle of Silkworm, Silkworm diseases
 - iii) Life cycle of Honeybee, Individuals of Honey bee.
 6. Spots (slides-4, specimen-2, bones-2) 16 Marks
 7. Viva - 05 Marks
 8. Sessional (project work, Practical record) 05 Marks

Note – Virtual dissection in place of animal dissection.

Signature of the members of B.O.S-

Date : 08.12.2016

Mandley
Pooja
Vijay
Pradeep
8/12/16
22/3/17

ZOOLOGY

Paper : Pass Course

Max. marks:80

Pass marks:21

Lectures:45

Code - 19007

(ECOLOGY, ENVIRONMENTAL BIOLOGY, TOXICOLOGY, MICROBIOLOGY AND MEDICAL ZOOLOGY)

UNIT - 01 : ECOLOGY

1. Aims and scopes of Ecology.
2. Major ecosystem of the world – brief introduction.
3. Population – characters and regulation of densities.
4. Communities and Ecosystem.
5. Biogeochemical cycle.
6. Air and Water pollution.
7. Ecological succession.

UNIT - 02 : ENVIRONMENTAL BIOLOGY

1. Law of limiting factors.
2. Food chain in a freshwater ecosystem.
3. Energy flow in ecosystem – Trophic level.
4. Conservation of Natural resources.
5. Environmental Impact Assessment.

UNIT - 03 : TOXICOLOGY

1. Definition of Toxicity.
2. Classification of toxins.
3. Principle of systematic toxicology.
4. Toxic agents and their action – Metallic and inorganic agents.
5. Animal poison – Snake venom, Scorpion and Bee poisoning.
6. Food poisoning

UNIT - 04 : MICROBIOLOGY

1. General and Applied microbiology.
2. Microbiology of Domestic water and Sewage.
3. Microbiology of milk and milk products.
4. Industrial microbiology.

UNIT - 05 : MEDICAL ZOOLOGY

1. A brief introduction to pathogenic micro-viruses, Rickettsial, Spirochaetes and Bacteria.

2. Brief account of life history, pathogenicity of the following pathogens with reference to Man, Prophylaxis and Treatment –
- Pathogens Protozoans – Entamoeba histolytica, Trypanosoma
 - Pathogenic helminthes – Schistosoma.
 - Pathogenic nematode parasites of man.
3. Vector insects.

SUGGESTED READINGS

- Colinvaux, P. A. (1993). *Ecology*. II Edition. Wiley, John and Sons, Inc.
- Krebs, C. J. (2001). *Ecology*. VI Edition. Benjamin Cummings.
- Odum, E.P., (2008). *Fundamentals of Ecology*. Indian Edition. Brooks/Cole
- Robert Leo Smith Ecology and field biology Harper and Row publisher
- Ricklefs, R.E., (2000). *Ecology*. V Edition. Chiron Pres

Name of the members of the B.O.S.

- Dr. Ramesh Kumar Tamboli.
- Dr. Sanjay Thiske
- Dr. Dhananjay Mishra
- Prof. Rashmi Patel
- Mr. Kamal Jindal
- Prof. Anita Pandey
- Prof. Vinita Pandey
- Mr. Vijay Kante
- Ms. Pooja Sao

Signature

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Date of Meeting

08.12.2016

.....

Head of the department

Name – Dr. Ramesh Kumar Tamboli

.....

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH (C. G.)

B. Sc. ZOOLOGY – SEMESTER : V

Paper : Choice Based Course - A

Session 2016-2017 & 2017-18

WILD LIFE CONSERVATION AND MANAGEMENT

(CREDITS: THEORY-3)
LECTURES: 45

Code - 19007-A

Max. Marks : 60
Min. Pass Marks : 21

Unit 1:

Wild life - Values of wild life - positive and negative; Our conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies. Habitat analysis, Evaluation and management of wild life - Physical parameters: Topography, Geology, Soil and water; Biological Parameters: food, cover, forage, browse and cover estimation; Standard evaluation procedures: remote sensing and GIS.

Unit 2:

Management of habitats - Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity.

Unit3:

Population estimation: Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores: Faecal samples, slide preparation, Hair identification, Pug marks and census method.

Unit 4:

National Organizations involved in wild life conservation; Elementary idea of Wild life Legislation - Wild Protection act - 1972, its amendments and implementation. Management of excess population & translocation; Bio- telemetry; Care of injured and diseased animal; Quarantine; Common diseases of wild animal

Unit 5

Protected areas National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve. Management planning of wild life in protected areas; Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence;

PRACTICALS (CREDITS: PRACTICALS-2)

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
4. Demonstration of different field techniques for flora and fauna
5. PCQ, Ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences).

22/3/17

Unit 1: Bee-keeping and Bee Economy (Apiculture)

Varieties of honey bees and Bee pasturage; Setting up an apiary: Langstroth's/Newton's hive, bee veil, brood and storage chambers, iron frames and comb sheets, drone excluder, rearing equipments, handling of bees, artificial diet; Diseases of honey bee, American and European Foulbrood, and their management; Honey extraction techniques; Physico-chemical analysis of honey; Other beneficial products from bee; Visit to an Apiculture Institute and honey processing Units

Unit 2: Silk and Silk Production (Sericulture)

Different types of silk and silkworms in India; Rearing of *Bombyx mori* – Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles, and their management; Silk reeling techniques, Quality assessment of silk fibre

Unit 3: Aquaculture

Brood stock management; Induced breeding of fish and prawn; Management of hatchery of fish, Management of nursery, rearing and stocking ponds, Preparation and maintenance of fish aquarium, Preparation of compound diets for fish; Role of water quality in aquaculture, Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish, Fishery by-products

Unit 4: Poultry Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing, Commercial importance of poultry farming; Varietal improvement techniques; Diseases and their management; poultry farm management and business plan; Visit to any Poultry Poultry farm.

Unit 5: Dairy Farming

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing, Commercial importance of dairy farming; Varietal improvement techniques; Diseases and their management, Dairy farm management and business plan; Visit to any Dairy farm.

SUGGESTED READINGS

1. Prost, P. J. (1962). *Apiculture*. Oxford and IBH, New Delhi.
2. Sericulture, *FAO Manual of Sericulture*.
3. Hafez, E. S. E. (1962). *Reproduction in Farm Animals*, Lea and Fabiger Publishers.
4. Srivastava, C. B. L. (1999). *Fishery Science and Indian Fisheries*. Kitab Mahal publications, India.
5. Sardar Singh, *Beekeeping in India*, Indian council of Agricultural Research, New Delhi.
6. Dhyan Singh Bisht, *Apiculture*, ICAR Publication.
7. Knobil, E. and Neill, J. D. (2006). *The Physiology of Reproduction*, Vol. 2, Elsevier Publishers.

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K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH (C. G.)

B. Sc. ZOOLOGY – SEMESTER : V

Paper : Choice Based Course – C

Session 2016-2017 & 2017-18

AQUACULTURE

(CREDITS: THEORY-3)

LECTURES: 45

code - 19007-C

Max. Marks : 60

Min. Pass Marks : 21

UNIT – 1

1. Aquaculture and its importance.
2. Principle cultivable fishes.
3. Fish farming- planning, construction and maintenance of fish farm.
4. Pond management

UNIT – 2

1. Types of fish culture.
2. Composite fish culture.
3. Fish culture in sewage water.
4. Fish culture in paddy fields.
5. Prawn culture.

UNIT – 3

1. Induced breeding.
2. Identification of male and female brooders.
3. Chinese hatcheries structure.
4. Transport of fish seed.

UNIT – 4

1. Fish diseases : bacterial, viral and parasitic.
2. Aquatic weeds and their role in aquaculture.
3. Aquatic insects and their control.
4. Water pollution and their effect on aquaculture.

UNIT – 5

1. Preservation and processing of harvested fish.
2. Economic importance of fish.
3. Fish by-products.
4. Larvivorous fishes.
5. Marketing of fish.

SUGGESTED READINGS :

1. Freshwater Aquaculture, R. K. Rath, Scientific publishers (India), Jodhpur.
2. Freshwater Aquaculture in India, S. D. Tripathi.
3. An Introduction to Fishes, S. S. Khanna.
4. Fish and fisheries, Kamleshwar Pandey, Rastogi Publication, Meerut (India).

Date : 08.12.2016

Signature of the members of the BOS -

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Signature 2: [Signature] 8/12/16
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(Credits: Practical – 2)

19007-D

Maximum Marks : 50

Min. Pass Marks : 17

Duration : 2:30 Hours

1. Study of freshwater cultivable fishes
2. Study of aquatic weeds
3. Study of aquatic insects
4. Study of air breathing freshwater fishes
5. Study of brooders
6. Study of fish seeds
7. Scales of fishes
8. Study of Chinese hatcheries
9. Study of common Fish diseases
10. Study of cultivable Prawn species
11. Study of appendages of prawn
12. Study of sexual dimorphism of prawn.

SCHEME OF MARKS

- | | |
|--|----------|
| 1. Identification of freshwater fishes – (any 2) | 10 marks |
| 2. Identification of male and female fish brooders/Prawn | 04 marks |
| 3. Mounting of Scales | 05 marks |
| 4. Spotting – (museum-2, slides-2, weeds-2, insects-2) | 16 marks |
| 5. Project – collection & photograph of fish, weeds, insects | 10 marks |
| 6. Sessional- | 05 marks |

Name of the members of the B.O.S.

Signature

Date : 08.12.2016


1. Dr. Ramesh Kumar Tamboli.


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2. Dr. Sanjay Thiske


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3. Dr. Dhananjay Mishra


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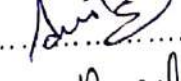
4. Prof. Rashmi Patel


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5. Mr. Kamal Jindal


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6. Prof. Anita Pandey


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7. Prof. Vinita Pandey


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8. Mr. Vijay Kante


.....

9. Ms. Pooja Sao


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K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

B. Sc. SEMESTER –VI Session: 2016-17& 2017-18

ZOOLOGY

Paper : Pass Course

Max. marks:80

Code - 19008

Pass marks:21

Lectures:45

(GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUE)

UNIT – 01 : GENETICS

1. Linkage and linkage maps.
2. Variation of gene expression – Multiple alleles; Lithogenesis; Pleiotropic genes; gene interaction; epistasis.
3. Sex chromosome systems and sex-linkage.
4. Mutation and chromosomal alterations, meiotic consequences.
5. Human genetics – chromosomal and single gene disorders (somatic cell genetics)

UNIT – 02 : CELL PHYSIOLOGY

1. General idea about pH and Buffer.
2. Transport across membranes – cell membrane; Mitochondria.
3. Active transport and its mechanism; active transport in Mitochondria and Endoplasmic reticulum.
4. Hydrolytic enzymes- their chemical nature, Activation and specificity.

UNIT – 03 : BIOCHEMISTRY

1. Amino acids and Peptides – Basic structure and biological function.
2. Carbohydrate and its metabolism- Glycogenesis, Glyconeogenesis, Glycolysis, Glycogenolysis, Cori cycle.
3. Lipid metabolism- Oxidation of glycerol, oxidation of fatty acid.
4. Protein metabolism- Deamination, Transamination, Transethylation. Biosynthesis of Protein.

UNIT – 04 : BIOTECHNOLOGY

1. Biotechnology – scope and importance.
2. Recombinant DNA and gene cloning.
3. Cloned genes and other tools of biotechnology.
4. Application of biotechnology in –
i) Pharmaceutical industry ii) Food processing industry

Cont. on page -2

UNIT - 05 : BIOTECHNIQUES

1. Principle and technique of pH meter, Colorimeter.
2. Microscopy- Light microscopes, phase contrast and electron microscope.
3. Centrifuge.
4. Separation of biomolecules by chromatography and.
5. Histochemical methods for determination of Protein, Lipid and Carbohydrate.

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.

2. Dr. Sanjay Thiske

3. Dr. Dhananjay Mishra

4. Prof. Rashmi Patel

5. Mr. Kamal Jindal

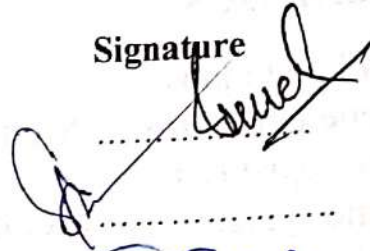
6. Prof. Anita Pandey

7. Prof. Vinita Pandey

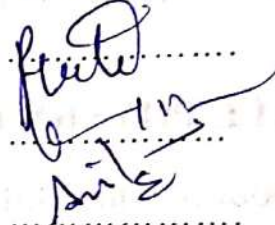
8. Mr. Vijay Kante

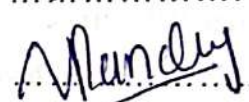
9. Ms. Pooja Sao

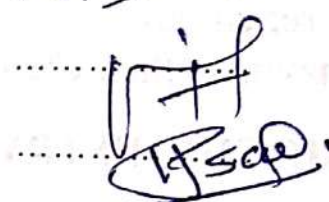
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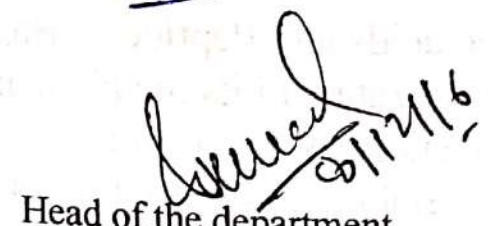










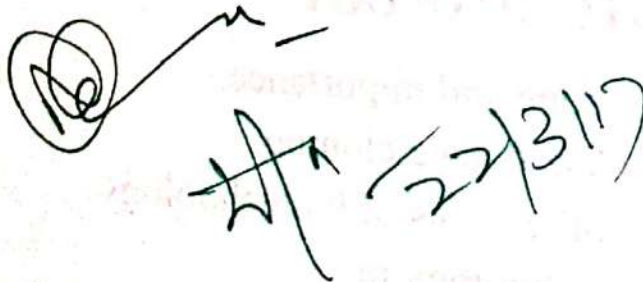


Date of Meeting

08.12.2016

Head of the department

Name - Dr. Ramesh Kumar Tamboli



K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE RAIGARH

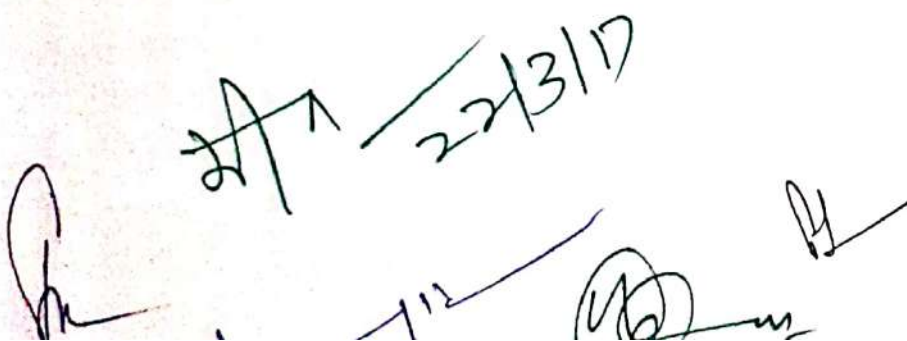
PRACTICAL WORK

SEMESTER - V & VI 2016-17 & 2017-18 Code - 19009

1. Estimation of population density, percentage frequency . Analysis of Producer & Consumer in Grassland.
2. Analysis of producers and consumers in grassland/aquatic Ecosystem.
3. Detection of gram positive and gram negative bacteria.
4. Haematological exercise -
 - i) Blood group detection (A,B,AB,O).
 - ii) R.B.C. count.
 - iii) W.B.C. count.
 - iv) Blood film preparation
 - v) Preparation of Heamatin crystals from blood of rat.
 - vi) Haemoglobin %
5. Observation of Drosophila wild and mutant.
6. Chromatography – paper or gel.
7. Colorimetric estimation of haemoglobin /glucose/KMnO₄.
8. Mitosis in onion root tip.
9. Biochemical detection of carbohydrate, protein and lipid.
10. Study of permanent slides of parasites based on theory paper.
(Entamoeba histolytica, Trypanosoma, Plasmodium, Georgia)
11. Working principles of colorimeter, centrifuge and microscopes.

Date : 08.12.2016

Signature of the Members of the BOS –

Handwritten signatures of the members of the BOS, including a date '22/3/17' written above one of the signatures.

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K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2018-19 & 2019-20

SEMESTER - III PAPER - I

Code : 1909

COMPARATIVE ANATOMY OF VERTEBRATES

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. Origin of Chordata.
2. Origin of vertebrates :
 - a. Amphibia
 - b. Reptiles
 - c. Birds
 - d. Mammals
3. Vertebrate integument and its derivatives :
 - a. General structure and function of skin
 - b. Derivatives - Scales, feathers, hair and gland
4. Comparison of Stomach in Mammals.
5. Circulatory system :
 - a. Evolution of heart.
 - b. Evolution of aortic arches.
6. Respiratory system : Gill and lung.
7. Skeletal system :
 - a. Skull of reptiles and its significance.
 - b. Types of skull in Birds.
 - c. Girdles of amphibian, Reptiles, Birds and Mammals.
8. Nervous system : Comparative account of brain in vertebrates.
9. Comparative account of Ratitae and Carinates.
10. Comparative account of Cetacea and Sirenia.

REFERENCE BOOKS -

1. Alexander, R.M. The Chordata. Cambridge University Press, London.
2. Kingsley, J.S. Outlines of comparative Anatomy of Vertebrates. Central Book Depot. Allahabad.
3. Kent, C.G. Comparative Anatomy of Vertebrates.
4. Sedgwick, A.A Student text book of Zoology, vol ii
5. Young, J.Z. Life of Vertebrates. The Oxford University Press, London.

Signature of the Members of the BOS -

Date : 06.09.2018

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06.9.18
P *all* *Prasad* *Mamdy* *VS* *Shankar*

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2018-19 & 2019-20

SEMESTER – III PAPER – II

Code: 1910

BIOLOGY OF VERTEBRATES IMMUNE SYSTEM

Time : 3 hours

Max. Marks : 80

Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. Innate and acquired immunity.
2. Cells and organs of immune system :
 - a. Organization & structure of lymphoid organs.
 - b. Cells of the immune system & their differentiation.
3. Nature of antigens :
 - a. Antigenicity & Immunogenicity
 - b. Factors influencing immunogenicity
 - c. Antigenic determinates / epitops and haptens
4. Antibodies (Immunoglobulin's) :
 - a. Structure and function of antibodies
 - b. Immunoglobulin classes and subclasses
5. Antigen – Antibody interaction.
6. β cell maturation, activation and differentiation :
 - a. B cell receptors
 - b. B cell activation and proliferation
 - c. Humoral immune response kinetics.
7. T cell maturation, activation and differentiation :
 - a. T cell receptors
 - b. T cell activation and proliferation
 - c. T cell immune response
8. Cytokines :
 - a. General properties of Cytokines
 - b. Structure and function
9. Compliment system :
 - a. Compliment component
 - b. Regulation of compliment system
 - c. Compliment deficiencies
10. Major and minor histo-compatibility complex :
 - a. MHC haptotypes
 - b. Structure of MHC molecule
 - c. Peptide interaction with MHC molecule
 - d. MHC and susceptibility to infectious disease.
11. Hypersensitivity and immune response to infection agents specially intra-cellular parasites
12. Vaccine – impact on Immunity.

Signature of the Members of the BOS -

Date : 06.5.18

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SEMESTER – III PAPER – III
GAMETE BIOLOGY AND REPRODUCTIVE PHYSIOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **Sex differentiation and development :**
 - a. Chromosomal (genetic) basics of sex determination
 - b. Gonadal sex
 - c. Phynotypic (differentiation of external genitalia)
2. **Reproductive cycle :**
 - a. Adrenarche
 - b. Purbaechi and Puberty
 - c. Menarche and Menstruation
 - d. Menopause
3. **The male reproductive system :**
 - a. Morphology, Anatomy and function of male reproductive system
 - b. Spermatogenesis and development of spermatozoa
 - c. Composition of semen, Biochemistry of semen
4. **Endocrine function of Testis :**
 - a. Endocrine control of testicular function
 - b. Biosynthesis and chemistry of androgen
 - c. Secretion, transport and function of testicular hormone
 - d. Secondary sexual characteristics
5. **Female reproductive system :**
 - a. Morphology, Anatomy and function of female reproductive system
 - b. Oogenesis and development of ova
 - c. Biosynthesis, chemistry and function of Esrogen, Progesteron, Relaxin.
 - d. Control and abnormalities of ovarian function
6. **Fertilization :**
 - a. Pre-fertilization event
 - b. Biochemistry of fertilization
 - c. Post fertilization
7. **Endocrinology of :**
 - a. Pregnancy
 - b. Parturition
 - c. Lactation
8. **Development of Placenta and its function.**
9. **Contraceptive techniques :**
 - a. Physical barriers
 - b. Surgical methods
 - c. Hormonal methods
 - d. I.U.C.D.
10. **Methods of Cryopreservation – Sperms, Ova and Zygote**

Signature of the Members of the BOS -

Date : 06.09.2018

The image shows several handwritten signatures in blue ink. From left to right, there are approximately seven distinct signatures. Some are simple scribbles, while others are more legible, such as 'Nanday' and 'Sudhar'.

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2018-19 & 2019-20

SEMESTER – III PAPER – IV

Code : 1912

POPULATION GENETICS AND EVOLUTION

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

POPULATION GENETICS :

1. The hardy-Weinberg Law :

- Gene frequency
- Genotype frequency
- Gene pool
- Hardy – Weinberg law – i) Random union of Gametes ii) Random mating among Genotype
- Hardy – Weinberg equilibrium

2. A detail account of destabilizing forces/factors :

- Natural selection
- Mutation
- Genetic drift / Random drift
- Migration
- Meiotic drive
- Founder principle

3. Speciation :

- Types of speciation
- Pattern of speciation

4. Molecular clock

EVOLUTION :

5. Theories of organic evolution :

- Lamarckism
- Darwinism
- Modern synthetic theory
- Germplasm theory
- Mutation theory

6. Direct evidences of evolution – Fossils.

7. Indirect evidences of evolution.

8. Isolation

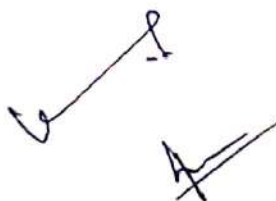
9. Variation

10. Evolution of Man.

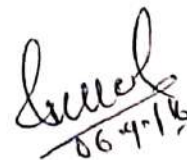
Signature of the Members of the BOS -

Date : 06.09.2018













K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – III

LAB COURSE - V

Code-1921

Session : Session : 2018 - 19 & 2019 - 20

Duration : 5 hours

Max. Marks : 100

Ex.1 Study of 5,7,9,10 Cranial nerves of Scoliodon by clay modeling	10 Marks
Ex.2 Study of 5,7,9,10 Cranial nerves of Trygon by clay modeling	10 Marks
Ex.3 Study of Pecten of bird	10 Marks
Ex.4 Slide preparation & its identification	10 Marks
Ex.5 Skull description	10 Marks
Ex.6 Spotting (8 spots), 2½ marks each	20 Marks
Ex.7 Viva	10 Marks
Ex.8 Sessional	20 Marks

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – III

LAB COURSE - VI

Code-1922

Session : Session : 2018 - 19 & 2019 - 20

Duration : 5 hours

Max. Marks : 100

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|---|----|
| 1) Block Preparation | 20 |
| 2) Block cutting & Spreading | 10 |
| 3) (I) Blood Group | 10 |
| (II) Ag-Ab Reaction Broth of Pulser | |
| 4) Chromosomal Study - Slide Preparation Squash Method..... | 10 |
| (I) Onion Root Tip | |
| (II) Testis of Grasshopper | |
| 5) Evolution Study - | 10 |
| (I) Homologous | |
| (II) Analogous | |
| 6) Animal Behavior | 10 |
| Operculum movement of fish in different temperature | |
| 7) Viva | 10 |
| 8) Sessional | 20 |

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5/9/19

Time : 3 hours

Max. Marks : 80

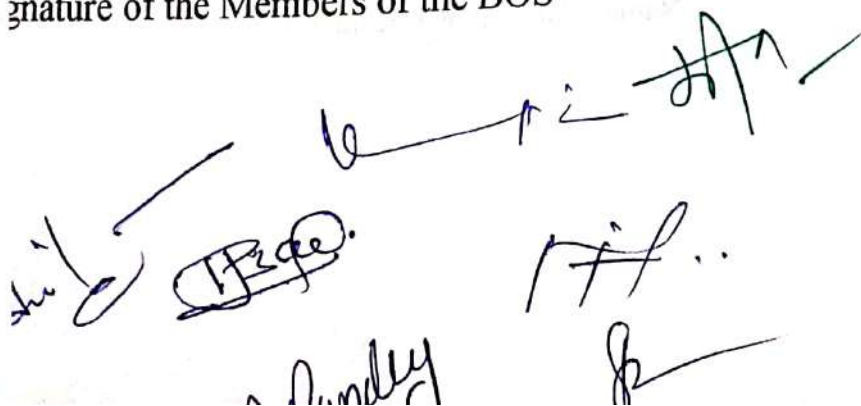
Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

- Outline classification of class Insecta upto orders.
- Head capsule and Head segmentation.
- Structure and function of integument.
- Mouth parts – structure, variation and mechanism of feeding.
- Digestive system and physiology of digestion.
- Respiratory organs & its mechanism in aquatic and terrestrial insects.
- Excretory organs and physiology of excretion.
- Sense organs and perception.
- Nervous system – general plan.
- 1. Male and female reproductive system, Pheromones.
- 2. Endocrine system in insects.
- 3. Metamorphosis in insects.
- 4. Diapause.
- 5. Pest and pest control.
- 6. Arthropod vector.
- 7. Control of insects.

Signature of the Members of the BOS -

Date : 08.12.2016

Handwritten signatures of the members of the Board of Studies (BOS). The signatures are in black ink and include names like 'D. D. D.', 'A. A.', 'B. B.', and 'C. C.'.

Handwritten signature and date. The signature is in black ink and includes the name 'D. D. D.' and the date '08/12/16'.

WILD LIFE ECOLOGY AND CONSRVATION BIOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

POPULATION ECOLOGY –

- 2016
- a) Demographic & life history parameters
 - b) r and k selection
 - c) Life table and age models
 - d) Population dynamics:
 - i. Exponential & logistic growth
 - ii. Density dependent & independent growth
 - iii. Prey – Predatory system.

COMMUNITY ECOLOGY –

- a) Definition and nature of community
- b) Energy flow and material cycle
- c) Inter & Intra-species competition
- d) Community structure
- e) Measurement of diversity and richness

CONSERVATION BIOLOGY –

- a) Ethics of conservation of natural resources
- b) Concept of biodiversity
- c) Causes & factors of mass extinction
- d) Concept of endangered species
- e) In-situ and Ex-situ conservation

NATURAL RESOURCE MANAGEMENT –

- a) Conservation and management of forest & wild life
- b) Conservation projects in India

HABITAT ECOLOGY –

- a) Ecology of major habitat :
 - i. Desert
 - ii. Forest
 - iii. Grassland
- b) Factors affecting the terrestrial habitat :
 - i. Drought
 - ii. Flood
 - iii. Soil erosion
 - iv. Fire
 - v. Grassing

6. **FOREST MANAGEMENT -**
a) Principles of forest management
b) Silviculture system
c) Management of forest fire, weeds

7. **WILD LIFE MANAGEMENT -**
a) Management of zoo animals
b) Common diseases & its control measures

8. **WETLAND CONSERVATION & DEVELOPMENT -**
a) Wetland classification
b) Wetland management

9. **WILD LIFE & FOREST PROTECTION LAW -**
a) Wild life protection Act, 1972
b) Forest law, 1980 & rules, 2003

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.
2. Dr. Sanjay Thiske
3. Dr. Dhananjay Mishra
4. Prof. Rashmi Patel
5. Mr. Kamal Jindal
6. Prof. Anita Pandey
7. Prof. Vinita Pandey
8. Mr. Vijay Kante
9. Ms. Pooja Sao

Signature

Date : 08.12.2016


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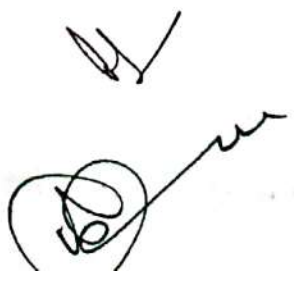
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Date of Meeting

08.12.2016




08/12/16
Head of the department

Name - Dr. Ramesh Kumar Tamboli

MOLECULAR BIOLOGY AND CYTOGENETICS

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

BIOLOGY OF CHROMOSOME -

- a) Eukaryotic chromosome
- b) Giant chromosomes - Lampbrush and Polytene

SEX CHROMOSOME, SEX DETERMINATION, SEX-LINKED INHERITANCE

LINKAGE, CROSSING OVER AND MULTIPLE ALLELES

CELL FUSION BY HYBRIDOMA- AGENTS AND MECHANISM OF FUSION

CHROMOSOMAL SYNDROME -

MICROBIAL GENETICS -

- a) Bacterial transformation, Transduction, conjugation bacterial chromosome
- b) Bacteriophage, type, structure of T4 phage & morphogenesis

MOLECULAR CYTOGENETICS TECHNIQUES -

- a) DNA finger printing
- b) Flow cytometry.

TRANSPOSABLE ELEMENTS IN PROKARYOTE AND EUKARYOTE, ROLE OF TRANSPOSABLE ELEMENTS IN GENETIC REGULATION

DNA STRUCTURE AND REPLICATION

RNA STRUCTURE AND FUNCTION

GENETIC CODE

PROTEIN SYNTHESIS IN EUKARYOTE

GENE REGULATION

Signature of the Members of the BOS -

Date : 08.12.2016

(Handwritten signatures and initials)

BIOSTATISTICS AND TOOLS AND TECHNIQUES FOR BIOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **Diagrammatic & graphic presentation of biometric data, uses of computer for presentation of biometric data.**
2. **Biostatistical distribution of data –**
 - a) Mean
 - b) Median
 - c) Mode

T – test, F – test.

Standard deviation.

Chi-square test : degree of freedom, the X^2 test for goodness of fit and association of attributes.

Principle and uses of analytical instrument –

 - a) pH meter
 - b) Colorimeter
 - c) Centrifuge
 - d) Spectrophotometer

Microscopy –

 - a) Principle of light microscope
 - b) Phase contrast microscope
 - c) Fluorescent microscope
 - d) Electron microscope

Chromatography – paper chromatography, thin layer chromatography

Electrophoresis – gel and paper electrophoresis

Immunological techniques based on antigen-antibody interaction.

Microbiological techniques –

 - a) Methods of sterilization
 - b) Culture media, culture method

Cell culture techniques –

 - a) Tissue culture technique
 - b) Application of tissue culture

13. Histological and histochemical techniques for carbohydrate, protein, fat and nucleic acid.
14. Electro physiological method - ECG

Name of the members of the B.O.S.

Signature

Date : 08.12.20

1. Dr. Ramesh Kumar Tamboli.

Ramesh

2. Dr. Sanjay Thiske

Sanjay

3. Dr. Dhananjay Mishra

Dhananjay

4. Prof. Rashmi Patel

Rashmi

5. Mr. Kamal Jindal

Kamal

6. Prof. Anita Pandey

Anita

7. Prof. Vinita Pandey

Vinita

8. Mr. Vijay Kante

Vijay

9. Ms. Pooja Sao

Date of Meeting

08.12.2016

Ramesh
08/12/16
Head of the department

Name - Dr. Ramesh Kumar Tamboli

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – II

LAB COURSE - III

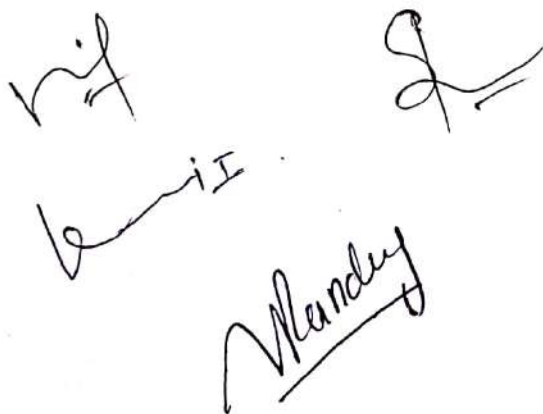
Code-1919

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

Ex.1 Study of nervous system of insects by clay modeling	10 Marks
Ex.2 Study of reproductive system by clay modeling	10 Marks
Ex.3 Study of life cycle of silk moth	10 Marks
Ex.4 Slide preparation mouth parts of insect	10 Marks
Ex.5 Identification of pest of grains	10 Marks
Ex.6 Spotting (8 spots), 2½ marks each	20 Marks
Ex7 Viva	10 Marks
Ex.7 Sessional	20 Marks



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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – II

LAB COURSE - IV

Code-1920

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

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|---|----|
| 1) Determination of unknown concentration A B C D E of a coloured solution by colorimeter ----- | 15 |
| 2) Colour separation by using the paper chromatography..... | 10 |
| 3) Separation of plasma and serum in blood by using centrifuge..... | 10 |
| 4) Calculation mean length value in inch of 10 fish | 05 |
| 5) Calculation of median of given data by using continuous series.... | 05 |
| 6) Calculation of mode of given data | 05 |
| 7) Presentation of data through pie diagram | 05 |
| 8) Spotting | 20 |
| 9) Viva | 10 |
| 7) Sessional | 20 |

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08/12/16



अटल बिहारी वाजपेयी विश्वविद्यालय बिलासपुर

(छत्तीसगढ़)

सेमेस्टर पाठ्यक्रम

M.Sc. ZOOLOGY

SEMESTER-II

PAPER-I

GENERAL AND COMPARATIVE ENDOCRINOLOGY OF VERTEBRATES

Unit 1

• AIMS and scope of endocrinology

Discovery of hormones

Classification of endocrine glands and hormones

Experimental methods of hormones research

• Comparative morphology of Endocrine tissue

Pituitary gland

Thyroid, Adrenal

Gastrointestinal tract

Juxtaglomerular apparatus (kidney)

Unit 2 (15 Lectures)

• Life history of hormones-

Biosynthesis of hormones

- Biosynthesis of simple peptide hormone
 - Biosynthesis of amino acid derived small size hormone (T₃, T₄, epinephrine and nor-epinephrine)
 - Biosynthesis of steroid hormone (cortisol, cortisone, cortico sterone, progesterone)
- Release of hormone from endocrine gland

- Releasing stimuli
- Pulsatile release of hormone
- Releasing mechanism
- Concentration and transport of hormone in the blood
- General mechanism of hormone action

Plasma membrane hormone receptor and its action

Cgksolic hormone receptor and its action

- Termination of hormone action and metabolism of hormone

Unit 3 (15 Lectures)

- Neuro-endocrine system-types of neuro-hormones, synthesis and function of endorphins, enkephalin and hypothalamic hormones



अटल बिहारी वाजपेयी विश्वविद्यालय बिलासपुर

(छत्तीसगढ़)

सेमेस्टर पाठ्यक्रम

M.Sc. ZOOLOGY

• Synthesis, function control and disorder of following endocrine gland hormones

• Pituitary hormones

• Adrenal hormones

• Thyroid and parathyroid hormones

• Gastro-intestinal hormones

• Juxta-glomerular hormones

Unit 4 (15 Lectures)

• Hormonal regulation and its metabolic activity

Role of hormone in –

• Carbohydrate metabolism

• Protein metabolism

• Fat metabolism

• Calcium metabolism

• Role of hormone in fasting

• Hormone & behaviour

• Role of hormone in growth & development

Suggested Reading Materials-

1. General & comparative endocrinology : E.J.W. Barrington, oxford, Clarendon Press
2. Text book of Endocrinology : R.H. Williams, W.B Saunders
3. Endocrine Physiology : C.R Martin, Oxford Univ. Press
4. Comparative endocrinology : A. Gorbman et al, John Wiley and sons
5. Medical Physiology : W.F. Ganong(1981) :10th edition Lange Medical Publications
6. Principles of anatomy and physiology : Torota Grabowski, 9th edition, John Wiley & sons
7. Reproductive Physiology of vertebrates: Van Tienhoven, A,(1983) 2nd edition Cornell Univ.Press,NY
8. The pituitary gland :Imura.H(1994)2nd editionComprehensive Endocrinology revised series Raven, NY
9. Comparative vertebrate endocrinology : Bentley, P.J.(1976),Cambridge Univ. press, Cambridge
10. Comparative vertebrate endocrinological: Bentley, P.J(1976) Cambridge Univ. press, Cambridge
11. Invertebrate endocrinology:D.B. Temblaro,Himalaya Publishing house
12. Endocrinology : Hardley
13. Endocrinology : Negi



अटल बिहारी वाजपेयी विश्वविद्यालय बिलासपुर
(छत्तीसगढ़)
सेमेस्टर पाठ्यक्रम
M.Sc. ZOOLOGY

SEMESTER-II
PAPER-III
MOLECULAR CELL BIOLOGY

Unit 1

- **Biomembranes**
Structure, molecular composition and function of plasma membrane
Specialization of plasma membrane
Transport across cell membrane, diffusion, facilitated diffusion, ion channel, active transport and pumps, Uniports, Symports and Antiports

Unit 2

- **Cytoskeleton-**
Microfilaments and microtubules-structure and dynamics
Role of microtubules in mitosis
Cell movements- intracellular transport role of kinesin and dynein
Signal transduction mechanism
- **Cilia and flagella**

Unit 3

- **Cell cycle and its controlling mechanism check points in cell cycle regulations CDK's and cyclase**
- **Cell-cell Signalling-General Idea**
- **Cell-cell adhesion and communication**
Ca⁺⁺ dependent homophilic cell-cell adhesion
Ca⁺⁺ independent homophilic cell-cell adhesion
- **Cell matrix and adhesion**
Integrins
Collagens
- **Cell organelles**
Structure and function of mitochondria, ribosomes, golgi bodies, endoplasmic reticulum

Unit 4

- **Genome organization**
Morphological and functional elements of Eukaryotic chromosome
Morphology of giant chromosome
DNA- structure, replication and genetic code, RNA-structure, transcription and transposon
- **Intracellular protein traffic**
Protein synthesis on free and bound polysomes
Uptake into E.R
Uptake into mitochondria
- **Biology of cancer**

SEMESTER-II
PAPER-IV
TOOLS AND TECHNIQUES FOR BIOLOGY

Unit 1

- **Principal and use of analytic instruments**
Balances, pH meter, colorimeter, spectrophotometer, ultra centrifuge
- **Microscopy**
Principle of light transmission, Electron (SEM, TEM) phase contrast, Fluorescence,

Unit 2 (15 Lectures)

- **Microbiological techniques**
Media preparation and sterilization
Inoculation and growth monitoring
- **Cell structure techniques**
Design and function of tissue culture laboratory
Culture media preparation
Cell harvesting method
Cell viability testing
Cell proliferation measurements

Unit 3 (15 Lectures)

- **Cryotechniques**
Cryopreservation for cells tissues and organisms
Cryotechniques for light microscopy
Cryotechniques for electron microscopy
- **Immunological techniques based on antigen antibody interactions**
Agglutination and precipitation
• Biosensors

Unit 4 (15 Lectures)

- **Separation techniques in Biology**
Molecular separations by chromatography and its different types
Electrophoresis- paper and gel
Organelle separation by centrifugation
Cell preparation by density gradient, centrifugation affinity adsorption

Suggested Reading materials

- Temperature endocrinology of vertebrates**
1. Dissection of various endocrine glands of vertebrates (Fishes, Amphibians, Reptiles, Birds, Mammals, any available animals/ Virtual)
 2. Dissection of various endocrine glands of insects (Cockroach/any other Insect, any available animals/ Virtual)
 3. Study of microscopic slides of endocrine and related structures
 - o T.S. Pituitary, T.S. of Thyroid, T.S. of Parathyroid, T.S. of Adrenal, T.S. of Testes, T.S. of Ovary, T.S. Thymus, T.S. of Kidney, T.S. of Heart, T.S. of Stomach, T.S. of Intestine
 4. Effect of epinephrine on chromatophores of fishes
 5. Biochemical estimation of cholesterol content in adrenal tissue, glycogen in uterine tissue
 6. Microtomy block preparation, section cutting, stretching and straining Gamete biology and reproductive physiology in human beings
 7. Study of Estrous cycle in mouse or rat
 8. Preparation on Blastodisc of hen's egg
 9. Formation of egg window in chicken egg
 10. Collection of developmental stages of eggs of Lymnea or any gastropod
 11. Collection of developmental stages of insects/ fishes
 12. Study of development stages of frog through slides and whole mounts.
 13. Study of development stages of chick through slides and whole mounts.
 14. Slide preparation (earthworm ovary, amphibian, reptiles, birds and mammals testes & ovary.)

Note-

1. Use of animal for dissection and practical work is subject to the conditions that they are not banned under the wildlife protection act
2. External features and anatomy should be studied by digital techniques and the alternatives. Wherever live animals is studies it should be either pest or culturable species without painning them

SEMESTER-II

PAPER-II

GAMETE BIOLOGY & REPRODUCTIVE PHYSIOLOGY IN HUMAN BEINGS

Unit 1

- **Endocrinology of sex differentiation & judgment-**
 - Chromosomal (genetic) basis of sex determination
 - Gonadal sex
 - Phenotypic sex
 - Brain sex differentiation
- **Reproductive cycle-**
 - Adrenarcho
 - Pubarche and puberty
 - Ovarian cycle
- Formation of ova
- Luteal cycle
- Uterine cycle
- Menstruation cycle
 - Estrous cycle

Unit 2 (15 Lectures)

Male reproductive system-

- Anatomy, physiology and morphology of male reproductive system
- Spermatogenesis and development of spermatozoa
- Biochemistry of semen
- Endocrine function in male-**
 - Endocrine control of testicular function
 - Chemistry and biosynthesis of androgens
 - Secretion transport and metabolism of testis hormone
 - Physiological role of androgens-
- Role in spermatogenesis
- Secondary sex characteristics
- Anabolic function
- Physiological roles of estrogens in male
- Fertility
- Male behaviour
- Epiphyseal fusion

Unit 3 (15 Lectures)

- **Female reproductive system**
 - Anatomy of female reproductive system-
- Ovary
- Fallopian tube
- Uterus
 - Oogenesis
- Ovarian hormones

- Temperature endocrinology of vertebrates**
1. Dissection of various endocrine glands of vertebrates (Fishes, Amphibians, Reptiles, Birds, Mammals, any available animals/ Virtual)
 2. Dissection of various endocrine glands of insects (Cockroach/any other Insect, any available animals/ Virtual)
 3. Study of microscopic slides of endocrine and related structures
 - o T.S. Pituitary, T.S. of Thyroid, T.S. of Parathyroid, T.S. of Adrenal, T.S. of Testes, T.S. of Ovary, T.S. Thymus, T.S. of Kidney, T.S. of Heart, T.S. of Stomach, T.S. of Intestine
 4. Effect of epinephrine on chromatophores of fishes
 5. Biochemical estimation of cholesterol content in adrenal tissue, glycogen in uterine tissue
 6. Microtomy block preparation, section cutting, stretching and straining Gamete biology and reproductive physiology in human beings
 7. Study of Estrous cycle in mouse or rat
 8. Preparation on Blastodisc of hen's egg
 9. Formation of egg window in chicken egg
 10. Collection of developmental stages of eggs of *Lymnea* or any gastropod
 11. Collection of developmental stages of insects/ fishes
 12. Study of development stages of frog through slides and whole mounts.
 13. Study of development stages of chick through slides and whole mounts.
 14. Slide preparation (earthworm ovary, amphibian, reptiles, birds and mammals testes & ovary.)

Note-

1. Use of animal for dissection and practical work is subject to the conditions that they are not banned under the wildlife protection act
2. External features and anatomy should be studied by digital techniques and the alternatives. Wherever live animals is studies it should be either pest or culturable species without painning them

SEMESTER-II
LAB COURSE I

General & comparative endocrinology of vertebrates

1. Dissection of various endocrine glands of vertebrates (Fishes, Amphibians, Reptiles, Birds, Mammals, any available animals/ Virtual)
2. Dissection of various endocrine glands of insects (Cockroach/any other insect, any available animals/ Virtual)
3. Study of microscopic slides of endocrine and related structures
 - o T.S. Pituitary, T.S. of Thyroid, T.S. of Parathyroid, T.S. of Adrenal, T.S. of Testes, T.S. of Ovary, T.S. Thymus, T.S. of Kidney, T.S. of Heart, T.S. of Stomach, T.S. of Intestine
4. Effect of epinephrine on chromatophores of fishes
5. Biochemical estimation of cholesterol content in adrenal tissue, glycogen in uterine tissue
6. Microtomy block preparation, section cutting, stretching and straining Gamete biology and reproductive physiology in human beings
7. Study of Estrous cycle in mouse or rat
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11. Collection of developmental stages of insects/ fishes
12. Study of development stages of frog through slides and whole mounts.
13. Study of development stages of chick through slides and whole mounts.
14. Slide preparation (earthworm ovary, amphibian, reptiles, birds and mammal testes & ovary)

Note-

1. Use of animal for dissection and practical work is subject to the conditions that they are not banned under the wildlife protection act
2. External features and anatomy should be studied by digital techniques and the alternatives. Wherever live animals is studied it should be either pest or culturable species without painning them

**SEMESTER-II
Lab-course II**

Molecular cell biology

1. Study of Prokaryotic and Eukaryotic cells
2. Study of permanent slides -Mitosis, Meiosis and cell organelles
3. Temporary squash preparation to show mitosis and meiosis
4. Preparation of giant chromosomes, barr bodies
5. Histological study of cancer cells

Tools and techniques for biology

6. Use of balance Ph meter, colorimeter, centrifuge spectrophotometer, camera Lucida etc.
7. Molecular separation by Chromatography, Electrophoresis
8. Media preparation
9. Cell culture
10. Colorimetric estimation of glucose, protein, RNA, DNA
11. Absorption spectrum of any coloured solution
12. Histochemical techniques

Note-

1. Use of animal for dissection and practical work is subject to the conditions that they are not banned under the wildlife protection act

Azal Bihari Vajpayee Vishwavidyalaya, Bilaspur (CHHATTISGARH)
www.bilaspuruniversity.ac.in



अटल बिहारी वाजपेयी विश्वविद्यालय बिलासपुर

(छत्तीसगढ़)

सेमेस्टर पाठ्यक्रम

M.Sc. ZOOLOGY

2. External features and anatomy should be studied by digital techniques and the alternatives. Wherever live animals is studies it should be either pest or culturable species without painning them

**SEMESTER-II
LAB-COURSE II**

**Time-06 Hours
Max. Marks-100**

Distribution of marks in practical exam.

1. Spotting (mitosis and meiosis, Tools & Techniques)	(20)
2. Exercise based on cell Biology	(10)
3. Chromatography	(20)
4. Colorimetric estimation	(10)
5. Application of different Instruments	(10)
6. Viva	(10)
7. Sessional	(20)

Total = 100

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2016-17 & 2017-18

SEMESTER - III PAPER - I

Code : 1909

COMPARATIVE ANATOMY OF VERTEBRATES

Time : 3 hours

Max. Marks : 80 Pass Marks : 29


Note : Total 08 questions to be asked & total 04 questions to be attempted.

- 1. Origin of Chordata.**
- 2. Origin of vertebrates :**
 - a. Amphibia
 - b. Reptiles
 - c. Birds
 - d. Mammals
- 3. Vertebrate integument and its derivatives :**
 - a. General structure and function of skin
 - b. Derivatives - Scales, feathers, hair and gland
- 4. Comparison of Stomach in Mammals.**
- 5. Circulatory system :**
 - a. Evolution of heart.
 - b. Evolution of aortic arches.
- 6. Respiratory system : Comparative account of respiratory organs.**
- 7. Skeletal system :**
 - a. Skull of reptiles and its significance.
 - b. Types of skull in Birds.
 - c. Girdles of amphibian, Reptiles, Birds and Mammals.
- 8. Nervous system : Comparative account of brain in vertebrates.**
- 9. Comparative account of Ratitae and Carinates.**
- 10. Comparative account of Cetacea and Sirenia.**

Signature of the Members of the BOS -




Date : 08.12.2016







SEMESTER - III PAPER - III
GAMETE BIOLOGY AND REPRODUCTIVE PHYSIOLOGY

Max. Marks : 80 Pass Marks : 29

Time : 3 hours

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **Endocrinology of sex differentiation and development :**
 - a. Chromosomal (genetic) basics of sex determination
 - b. Gonadal sex
 - c. Phenotypic (differentiation of external genitalia)
2. **Reproductive cycle :**
 - a. Adrenarche
 - b. Puberty and Menarche
 - c. Menarche and Menstruation
 - d. Menopause
3. **The male reproductive system :**
 - a. Morphology, Anatomy and function of male reproductive system
 - b. Spermatogenesis and development of spermatozoa
 - c. Composition of semen, Biochemistry of semen
4. **Endocrine function of Testis :**
 - a. Endocrine control of testicular function
 - b. Biosynthesis and chemistry of androgen
 - c. Secretion, transport and function of testicular hormone
 - d. Secondary sexual characteristics
5. **Female reproductive system :**
 - a. Morphology, Anatomy and function of female reproductive system
 - b. Oogenesis and development of ova
 - c. Biosynthesis, chemistry and function of Estrogen, Progesterone, Relaxin.
 - d. Control and abnormalities of ovarian function
6. **Fertilization :**
 - a. Pre-fertilization event
 - b. Biochemistry of fertilization
 - c. Post fertilization
7. **Endocrinology of :**
 - a. Pregnancy
 - b. Parturition
 - c. Lactation
8. **Development of Placenta and its function.**
9. **Contraceptive techniques :**
 - a. Physical barriers
 - b. Surgical methods
 - c. Hormonal methods
 - d. I.U.C.D.

Date : 08.12.2016

Signature of the Members of the BOS -

(Handwritten signatures of BOS members)

SEMESTER - III PAPER - IV
POPULATION GENETICS AND EVOLUTION

Max. Marks : 80 Pass Marks : 29

Time : 3 hours

Total 08 questions to be asked & total 04 questions to be attempted.

POPULATION GENETICS :

1. The hardy-Weinberg Law :

- Gene frequency
- Genotype frequency
- Gene pool
- Hardy - Weinberg law - i) Random union of Gametes ii) Random mating among Genotype
- Hardy - Weinberg equilibrium

2. A detail account of destabilizing forces/factors :

- Natural selection
- Mutation
- Genetic drift / Random drift
- Migration
- Meiotic drive
- Founder principle

3. Speciation :

- Types of speciation
- Pattern of speciation

4. Molecular clock

EVOLUTION :

5. Theories of organic evolution :

- Lamarckism
- Darwinism
- Modern synthetic theory
- Germplasm theory
- Mutation theory

6. Direct evidences of evolution - Fossils.

7. Indirect evidences of evolution.

8. Isolation

9. Variation

10. Evolution of Man.

Signature of the Members of the BOS -

Date : 08.12.2016

Handwritten signatures of members of the BOS, including names like Anil, Manoj, Pradeep, and others, along with a date stamp 08/12/16.

K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – III

LAB COURSE - V

Code-1921

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

Ex.1 Study of 5,7,9,10 Cranial nerves of Scoliodon by clay modeling	10 Marks
Ex.2 Study of 5,7,9,10 Cranial nerves of Trygon by clay modeling	10 Marks
Ex.3 Study of Pecten of bird	10 Marks
Ex.4 Slide preparation & its identification	10 Marks
Ex.5 Skull description	10 Marks
Ex.6 Spotting (8 spots), 2½ marks each	20 Marks
Ex.7 Viva	10 Marks
Ex.8 Sessional	20 Marks

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08/11/2016

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – III

LAB COURSE - VI

Code-1922

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

-
- | | |
|---|----|
| 1) Block Preparation | 20 |
| 2) Block cutting & Spreading | 10 |
| 3) (I) Blood Group | 10 |
| (II) Ag-Ab Reaction Broth of Pulser | |
| 4) Chromosomal Study - Slide Preparation Squash Method..... | 10 |
| (I) Onion Root Tip | |
| (II) Testis of Grasshopper | |
| 5) Evolution Study - | 10 |
| (I) Homologous | |
| (II) Analogous | |
| 6) Animal Behavior | 10 |
| Operculum movement of fish in different temperature | |
| 7) Viva | 10 |
| 8) Sessional | 20 |

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COMPARATIVE AND HUMAN PHYSIOLOGY

Time : 3 hours

Max. Marks : 80

Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

Cellular and molecular neurobiology and physiology :

- Central nervous system gross neuroanatomy of brain and spinal cord.
- Histological structure and origin of nervous tissue "neuron & neuroglia" & its function.
- Neurotrophins, cerebro spinal fluid and its function.
- Mechanism of conduction of nerve impulse in non-medullated & medullated nerve fibres.
- Physiological properties of nerve fibres.
- Nerve endings (Bio-analyzers).
- Synapse - structure, properties and its re-uptake mechanism.
- Neuro transmitters - classification, structure, receptors, function.
- Autonomic nervous system
- Electrical activity of the Brain (EEG)

Feeding mechanism and revolution and comparative physiology of digestion :

- Nutrition.
- Histology and function of digestive track.
- Digestive juice [(i) Saliva (ii) Gastric Juice (iii) Pancreatic Juice (iv) Bile Juice v) Succus entericus] composition function and mechanism of secretion of various digestive juice.
- Movement of alimentary canal [(i) Deglutition (ii) Stomach (iii) Vomiting (iv) Small intestine (vii) Defecation]
- Physiology of digestion of carbohydrate, protein, fat and nucleic acid.
- Absorption of carbohydrate, protein, fat, water and salt.

Circulation of body fluid and its regulation :

- Circulative system [(i) Structure of heart (ii) Histology and properties of cardiac muscle].
- Structure, function, synthesis & composition of blood, hydrolymph, haemolymph & lymph.
- Blood group system.
- Blood coagulation.
- Blood pressure.
- Cardiac cycle.
- Heart sound.
- Electric cardiogram (ECG), its principle and significance.
- Nerves of heart and their action.

Respiratory system and physiology of respiration :

- Structure of respiratory track.
- Breathing physiology.
- Transport of gases [(i) Oxygen carriage (ii) Carriage of carbon di-oxide]
- Asphyxia, Hyperpnoea, Dyspnoea, Orthopnoea, Apnoea.

5. **Contractile elements and its physiology.**
 - a. Ultra structure, composition of skeletal, smooth and cardiac muscle.
 - b. Properties of skeletal smooth and cardiac muscle.
 - c. Mechanism of muscle contraction. Physiology and theories of muscle contraction.
 - d. Changes during muscle contraction [(i) Mechanical (ii) Chemical (iii) Thermal (iv) Electrical]
6. **Patterns of nitrogen excretion and its physiology :**
 - a. Excretory substance of body.
 - b. Structure of kidney and its excretory physiology.
 - c. Formation of urine and micturition.
 - d. Structure of Skin and mechanism of sweat secretion.
 - e. Regulation of Acid-Base balance (Acidaemia & Alkalaemia)
 - f. Detoxification.
7. **Osmoregulation in different animals.**
8. **Receptor physiology – A comparative study :**
 - a. Photo receptor.
 - b. Phono receptor.
9. **Communication among animals :**
 - a. Bioluminescence,
 - b. Pheromones.
10. **Regulation of body temperature :**
 - a. Pyrexia.
 - b. Hypothermia.

Signature of the Members of the BOS -

Date : 08.12.2016

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.
2. Dr. Sanjay Thiske
3. Dr. Dhananjay Mishra
4. Prof. Rashmi Patel
5. Mr. Kamal Jindal
6. Prof. Anita Pandey
7. Prof. Vinita Pandey
8. Mr. Vijay Kante
9. Ms. Pooja Sao

Signature

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BIOCHEMISTRY, BIOPHYSICS, BIOENERGETICS AND METABOLISM

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **Water the solvent of life :**
 - a. Chemistry of water
 - b. Functions and regulation of water in human.
2. **Biophysics :**
 - a. pH & buffers
 - b. Osmosis & osmotic pressure
 - c. Surface tension
 - d. Adsorption, hydrotrophy, viscosity & colloids
3. **General structure of Monosaccharides :**
 - a. Nomenclature, definition and classification
 - b. Formation of monosaccharides – formation of glucose –
 - i) Linear form
 - ii) Ring form
4. **Occurrence, chemistry, properties and hydrolysis of Oligosaccharides :** (Sucrose, Lactose, Maltose)
5. **The artificial or synthetic sweetness.**
6. **Structure of Polysachharides :** i) Starch ii) Glycogen iii) Cellulose iv) Heparin
7. **Biosynthesis of amino acid.**
8. **Protein configuration :**
 - a. Primary structure
 - b. Secondary structure
 - c. tertiary structure
 - d. Quaternary structure
9. **Classification of protein.**
10. **General structure of lipid.**
11. **Classification and properties of lipids.**
12. **Historical resume, structure and synthesis of nucleic acid.**
13. **Enzymes :**
 - a. Nomenclature and classification
 - b. Properties of enzyme
 - c. Enzyme inhibitors and activators
 - d. Mechanism of enzyme action

14. Metabolism of carbohydrate, protein, fat and nucleic acid.
15. Biological oxidation or energy metabolism :
 - a. Enzymes and co-enzymes involved in oxidation and reduction
 - b. Mitochondrial electron transport chain
 - c. Oxidative phosphorylation
16. Vitamins.
17. Elcosanoids
18. Metabolism of inorganic elements :
 - a. Macro-minerals
 - b. Micro-minerals

Name of the members of the B.O.S.

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9. Ms. Pooja Sao

Signature

[Handwritten signatures of members]

Date of Meeting

08.12.2016

Head of the department

Name - Dr. Ramesh Kumar Tamboli

[Handwritten signature and date: 22/3/17]

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2016-17 & 2017-18

SEMESTER - IV PAPER - III

Code : 1915

ICTHYOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. Classification of fishes by Berg.
2. General organization, distribution and affinities of Holocephali.
3. General organization and affinities of Coelacanth.
4. General organization and affinities of Dipnoi.
5. Scales - types, development and significance.
6. Fin and locomotion.
7. Origin and evolution of paired fins.
8. Alimentary canal and its adaptive modification related to food.
9. Accessory respiratory organs in fishes.
10. Swim bladder in fishes - structure, function and its phylogenetic relationship with lung.
11. Osmoregulation in fishes.
12. Deep sea fishes and their adaptations.
13. Hill stream fishes and their adaptations.
14. Luminous organs : structure, development and significance.
15. Weberian ossicles.
16. Sound producing organs : structure, function and significance.
17. Parental care in fishes.
18. Doctrine of nerve component.

Signature of the Members of the BOS -

Date : 08.12.2016

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K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2016-17 & 2017-18

SEMESTER - IV PAPER - IV

Code : 1916

AQUACULTURE AND FISHERIES

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **Principle cultivable fishes with special reference to India.**
2. **Fish farming :**
 - a) Planning
 - b) Construction
 - c) Maintenance
3. **Pond management :**
 - a) Nursery pond
 - b) Rearing pond
 - c) Stocking pond
4. **Fish culture in Paddy fields.**
5. **Sewage fisheries.**
6. **Composite fish culture**
7. **Aquatic weeds and their control measures.**
8. **Aquatic insects and their control.**
9. **Predatory and weed fishes.**
10. **Fish disease and their control.**
11. **Induced breeding.**
12. **Preservation and processing of fishes. Local methods of preservation.**
13. **Marketing of fishes and price determination.**
14. **Economic importance of fishes.**
15. **Fishing craft and gears. Local fishing contrivances.**
16. **Larvicidal fishes.**
17. **Exotic fishes.**

Date : 08.12.2016

Signature of the Members of the BOS -

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – IV

LAB COURSE - VII

Code-1923

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

-
- 1) To determine the total count of RBCs in own blood..... 15
 - 2) To determine the Hb% in own blood..... 10
 - 3) To determine the total count of WBCs in own blood..... 15
 - 4) To determine the differential count of WBCs (DLC) in own blood.... 10
 - 5) Separation of colour pigment by using the paper chromatography.. 10
 - 6) Separation of tissue constituent the help of centrifugation..... 10
 - 7) Viva..... 10
 - 7) Sessional 20

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – IV

LAB COURSE - VIII

Code-1924

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

Exercise	Marks
1. Study of nervous system of Cyprinid, Silurid fishes by clay model	10
2. Study of Weberian Ossicle of Cyprinid, Silurid fishes by clay model	10
3. Permanent mounting and its identification	10
4. Identification of local freshwater fishes (four fishes)	20
5. Spotting from 1-8 (2½ mark each) : (2 slides, 2 specimens, 1 aquatic insect, 1 aquatic weed 2 bones)	20
6. Skeleton submission	10
7. Viva	10
8. Sessional (Record + submission of 5 local freshwater fishes)	20

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MOLECULAR CELL BIOLOGY

Time : 3 hours

Max. Marks : 80

Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. INTRODUCTION AND HISTORY OF CELL BIOLOGY :

- a) History of cell biology.
- b) Unit of measurement of cell.
- c) Cell biology & other biological sciences.

2. TECHNIQUES IN CELL BIOLOGY

3. STRUCTURE OF CELL - Prokaryotic and Eukaryotic cell

4. BIOMEMBRANE :

- a) Molecular composition.
- b) Models of cell membrane.
- c) Function of cell membrane.
- d) Junction complex.

5. CYTOPLASMIC MATRIX :

- a) Physical properties of Cytosol.
- b) Chemical nature of Cytosol.
- c) Properties of cytoplasmic matrix.

6. CYTOSKELETON :

- a) Microtubules, Microfilament and intermediate filament structure & dynamics.
- b) Cell Movements - intracellular transport, Role of Kinesin and Dynein signal transduction.

7. STRUCTURAL ORGANIZATION AND INTRACELLULAR ORGANELLES :

- | | |
|---------------------------|--------------------------------|
| a) Nucleus. | e) Centrioles and Basal Bodies |
| b) Golgi Bodies | f) Ribosomes |
| c) Lysosomes. | G) Chromosomes |
| d) Endoplasmic reticulum. | |

8. MITOCHONDRIA :

a) History & distribution of Mitochondria

b) Structure of Mitochondria.

- i. The morphology of mitochondria.
- ii. The mitochondrial membrane.
- iii. Mitochondrial particles.
- iv. The respiratory chain complex.
- v. Location of electron transport and phosphorylatory.
- vi. Electron transport mechanism.
- vii. Function of mitochondria.
- viii. Biogenesis of mitochondria.




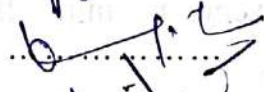
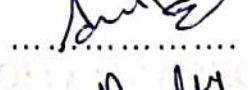

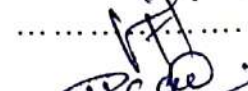


9. CELL CYCLE : General account, cell cycle synthesis activities.

10. INTRODUCTORY KNOWLEDGE OF BIOLOGY OF CANCER.

11. APOPTOSIS – DEFINITION MECHANISM AND SIGNIFICANCE.

12. BIOLOGY OF AGING. AND FREE RADICALS.

~~13. FREE RADICALS.~~

Name of the members of the B.O.S.	Signature	Date : 08.12.2016
1. Dr. Ramesh Kumar Tamboli.		
2. Dr. Sanjay Thiske		
3. Dr. Dhananjay Mishra		
4. Prof. Rashmi Patel		
5. Mr. Kamal Jindal		
6. Prof. Anita Pandey		
7. Prof. Vinita Pandey		
8. Mr. Vijay Kante		
9. Ms. Pooja Sao		

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. AIMS AND SCOPE OF ENDOCRINOLOGY :

- a) Types of chemical messengers.
- b) Discovery of hormones.
- c) Experimental methods of hormone research.
- d) Classification of Endocrine glands and hormones.

2. ENDOCRINE GLANDS – STRUCTURE AND FUNCTION :

- a) Hypothalamus.
- b) Pituitary.
- c) Pineal gland
- c) Thyroid, Parathyroid and Ultimobranchial Bodies.
- d) Adrenal.
- e) Endocrine hormones of the Gut.
- f) Gonads.
- g) Justaglomerular apparatus.

3. NEURO – ENDOCRINE SYSTEM AND NEUROSECRETION :

- a) Concept of neurosecretion.
- b) Types of neurosecretion structure & function.
- c) Control of endocrine system by nervous system.
- e) Neurohormones –
 - i. Gases as neural messengers.
 - ii. Endorphins.
 - iii. Brain hormones and behavior.

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4. LIFE HISTORY OF HORMONES :

- a) Synthesis of hormones.
- b) Release of hormones from endocrine gland.
- c) Concentration and transport of hormones in blood.
- d) General mechanism of hormones action.
 - i. Plasma membrane hormone receptor.
 - ii. Second messenger of hormone action.
 - iii. Receptor signal transduction and multiple membrane messengers.
 - iv. Eicosanoids and hormones action.
 - v. Cytosolic hormone receptor.
 - vi. Termination of hormone action and metabolism of hormones.

5. HORMONAL REGULATION AND ITS METABOLIC ACTIVITY :

- a) Carbohydrate metabolism.
- b) Protein metabolism.
- c) Fat metabolism.
- d) Calcium homeostasis.

6. ROLE OF HORMONE IN FASTING.

7. HORMONES AND BEHAVIOUR.

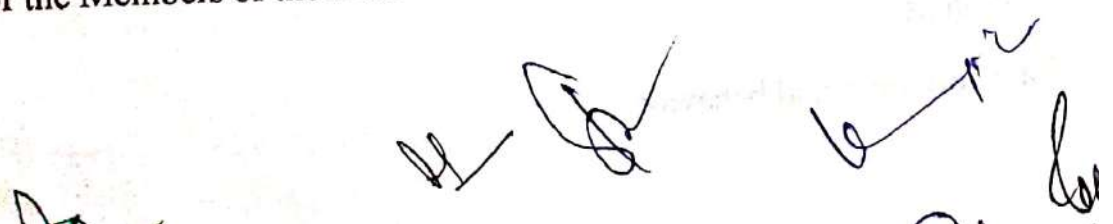
8. ROLE OF HORMONE IN GROWTH AND DEVELOPMENT :

- a) Growth hormone and somatomedins.
- b) Insulin.
- c) Prolactin.
- d) Placental lactogen.
- e) Steroid hormone
- f) Neurotropic growth factor
- g) Haemopoetic growth factor
- h) Other peptide growth factor

9. HORMONAL DISORDERS.

Signature of the Members of the BOS -

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ENVIRONMENTAL PHYSIOLOGY AND ECOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. ADAPTATION :

- a) Mechanisms of adaptation.
- b) Significance of body size.

2. STRESS PHYSIOLOGY :

- a) Basic concept of environmental stress and strain.
- b) Concept of elastic & plastic strain.
- c) Stress resistance.
- d) Stress avoidance.
- e) Stress tolerance.
- f) Concept of homeostasis.

3. ECOLOGY & ECOLOGICAL FACTORS :

- a) Introduction to ecology.
- b) Abiotic & biotic factors.
- c) Limiting factors.
- d) Laws : i. Liebig's Law ii. Shelfords Law

4. ECOSYSTEM :

- a) Basic concepts & types of ecosystem.
- b) Trophic levels.
- c) Energy flow.
- d) Pyramid.

5. COMMUNITY ECOLOGY :

- a) Biotic community, community structure & its characteristics.
- b) Ecotone & edge effects.
- c) Habitat & niche concepts.

6. BIODIVERSITY & NATURAL RESOURCES :

- a) Conservation principle of species.
- b) Ecotone & edge effects.
- c) Resource management.

7. POLLUTION ECOLOGY :

- a) Definition & types of pollution.
- b) Pollution of soil, water and air.
- c) Bio indicators of pollution.
- d) Environmental impact assessment.

8. ENVIRONMENTAL TOXICOLOGY :

- a) Toxic chemicals.
- b) Toxicology, toxicant & mechanism of action.
- c) Biotransformation, bioaccumulation & xenobiotics.

9. WASTELANDS :

- a) Causes & its reclamation strategies.
- b) Wasteland management.

10. CONVENTIONAL & NON-CONVENTIONAL FORM OF ENERGY :

- a) Energy management.

11. ENVIRONMENTAL ISSUES :

- a) Greenhouse gases & climate change.
- b) Ozone depletion.
- c) Acid rain.
- d) Sustainable environment.
- e) Environmental awareness program.

12. PESTICIDES & VARIOUS TYPES :

- a) Pest problem & control strategy.
- b) Integrated pest management.

13. SOLID WASTE MANAGEMENT :

- a) Hazardous waste.
- b) Biomedical waste.
- c) Municipal waste
- d) Solid waste management

14. DEVELOPMENT & EVOLUTION OF ECOSYSTEM :


- a) Strategies of ecosystem development.
- b) Relevance of ecosystem development.

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.
2. Dr. Sanjay Thiske
3. Dr. Dhananjay Mishra
4. Prof. Rashmi Patel
5. Mr. Kamal Jindal
6. Prof. Anita Pandey
7. Prof. Vinita Pandey
8. Mr. Vijay Kante
9. Ms. Pooja Sao

Signature

Date : 08.12.20



K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – I : LAB COURSE - I Code-1917

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

Ex.1 Study of nervous system of Arthropod by clay modeling	15 Marks
Ex.2 Study of nervous system of Mollusc by clay modeling	15 Marks
Ex.3 Slide preparation & its identification	10 Marks
Ex.4 Identification of Plankton by using Camera Lucida	10 Marks
Ex.5 Spotting (8 spots), 2½ marks each	20 Marks
Ex.6 Viva	10 Marks
Ex.7 Sessional	20 Marks

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – I : LAB COURSE - II Code-1918

Session : 2016 - 17 & 2017 - 18

Duration : 5 hours

Max. Marks : 100

1. D.O. Detection in Water samples.....	10
2. CO ₂ Detection in Water samples	10
3. Chloride detection in Water samples	10
4. Endocrine gland (Expose-Intestine,Stomach,Pancreas,Brain,heart)	10
5. DNA Extraction- Pea, Banana.....	10
6. Spotting(10spots).....	20
7. Viva.....	10
3. Sessional	20

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STRUCTURE & FUNCTION OF INVERTEBRATES

Time : 3 hours

Max. Marks : 80

Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **LOCOMOTION** : a) Types of pseudopodia and theories of locomotion
b) Flagellar locomotion in protozoa.
c) Ciliary locomotion in protozoa.
2. **NUTRITION** : a) Pattern of feeding in lower metazoan (Porifera to Helminth).
b) Feeding in Polychaeta.
3. **RESPIRATION** : a) Aerial respiration in Arthropoda
b) Aquatic respiration in Arthropoda.
c) Respiration in Mollusca.
d) Respiratory pigment.
4. **EXCRETION** : a) Excretory organ in Annelida.
b) Excretory organ in Arthropoda.
5. **NERVOUS SYSTEM** : a) Nervous system in Arthropoda.
b) Advance nervous system in Mollusca.
6. **GENERAL ORGANIZATION OF COELOM -**
7. **TORSION IN GASTROPODA -**
8. **PARASITISM** : a) Life cycle of Sacculina & Parasitic castration.
b) Parasitic adaptation in Helminthes.
9. **REPRODUCTION** : a) Reproduction in Sarcodina
b) Reproduction in Ciliata
10. **LARVAL FORMS** : a) Trochophore larva : structure & significance.
b) Larval forms of Crustacea
c) Larval forms of Helminthes

REFERENCE BOOKS -

1. Barnes, Invertebrate zoology, Halt-Saunders International.
2. Barrington, Invertebrate structure and function, Nelson.
3. Marshall and Williams, Textbook of Zoology. Vol I Macmillan Co., London.
4. Sedgewick, Textbook of Zoology, Vol I,II, III, Macmillan Co., London
5. Hyman, The Invertebrates, Vol I-VIII, McGraw Hill Co. New York.
6. Invertebrates, Misten

Members of the Board of Studies -








06.9.18

MOLECULAR CELL BIOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. INTRODUCTION AND HISTORY OF CELL BIOLOGY :

- a) History of cell biology.
- b) Unit of measurement of cell.
- c) Cell biology & other biological sciences.

2. TECHNIQUES IN CELL BIOLOGY -

- a) Centrifuge b) Colorimeter c) Microscopy d) Ph meter e) Chromatography

3. STRUCTURE OF CELL - Prokaryotic and Eukaryotic cell

4. BIOMEMBRANE :

- a) Molecular composition.
- b) Models of cell membrane.
- c) Function of cell membrane.
- d) Junction complex.

5. CYTOPLASMIC MATRIX :

- a) Physical properties of Cytosol.
- b) Chemical nature of Cytosol.
- c) Properties of cytoplasmic matrix.

6. CYTOSKELETON :

- a) Microtubules, Microfilament and intermediate filament structure & dynamics.
- b) Cell Movements - intracellular transport, Role of Kenesin and Dynein signal transduction.

7. STRUCTURAL ORGANIZATION AND INTRACELLULAR ORGANELLES :

- a) Nucleus.
- b) Golgi Bodies
- c) Lysosomes.
- d) Endoplasmic reticulum.
- e) Centrioles and Basal Bodies
- f) Ribosomes
- G) Chromosomes

8. MITOCHONDRIA :

- a) History & distribution of Mitochondria
- b) Structure of Mitochondria.
 - i. The morphology of mitochondria.
 - ii. The mitochondrial membrane.
 - iii. Mitochondrial particles.
 - iv. The respiratory chain complex.
 - v. Location of electron transport and phosphorylatory.
 - vi. Electron transport mechanism.
 - vii. Function of mitochondria.
 - viii. Biogenesis of mitochondria.

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9. CELL CYCLE : General account, cell cycle synthesis activities.

10. INTRODUCTORY KNOWLEDGE OF BIOLOGY OF CANCER.


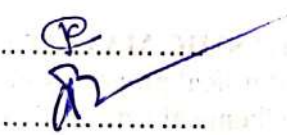

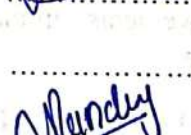
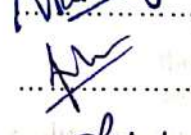
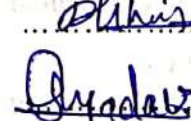
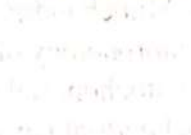
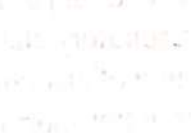
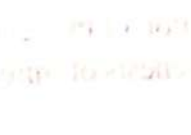

11. APOPTOSIS – DEFINITION MECHANISM AND SIGNIFICANCE.

12. BIOLOGY OF AGING.

13. FREE RADICAL.

REFERENCE BOOKS

1. Darrel, J., Lodish, H., Baltimore, D., Molecular Cell Biology. Scientific American Book
2. Alberts, B., Watson, J.D., Molecular Biology of Cell. Garland Publishers. New York
3. Dobzhansky, Th., The Genetics and Origin of Species. Columbia Univ. Press.
4. Lewin Benjamin, Gene VII. Oxford University Press. UK

Name of the members of the B.O.S.	Signature	Date :
1. Dr. Ramesh Kumar Tamboli.		06.9.18
2. Dr. Kanti Choubey		
3. Dr. Dhananjay Mishra		
4. Dr. K. R. Sahu		
5. Mr. Kamal Jindal		
6. Prof. Anita Pandey		
7. Prof. Vinita Pandey		
8. Prof. Ranjana Sahu		
9. Mr. Devendra Khandait		
10. Ms. Sangeeta Yadav		

GENERAL AND COMPARATIVE ENDOCRINOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. AIMS AND SCOPE OF ENDOCRINOLOGY :

- a) Discovery of hormones.
- b) Classification of Endocrine glands and hormones.
- c) Types of chemical messengers

2. ENDOCRINE GLANDS – STRUCTURE AND FUNCTION :

- a) Hypothalamus.
- b) Pituitary.
- c) Pineal gland
- d) Thyroid, Parathyroid.
- e) Adrenal.
- f) Gonads.
- g) Justaglomerular apparatus.

3. NEURO – ENDOCRINE SYSTEM AND NEUROSECRETION :

- a) Types of neurosecretion structure & function.
- b) Control of endocrine system by nervous system.
- c) Neurohormones –
 - i. Endorphins.
 - ii. Brain hormones and behavior.

4. PHYSIOLOGY OF HORMONES ACTION :

- a) Synthesis of hormones.
- b) Release & transport of hormone.
- c) General mechanism of hormones action.
 - i. Plasma membrane hormone receptor.
 - ii. Second messenger of hormone action.
 - iv. Cytosolic hormone receptor and Steroid hormone
 - vi. Termination of hormone action.

5. NON-CLASSICAL HORMONE : HORMONE IN GROWTH AND DEVELOPMENT

- a) Growth hormone and Somatomedine
- b) Growth factor : epidermal growth factor family(EGF & TGF α), Transforming growth factor β family (TGF β).
- c) Insulin family (IGF-I & IGF – II).

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7. CALCIUM HOMEOSTASIS
8. HORMONES AND BEHAVIOUR.
9. HORMONAL DISORDERS.
10. EICOSANOIDS (prostaglandins, thromboxanes and leukotrienes).

REFERENCE BOOKS -

1. E.J.W.Barrington, General and Comparative Endocrinology. Oxford, Clarendon Press.
2. P.J.Bentley, Comparative Vertebrate Endocrinology. Cambridge University Press.
3. R.H. Williams, Text Book of Endocrinology. W. B. Saunders.
4. Guyton and Hall, Text Book of Medical Physiology. Saunders.
5. Hadley, Endocrinology. Pearson Education.
6. Norris & Neill, Vertebrate Endocrinology, 5th Edn, Vol. V

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ENVIRONMENTAL PHYSIOLOGY AND ECOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. ADAPTATION :

- a) Mechanisms of adaptation.
- b) Significance of body size.

2. STRESS PHYSIOLOGY :

- a) Basic concept of environmental stress and strain.
- b) Concept of elastic & plastic strain.
- c) Stress resistance.
- d) Stress avoidance.
- e) Stress tolerance.

3. ECOLOGY & ECOLOGICAL FACTORS :

- a) Introduction to ecology.
- b) Abiotic & biotic factors.
- c) Limiting factors.
- d) Laws : i. Liebig's Law ii. Shelfords Law

4. ECOSYSTEM :

- a) Basic concepts & types of ecosystem.
- b) Trophic levels.
- c) Energy flow.
- d) Pyramid.

5. COMMUNITY ECOLOGY :

- a) Biotic community, community structure & its characteristics.
- b) Ecotone & edge effects.
- c) Habitat & niche concepts.

6. BIODIVERSITY & NATURAL RESOURCES :

- a) Conservation principle of species.
- b) Ecotone & edge effects.
- c) Resource management.

7. POLLUTION ECOLOGY :

- a) Definition & types of pollution.
- b) Pollution of soil, water and air.
- c) Bio indicators of pollution.
- d) Environmental impact assessment.

8. ENVIRONMENTAL TOXICOLOGY :

- a) Toxic chemicals.
- b) Toxicology, toxicant & mechanism of action.
- c) Biotransformation, bioaccumulation & xenobiotics.

PTO -



9. WASTELANDS :

- a) Causes & its reclamation strategies.
- b) Wasteland management.

10. CONVENTIONAL & NON-CONVENTIONAL FORM OF ENERGY :

- a) Energy management.

11. ENVIRONMENTAL ISSUES :

- a) Greenhouse gases & climate change.
- b) Ozone depletion.
- c) Acid rain.
- e) Environmental awareness program.

12. SOLID WASTE MANAGEMENT :

- a) Hazardous waste.
- b) Biomedical waste.
- c) Municipal waste
- d) Solid waste management

REFERENCE BOOKS -

1. Mukherjee, B. Environmental Biology
2. Krishna, N.T. Environmental Biology
3. Hoar, W.S., General and Comparative Animal Physiology, Prentis Hall.
4. Prosser, C.L., Environmental and Metabolic Animal Physiology, Wiley- Liss Inc.
5. Martin, Endocrine Physiology. Oxford Univ. Press.
6. Michael Reiss, Environmental Biology

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10. Ms. Sangeeta Yadav

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Date :

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K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – I : LAB COURSE - I Code-1917

Session : Session : 2018 - 19 & 2019 - 20

Duration : 5 hours

Max. Marks : 100

Ex.1 Study of nervous system of Arthropod by clay modeling	15 Marks
Ex.2 Study of nervous system of Mollusc by clay modeling	15 Marks
Ex.3 Slide preparation & its identification	10 Marks
Ex.4 Identification of Plankton by using Camera Lucida	10 Marks
Ex.5 Spotting (8 spots), 2½ marks each	20 Marks
Ex.6 Viva	10 Marks
Ex.7 Sessional	20 Marks

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(Ranjana Sahu)

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(R. Kr. Tamboli)
bur
(Kamal Jindal)

K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – I : LAB COURSE - II Code-1918

Session : 2018 - 19 & 2019 - 20

Duration : 5 hours

Max. Marks : 100

1. D.O. Detection in Water samples.....	10
2. CO ₂ Detection in Water samples	10
3. Chloride detection in Water samples	10
4. Endocrine gland (Expose-Intestine,Stomach,Pancreas,Brain,heart)	10
5. DNA Extraction- Pea, Banana.....	10
6. Spotting(10spots).....	20
7. Viva.....	10
8. Sessional	20

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K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2018-19 & 2019-20

SEMESTER – IV PAPER – I

Code : 1913

COMPARATIVE AND HUMAN PHYSIOLOGY

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. Cellular and molecular neurobiology and physiology :

- Central nervous system gross neuroanatomy of brain and spinal cord.
- Histological structure and origin of nervous tissue "neuron & neuroglia" & its function.
- Mechanism of conduction of nerve impulse in non-medullated & medullated nerve fibres.
- Synapse – structure, properties and its re-uptake mechanism.
- Neuro transmitters - classification, structure, receptors, function.

2. Feeding mechanism and evolution and comparative physiology of digestion :

- Nutrition.
- Histology and function of digestive track.
- Digestive juice [(i) Saliva (ii) Gastric Juice (iii) Pancreatic Juice (iv) Bile Juice v) Succus entericus] composition function and mechanism of secretion of various digestive juice.
- Physiology of digestion of carbohydrate, protein, fat and nucleic acid.
- Absorption of carbohydrate, protein, fat, water and salt.

3. Circulation of body fluid and its regulation :

- Circulative system [(i) Structure of heart (ii) Histology and properties of cardiac muscle].
- Blood group system – A, B, AB, O, Bombay blood group.
- Blood coagulation.
- Blood pressure.
- Cardiac cycle & ECG, .

4. Respiratory system and physiology of respiration :

- Structure of respiratory track.
- Breathing physiology.
- Transport of gases [(i) Oxygen carriage (ii) Carriage of carbon di-oxide]
- Asphyxia, Hyperpnoea, Dyspnoea, Orthopnoea, Apnoea.

5. Contractile elements and its physiology.

- Ultra structure, composition of skeletal, smooth and cardiac muscle.
- Mechanism of muscle contraction. Physiology and theories of muscle contraction.
- Changes during muscle contraction [(i) Mechanical (ii) Chemical (iii) Thermal (iv) Electrical]

6. Patterns of nitrogen excretion and its physiology :

- Structure of kidney and its excretory physiology.
- Formation of urine and micturition.
- Regulation of Acid-Base balance (Acidaemia & Alkalaemia)
- Detoxification.

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7. Osmoregulation in different animals.
8. Receptor physiology – A comparative study :
 - a. Photo receptor.
 - b. Phono receptor.
9. Communication among animals :
 - a. Bioluminescence,
 - b. Pheromones.
10. Regulation of body temperature :
 - a. Pyrexia.
 - b. Hypothermia.

REFERENCE BOOKS –

1. Principles of Anatomy and Physiology – Gerard J. Tortora, Bryan Derrckson
2. Text Book of Medical Physiology – Guyton & Hall
3. Medical Physiology – C. C. Chattergee

Name of the members of the B.O.S.

1. Dr. Ramesh Kumar Tamboli.
2. Dr. Kanti Choubey
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10. Ms. Sangeeta Yadav

Signature

Ramesh Kumar Tamboli
06.9.18

Kanti Choubey

Dhananjay Mishra

K. R. Sahu

Anita Pandey

Vinita Pandey

Ranjana Sahu

Devendra Khandait

Sangeeta Yadav

Date – 06.9.2018

Head,
Dept. of Zoology

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2018-19 & 2019-20

SEMESTER - IV PAPER - II

Code : 1914

BIOCHEMISTRY, BIOPHYSICS, BIOENERGETICS AND METABOLISM

Time : 3 hours

Max. Marks : 80

Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. **Water the solvent of life :**
 - a. Chemistry of water
 - b. Functions and regulation of water in human.
2. **Biophysics :**
 - a. pH & buffers
 - b. Osmosis & osmotic pressure
 - c. Isoelectric point
3. **General structure of Monosaccharides :**
 - a. Nomenclature, definition and classification
 - b. Structure monosaccharide -
 - i) Linear form
 - ii) Ring form
 - c. Structure and properties of Oligosaccharide - Sucrose, Lactose, Maltose
 - d. Structure of Polysaccharides : i) Starch ii) Glycogen iii) Cellulose iv) Heparin
4. **Carbohydrate metabolism -**
5. **Biosynthesis of amino acids -**
6. **Protein configuration :**
 - a. Primary structure
 - b. Secondary structure
 - c. Tertiary structure
 - d. Quaternary structure
7. **Protein metabolism -**
8. **General structure, classification and properties of lipid.**
9. **Metabolism of Fat -**
10. **Historical resume, structure and synthesis of nucleic acid.**
11. **Enzymes :**
 - a. Nomenclature and classification
 - b. Properties of enzyme
 - c. Enzyme inhibitors and activators
 - d. Mechanism of enzyme action
12. **Vitamins and minerals -**

Signature of the members of B.O.S.

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Date - 06.9.2018

K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY
SEMESTER – IV PAPER – III
ICTHYOLOGY

Session : 2018-19 & 2019-20

Code : 1915

Time : 3 hours

Max. Marks : 80 Pass Marks : 29

Note : Total 08 questions to be asked & total 04 questions to be attempted.

1. Classification of fishes by Berg.
2. General organization, distribution and affinities of Holocephali.
3. General organization and affinities of Coelacanth.
4. General organization and affinities of Dipnoi.
5. Scales – types, development and significance.
6. Fin and locomotion.
7. Origin and evolution of paired fins.
8. Alimentary canal and its adaptive modification related to food.
9. Accessory respiratory organs in fishes.
10. Swim bladder in fishes – structure, function and its phylogenetic relationship with lung.
11. Osmoregulation in fishes.
12. Deep sea fishes and their adaptations.
13. Hill stream fishes and their adaptations.
14. Luminous organs : structure, development and significance.
15. Weberian ossicles.
16. Sound producing organs : structure, function and significance.
17. Parental care in fishes.
18. Exotic fishes

REFERENCE BOOKS -

1. Hoar and Randall, Fish Physiology. Academic Press.
2. Berg, Classification of Fishes.
3. Jordan, Genera of Fishes and Classification of Fishes.CBD.
4. Kyle, Biology of Fishes, RPD.
5. Khanna An Introduction to Fishes. CBD
6. Gupta, Gupta, General and Applied Ichthyology. S.Chand.
7. Berg, Classification of Fishes.
8. Jordan, Genera of Fishes and Classification of Fishes.CBD

Signature of the Members of the BOS -

Date : 06.9.2018

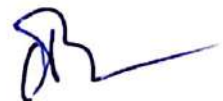












K. GOVT. ARTS & SCIENCE (AUTONOMOUS) COLLEGE, RAIGARH

M. Sc. ZOOLOGY

Session : 2018-19 & 2019-20

SEMESTER - IV PAPER - IV Code : 1916

AQUACULTURE AND FISHERIES

Max. Marks : 80 Pass Marks : 29

Time : 3 hours

Note : Total 08 questions to be asked & total 04 questions to be attempted.

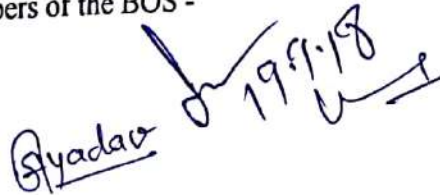
1. Principle cultivable fishes with special reference to India.
2. Fish farming :
 - a) Planning
 - b) Construction
 - c) Maintenance
3. Pond management :
 - a) Nursery pond
 - b) Rearing pond
 - c) Stocking pond
4. Fish culture in Paddy fields.
5. Sewage fisheries.
6. Composite fish culture
7. Aquatic weeds and their control measures.
8. Aquatic insects and their control.
9. Predatory and weed fishes.
10. Fish disease and their control.
11. Induced breeding.
12. Preservation and processing of fishes. Local methods of preservation.
13. Marketing of fishes and price determination.
14. Economic importance of fishes.
15. Fishing craft and gears. Local fishing contrivances.
16. Water pollution and fisheries.
17. Prawn culture..


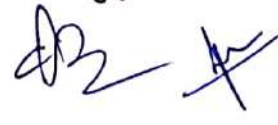

REFERENCE BOOK

1. Shammi Bhatnagar, Applied Fisheries Agrobios
2. Dholakia, Fisheries and Aquatic Resources of India. Daya Publishing House.
3. Biswas, K.P., Industrial Fisheries. Daya Publishing House
4. Gupta, Gupta, General and Applied Ichthyology. S.Chand
5. Khanna An Introduction to Fishes. CBD
6. Jhingran, Fish and Fisheries of India. HPC
7. Day, Fishes of India. Today and Tomorrow.
8. Shrivastav, Fishes of U.P. and Bihar.
9. Shrivastav, A TB of Fishery Science and Indian Fisheries. Kitab Mahal.

Signature of the Members of the BOS -



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Date : 06.9.2018



K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – IV

LAB COURSE - VII

Code-1923

Session : Session : 2018 - 19 & 2019 - 20

Duration : 5 hours

Max. Marks : 100

-
- 1) To determine the total count of RBCs in own blood..... 15
 - 2) To determine the Hb% in own blood..... 10
 - 3) To determine the total count of WBCs in own blood..... 15
 - 4) To determine the differential count of WBCs (DLC) in own blood.... 10
 - 5) Separation of colour pigment by using the paper chromatography.. 10
 - 6) Separation of tissue constituent the help of centrifugation..... 10
 - 7) Viva..... 10
 - 7) Sessional 20

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Suresh
06/9/18

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Manoj

K. Govt. Arts & Science College, Raigarh

M. Sc. Zoology : Semester – IV

LAB COURSE - VIII

Code-1924

Session : Session : 2018 - 19 & 2019 - 20

Duration : 5 hours

Max. Marks : 100

Exercise	Marks
1. Study of nervous system of Cyprinid, Silurid fishes by clay model	10
2. Study of Weberian Ossicle of Cyprinid, Silurid fishes by clay model	10
3. Permanent mounting and its identification	10
4. Identification of local freshwater fishes (four fishes)	20
5. Spotting from 1-8 (2½ mark each) : (2 slides, 2 specimens, 1 aquatic insect, 1 aquatic weed 2 bones)	20
6. Skeleton submission	10
7. Viva	10
8. Sessional (Record + submission of 5 local freshwater fishes)	20

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