

St. Aloysius College (Autonomous), Jabalpur

Department of Zoology

M.Sc. ZOOLOGY - IV Semester

Choice Based Credit System (CBCS)

Scheme of Examination (w.e.f. Session 2022-23)

| Course No. | Course Title | Credits | Marks | |
|-----------------------------|--|---------|------------|-------------------------|
| | | | Max. Marks | Min.Marks For Passing |
| CORE COURSES | | | | |
| ZC-401. | Animal Behaviour and Neurophysiology | 4 | 40 | 14 |
| ZC -402. | Gamete Biology, Development and Differentiation | 4 | 40 | 14 |
| ELECTIVE COURSE - (Any 01) | | | | |
| ZE -403 | <ul style="list-style-type: none">Pure and Applied fisheriesMolecular Endocrinology and Vertebrates Immune System | 4 | 40 | 14 |
| ZD -404 | DISSERTATION | 4 | | 18 |
| | Abstract | | 05 | |
| | Review of literature | | 05 | |
| | Methodology | | 05 | |
| | Analysis and interpretation | | 10 | |
| | Presentation | | 10 | |
| | Viva | | 15 | |
| | 50 | | | |
| INTERNAL ASSESSMENT | | | | |
| ZI -405 | CCE-Written test (Based on ZC -401, 402 & ZE -403) (Each test of 10 marks) | 0 | 30 | 12 (04 in each Test) |
| ZI -406 | Internship Project | 4 | 50 | 18 |
| ZI -407 | Comprehensive <ul style="list-style-type: none">Viva-VoceReport | 1 | 50 | 18 |
| PRACTICALS | | | | |
| ZP -408 | Practical- I Based on Course ZC -401 & ZC-402 | 2 | 50 | 18 |
| ZP -409 | Practical- II Based on Course ZE -403 | 2 | 50 | 18 |
| SKILL BASED COURSE | | | | |
| ZS-410 | Skill Based Course | 1 | 10 | 4 |
| Total Credits & Total Marks | | 26 | 410 | 148 |

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Session 2022-23

CORE COURSE

Paper I- Animal Behaviour and Neurophysiology

Max.M.-40

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| Unit-1 | <p>1.Introduction:</p> <ul style="list-style-type: none">- Ethology as a branch of biology.- Animal psychology, classification of behavioral patterns, analysis of behavior (ethogram) <p>2. Reflexes and complex behaviour.</p> <p>3. Perception of the environment wsr mechanical, electrical, chemical, olfactory, auditory and visual receptors .</p> <p>4. Evolution of proximate and ultimate causation wsr inheritance of behavior and relationships.</p> |
| Unit-2 | <p>1. Neural and hormonal control of behaviour.</p> <p>2. Genetic and environmental components in the development of behaviour.</p> <p>3. Motivation: Drive,timing and interaction of drives, physiological basis of motivation, Hormones and motivation.</p> <p>4. Types of Communication: Chemical, visual, light, audio communication and sonotaxonomy wsr bird call.</p> <p>5. Evolution of language (primates).</p> <p>6 Bioluminescence and Colouration in fishes</p> |
| Unit-3 | <p>1.Ecological aspects of behaviour: Habitat selection, food selection, Optimal foraging theory, anti-predator defenses, homing territoriality, dispersal, host parasite relations.</p> <p>2.Biological rhythms: Circadian and circannual rhythms, orientation and navigation, migration of fishes, turtles and birds.</p> <p>3.Learning and memory: Association learning wsr conditioning, habituation, insight learning and reasoning</p> <p>4.Memory –Basic concept and types</p> |

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| Unit-4 | <p>1.Reproductive behaviour.Evolution of sex and reproductive strategies,mating systems,courtship,sexual selection., Parental care in fishes .</p> <p>2.Social behaviour. Aggregations,Schooling in fishes,Flocking in birds,Herding in mammals, Group selection,</p> <p>3. Kin selection.</p> <p>4. Social organization in insects and primates.</p> |
| Unit-5 | <p>1. Human Ethology</p> <ul style="list-style-type: none"> -Ethological concept and human behavior. -Concept of sign stimuli. -Concept of imprinting. -Kinships of human social systems -Human Pheromones. <p>2. Territorial behavior.</p> <p>3. Aggressive behavior.</p> <p>4. Altruism</p> |

Suggested Readings-

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

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CORE COURSE

Paper-II - Gamete Biology, Development and Differentiation

M.M-40

| | |
|--------|---|
| Unit-1 | <ol style="list-style-type: none">1. Differentiation of gonads in mammals and its genetic basis.2. Spermatogenesis: Morphological basis in rodents.3. Gamete specific gene expression and genomics4. Biochemistry of Semen: Semen composition and formation, assessment of sperm function.5. Fertilization: Pre fertilization events biochemistry of fertilization post fertilization events. |
| Unit-2 | <ol style="list-style-type: none">1. Ovarian follicular growth and differentiation: morphology, endocrinology, molecular biology of oogenesis2. Vitellogenesis in Amphibia.3. Hormonal regulation of ovulation and ovum transport in mammals.4. Multiple ovulation and embryo transfer technology wsr in vitro oocyte maturation, superovulation and elementary idea of IVF. |
| Unit-3 | <ol style="list-style-type: none">1. Hormonal regulation of pregnancy and parturition.2. Hormonal regulation of development of mammary gland and lactation.3. Endocrinology and Physiology of placenta.4. Cryopreservation of Gametes and Embryo.5. Teratological effects of Xenobiotic on gametes.7. Melanogenesis. |
| Unit-4 | <ol style="list-style-type: none">1. Cell commitment and differentiation.2. Germ cell determinants and germ cell migration.3. Early development of fish upto gastrulation4. Types of morphogenetic movements in Frog.5. Concept of totipotency and pleuropotency.6. Competence and Induction, primary and secondary inducers.7. Primary neurulation. |

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| Unit-5 | <ol style="list-style-type: none"> 1. Stem cell concept: Potency definition of stem cells, Embryonic and adult stem cell. 2. Adult stem cell niches. 3. Mesenchymal stem cells. 4. Epidermal stem cell culture. 5. Connective tissue cell family 6. Haemopoietic stem cells: Blood cells formation, 7. Stem cell disorders. |
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Suggested Reading:

1. Long J.A.EvanH.M.1922: The oestrous cycle in the Rat and its associated phenomenon.
2. Nalbandou.A.C.–Reproductive physiology
3. PrakashA.S.1965-66Marshall's,Physiology Reproduction(3Vol.)
4. Gilbert,S.F.Developmenal Biology,SinauerAssociated Inc.Massachulsetts.
5. EthanBier,the cold Spring.The cold spring Harbor laboratory Press,NewYork.
6. BalinskyB.I.Introduction to Embryology sanders,Phliedelfia.
7. Berril N.J.and Karp.G.Development Biology.McGrawHill NewYork.
8. Davidson,E.H.Gene Activity During Early Development.Academic Press,New York.

M.Sc. Zoology IV Semester
Session 2022-23
ELECTIVE COURSE
Paper III: Pure and Applied fisheries

Max M.: 40

| | |
|---------------|---|
| Unit-1 | <ol style="list-style-type: none"> 1. Origin and outline of evolution of fishes 2. Classification of fishes as proposed by Berg 3. Structure of fish integument, development of placoid scale and types of Scales. 4. Growth studies wsr Age determination in fishes. 5. Elementary idea of morphometric and meristic characters of fishes. 6. Locomotion in fishes |
| Unit-2 | <ol style="list-style-type: none"> 1. Alimentary canal and digestion in Elasmobranch [Scoliodon] and teleost fish [Clarias]. 2. Accessory respiratory organs wsr in Clarias, Anabas and Heteropneustes. 3. Air bladder, Weberian ossicles and their functions. 4. Structure of heart and arrangement of blood vessels in gills. 5. Excretion and Osmoregulation. |
| Unit-3 | <ol style="list-style-type: none"> 1. Nervous system of fishes wsr Teleost fishes. 2. Venomous fishes. 3. Deep sea adaptations in fishes. 4. Hill stream adaptations in fishes. 5. Migration in fishes 6. Sexual cycle and fecundity of fishes |
| Unit-4 | <ol style="list-style-type: none"> 1. Collection of fish seed from natural resources. 2. Dry and Wet Bundh breeding of carps. 3. Method of Hypophysation . 4. Importance of genetic engineering in fishes with examples. 5. Quarantine measures- Fish quarantine procedure. 6. Basic varieties of fish feed. |
| Unit-5 | <ol style="list-style-type: none"> 1. Management of Hatcheries, Nurseries and Rearing Pond. 2. Management of stocking ponds. 3. Common aquatic weeds and control. 4. Methods of fish preservation. 5. By product of fishes. 6. Transport of live fish & fish seeds. 7. Marketing of fishes in India. |

Suggested Readings:

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|------------------------|---|--|
| 1. C.B.L.Shrivastava | : | Fishes of India |
| 2. Jhingan | : | Fish and fisheries of India |
| 3. S.S.Khanna | : | An Introduction to fishes |
| 4. R.S.Rath | : | Fresh water Aquaculture |
| 5. Gopalji Shrivastava | : | Fishes of U.P. & Bihar |
| 6. H.D.Kumar | : | Sustainability & Management of Aquaculture |
| Fisheries | | |
| 7. A.J.K.Mainan | : | Identification of fishes |
| 8. R.Sanatam | : | A Manual of freshwater Aquaculture |
| 9. S.K.Gupta | : | Fish & Fisheries |
| 10. P.D.Pandey | : | Fish & Fisheries |
| 11. K.P.Vishwas | : | Fish & Fisheries |

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Practical-I

(Based on Core Courses: Paper I & II)

M.M.:50

1. Exercise on Animal behavior

- a) Taxes – Hydrotaxis, Chemotaxis, Geotaxis, Phototaxis
- b) Reflexes
- c) Social behavior
- d) Learning behavior- Trial and error learning using step maze

2. Developmental Biology

- a) Study of embryological slides [Frog & chick]
- b) Preparation of permanent chick mount
- c) Study of different stages of spermatogenesis (slides of meiosis)
- d) Semen analysis –sperm count and sperm motility

Scheme for Practical Examination

| | | |
|-------|---|----------|
| 1. | Exercise based on animal behavior | 20 |
| 2. | Exercise based on developmental biology | 15 |
| 3. | Practical record / Collection | 10 |
| 4. | Viva Voce | 05 |
| Total | | 50 Marks |

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Practical-II

(Based on Elective Course : Paper III)

1. Major dissection Nervous system of Scoliodon and Digestive system of Clarias
2. Minor Dissection-Accessory respiratory organs /Reproductive system of Clarias /Heteropneustes/Anabas.
3. Age determination of teleost fish with the help of scales
4. Identification of fish (10 fishes)
5. Spotting of museum Specimen, slides and bones of fishes.
6. Viva Voce.
7. Practical record & survey of local fish market.

Scheme for Practical Examination

Time: hour

M:M 50

| | |
|---|----|
| 1. Major dissection. | 10 |
| 2. Minor dissection | 06 |
| 3. Age determination of fish with the help of scales. | 05 |
| 4. Identification of fish. | 06 |
| 5. Spotting of museum specimen, slides and bones. | 08 |
| 6. Viva Voce. | 05 |
| 7. Practical record & survey of local fish market | 10 |

Total

50