UNIVERSITY OF PUNE

DRAFT OF REVISED SYLLABUS
FOR
S. Y. B. Sc. ZOOLOGY
[Effective from the Academic Year 2009-2010]

Semester-I

Paper	Title	Marks
Paper I **ZY-211**	General Zoology and Biological techniques-part-I	50
Paper II **ZY-212**	Applied Zoology-part-I	50

Semester-II

Paper	Title	Marks
Paper I **ZY-221**	General Zoology and Biological techniques-part-II	50
Paper II **ZY-222**	Applied Zoology-part-II	50

Paper	Title	Marks
Paper III **ZY-223**	Practical course based on the above mentioned, corresponding theory courses.	100

NOTE: 1) For theory papers, out of 50 marks, the internal examination is of 10 marks and external examination is of 40 marks.

2) For practical course out of 100 marks, 20 marks are for internal assessment and 80 marks are for annual external examination.

SEMESTER-I

PAPER –I: ZY-211

Course Title: General Zoology and Biological Techniques Part-I

Units		No. of lectures
1) General Topics	------	**10**
2) Developmental Biology	------	**12**
3) Animal Type- Star fish	------	**08**
4) Biological Techniques	------	**15**
Total No. of Lectures	-------	**45**

Expanded syllabus based on the above topics.

Unit 1) General Topics:

1.1 Locomotion in Protista (Amoeboid, Ciliary and Flagellar). **2**

1.2 Economic importance of Protista **1**

1.3 Patterns of coelom and segmentation in animals:

a**)** Acoelomate, Pseudocoelomate and coelomate animals. **3**

b**)** Pseudosegmentation, Metamerism, Cephalothorax abdomen and Cephalothorax specialization.

1.4 Diversity of mouth parts in Insects (Biting and chewing,piercing and sucking , siphoning , sponging , chewing and lapping types). **2**

Unit 2) Developmental Biology:

2.1 Introduction and theories of Developmental Biology (Epigenesis, Pangenesis and Germ plasm). **2**

2.2 Gametogenesis in animals in brief and gross structure of gametes. **2**

2.3 Types of eggs: on the basis of distribution of yolk . **1**

2.4 Concept and significance of Fertilization : process and significance **2**

2.5 Cleavage and blastulation : Definition, pattern, structure of blastula and its types **2**

2.6 Gastrulation and Morphogenetic movements in early development (invagination, epiboly, emboly, involution, ingression and delamination). **2**

2.7 Test Tube Baby : Technique , Advantages and Disadvantages . **1**

Unit3) Animal Type:

3.1 Starfish—External characters, Digestive system, food and feeding, Water vascular system,Reproductive system and development. **8**

Unit 4) Biological Techniques:

4.1 Concept of sterilization: Filteration, Dry heat sterilization, Wet sterilization, Radiation. **2**

4.2 Separation of Biomolecules: **a)** Centrifugation (sedimentation, density gradient).
b) Chromatography: Principle and applications i) Thin layer ii) Gel filtration iii) Ion exchange,
c) Electrophoresis: Paper and gel (agarose) **3**

4.3 Cell counting techniques: using haemocytometer (by using suitable stain) **1**

4.4 Quantification techniques:
a) Principle of colorimeter and spectrophotometer.
b) Measurement of blood pressure. **3**

4.5 Introduction to microtechnique: Fixation- fixatives, their types, merits and demerits dehydration, clearing, cold and hot impregnation, block preparation, sectioning and staining for tissue sections (nuclear and cytoplasm) **4**

4.6 Microscopic measurements: i) micrometry (using the occular and stage micrometer)
ii) using Camera Lucida: construction and working. **2**

SEMESTER-I

PAPER- II: ZY-212

Course Title: Applied Zoology- Sec I

(Fisheries and Agricultural Pests and their control)

Units		No. of Lectures
1) Fisheries	------	**23**
2) Agricultural Pests and their control	--------	**22**
Total No. of Lectures	**-------**	**45**

Expanded syllabus based on the above topics.

Unit 1) Fisheries:

1.1 Types of Fisheries (in brief): **a)** Inland (freshwater) fisheries **b)** Marine fisheries: Coastal, Offshore and deep sea fisheries, **c)** Brackish water fisheries. **2**

1.2 Habit, habitat and culture methods of following freshwater forms: Rohu (*Labeo rohita*) **b)** Catla (*Catla catla*) **c)** Mrigal (*Cirrihinus mrigala*) **d)** Giant prawn (*Macrobrachium rosenbergi*). **6**

1.3 Harvesting methods of following marine forms: **a)** Harpadon **b)** Mackerel **c)** Lobsters **d)** Pearl oysters. **4**

1.4 Crafts and gears in Indian Fishery: **a)** Crafts—Catamaran, Machwa, Dinghy, Dug out canoe, Built- up. b) Gears---- Gill net, Dol net, Purse, Rampani, Cast net. **5**

1.5 Fishery byproducts: **a)** Fish meal **b)** Fish flour **c)** Liver Oil **d)** Ising glass **e)** Fish glue **f)** Fish manure**.g)** Fish fin soup **h**) Ladies Purse **3**

1.6 Fish preservation techniques: a) Chilling b) Freezing c) Salting d) Drying e) Canning. **3**

Unit 2) Agricultural Pests and their control:

2.1 Introduction to Pests, Concept of Pest and Types of pests (agricultural, household, stored grains, structural, veterinary, forestry and nursery). **2**

2.2 Major insect pests of agricultural importance (Marks of identification, life cycle, nature of damage and control measures).

a) Jowar stem borer **b)** Blister beetle **c)** Red cotton bug **d)** Castor Semilooper

e) Brinjal fruit borer **f)** Aphids **g)** Mango stem borer **h)** Lemon butterfly

i) Pulse beetle **j)** Rice weevil. **7**

2.3 Non insect pests: Rats and Bandicoots, Crabs, Snails, Slugs, Birds and Squirrels. **2**

2.4 Pest control practices: Cultural control, Physical control, Mechanical control, Chemical

2.5 control, Biological control, Herbal control, Pheromonal and autocidal control**.** and concept of IPM. **8**

2.6 Plant protection appliances:Rotary duster,knapsack sprayer and cynogas pump , hazards of pesticides and antidotes. **3**

SEMESTER- II

PAPER-I: ZY-221

Course Title: General Zoology and Biological Techniques: Sec II

Units		No. of Lectures
1) General Topics	------	**10**
2) Animal Type- Scoliodon	-------	**20**
3) Biological Techniques	-------	**15**
Total No. of Lectures	-------	**45**

Expanded syllabus based on the above topics.

Unit 1) General Topics:

1.1 Types of scales and fins in fishes. **2**

1.2 Parental care in Amphibia. **1**

1.3 Aquatic and desert (Extreme hot and cold) adaptations in vertebrates**.** **2**

1.4 Beak and feet modifications in Birds. **2**

1.5 Migration in Birds. **1**

1.6 Fossils, fossilization, types , Dating of fossils and examples of fossils**.** **2**

Unit2) Animal Type:

2.1 Study of Scoliodon—External characters, Digestive system, Respiratory system, Blood vascular system, Nervous system, sense organs , Male urinogenital and Female reproductive system **20**

Unit 3) Biological techniques:

3.1 a) Preparation of solutions: Molar, Normal, Percent solutions, PPM, PPB,

b) Dilutions—serial dilutions

c) Preparation of different stains: Methylene blue, Eosin, Haematoxylin, Janus green- B ,Acetocarmine, Aceto-orcein

3.2 Principles of different types of microscopes: **a)** Simple **b)** Compound **c)** Phase contrast **d)** Electron **e)** Fluorescence **f)** Confocal. **4**

3.3 Haematology: Blood cell count, Hb %, Lipid (HDL and LDL), Glucose Tolerance Test (GTT) Thyroid hormones (T1, T2, T3, T4) and significance of each **5**

3.4 Applications of computers for Zoological Sciences. **2**

SEMESTER-II

PAPER-II: ZY-222

Course Title: Applied Zoology Sec II

(Apiculture and Sericulture)

Units		No. of Lectures
1) Apiculture	**------**	**23**
2) Sericulture	**------**	**22**
Total No. of Lectures	**------**	**45**

Exapanded syllabus based on the above topics.

Unit 1) Apiculture:

1.1 Introduction to Apiculture and study of habit, habitat and nesting behaviour of *Apis dorsata, Apis indica, Apis floera, Apis mellifera.* **3**

1.2 Life cycle, Colony organization and division of labour. **3**

1.3 Bee behaviour and communication. **3**

1.4 Bee keeping equipments: **a)** Bee box (Langstroth type)**b)** Honey extractor **c)** Smoker **d)** Bee-veil **e)** Gloves **f)** Hive tool **g)** Brush **h)** queen excluder. **3**

1.5 Bee keeping and seasonal management. **2**

1.6 Bee products (collection methods, composition and uses): **a)** Honey b) Wax c) Venom d) Propolis e) Royal jelly f) Pollen. **2**

1.7 Diseases and enemies of Bees: **a)** Bee diseases- Protozoan, Bacterial, viral, Fungal. **3**

b) Bee pests- Wax moth (Greater and Lesser), wax beetle. **1**

c) Bee predators- Bee eater, King crow, Wasp, Lizard, Bear, Man. **1**

1.8 Bee pollination and management of bee colonies for pollination . **2**

Unit 2) Sericulture:

2.1 Study of different types silk moths, their distribution and varieties of silk produced by Mulberry, Tassar, Eri and Muga silk worms in India . **3**

2.2 External morphology and life cycle of *Bombyx mori*. **2**

2.3 Cultivation of mulberry: **a)** Varieties for cultivation **b)** Rainfed and irrigated mulberry cultivation- Fertilize schedule, Prunning methods and leaf yield **3**

2.4 Harvesting of mulberry: **a)** Leaf plucking **b)** Branch cutting **c)** Whole shoot cutting **1**

2.5 Silk worm rearing: **a)** Varieties for rearing **b)** Rearing house **c)** Rearing techniques **d)** Important diseases and pests **6**

2.6 Preparation of cocoons for marketing. **1**

2.7 Post harvest processing of cocoons: **a)** Stiffling, sorting, storage, deflossing and riddling, **b)** cocoon cooking, reeling equipment and rereeling, washing and polishing. **2**

2.8 Sericulture as labour intensive Agro- industry.

PAPER III: ZY-223

Practical Course

Practical No.1:a) Study of permanent slides of mouth parts of the following Insects: Mosquito, Plant bug/ Bed bug, Butterfly and House fly, cockroach **(D)**

b) Whole mount preparation of any suitable material **(E)**

Practical No. 2: a) Study of external characters and digestive system of starfish. **(E)**

b) Temporary preparation of gonads from starfish. **(E)**

Practical No. 3: a)Study of water vascular system of starfish**.** **(E)**

b) T.S. of arm of starfish, Bipinnaria larva and types of pedicillariae (Permanent slides) **(D)**

Practical No. 4: a) Study of permanent slides:Amphioxus , Insect ,Frog ,Hen Eggs **(D)**

b) Study of Blastulae and Gastrulae of amphioxus, Frog and chick. **(D)**

Practical No. 5: a) Preparation of standard acid (succinic acid) and alkali and their standardization.

b) Preparation of various solutions (normal,molar,and percent) and ppm/ppb by serial dilutions **(E)**

Practical No.6 a) Limits of cleanliness **(E)**

b) Study of use of oven, autoclave and filter for sterilization of Glass ware, Medium and Serum**.** **(D)**

Practical No. 7: a) Study of principles of Colorimetry and Electrophoresis. **(D)**

b) Study of principle and working of pH meter and Measurement of pH of Milk, Pepsi, Lemon juice etc. using pH paper and pH meter. **(E)**

Practical No. 8 a) Study of principle of Chromatography and separation of amino acids mixture by ascending Paper Chromatography.

b**)** Study of centrifugation technique **(D)**

Practical No.9: a) Measurement of blood pressure.and Estimation of haemoglobin percentage **(E)**

Practical No. 10: b) Differential count of W. B. Cs.

Practical No.11: Total count of R. B. Cs.

Practical No 12: Total count of W.B.C.

Practical No. 13: Identification, Classification and study of habit, habitat and economic importance of the following: **a)** Rohu, Catla, Mrigal, Mackerel, Bombay duck, Eel, Pomphret.

b) Prawn, Crab, Lobster, Oyster, Sepia. **(D)**

Practical No. 14: a) Study of maintenance of Aquarium.

b) Types of scales and tail fins in fishes.

c) Different types of crafts and gears in fishing (models/charts/ Photographs/line drawings etc). **(D)**

Practical No. 15: a) Study of any five insect pests and any five non-insect pests, corresponding to theory course.

b) Study of any one plant protection appliance (sprayers / duster). **(D)**

Practical No. 16: Study of modifications of beaks and feet in birds. **a) Beaks:** water and mud probing, tearing and piercing, fruit eating and mud straining. b**) Feet:** Perching, Raptorial, Cursorial and Swimming (museum specimens/ photographs/ models/ line drawings). **(D)**

Practical No. 17: Study of fossils: Trilobite, Fossil snail, Fossil fish, Archaeopteryx, Stegosaurus and Iguanodon (Museum specimens/ photographs/ models/ line drawings) **(D)**

Practical No. 18: a) Study of external characters,sexual dimorphism and digestive system of

Scoliodon. and mounting of placoid scales **(E)**

b) Study of Male and Female reproductive systems of *Scoliodon.* **(D)**

Practical No. 19: Study of heart and arterial system of *Scoliodon.* **(E)**

Practical No. 20: **a)** Study of brain of *Scoliodon.* **(E)**

b) Study of temporary preparations of ampullae of Lorenzini from *Scoliodon***.** **(E)**

c) Study of cranial nerves, eye ball muscles and membranous labyrinth of *Scoliodon.* **(D)**

Practical No. 21: **a)** External morphology and life-cycle of *Bombyx mori.*

b) Any five equipments in Sericulture. **(D)**

Practical No. 22: **a)** Study of life cycle of Honey Bee. **b)** Caste system in Honey Bee. **(D)**

c) Study of mouth parts, appendages, pollen basket and sting apparatus of worker bee. **(E)**

Practical No. 23: Study of **a)** Bee keeping equipments **b)** Bee products **c)** Bee pests, parasites and enemies. **(D)**

Practical No. 24: Compulsory study tour/Visit to following Institutes:

a) Fishery **b)** Sericulture **c)** Apiculture **d)** Agriculture University/ College/ any agricultural farm./sea shore.

Practical No. 25: Preparation of temporary and permanent whole mount of small animals or their parts. and measurement under microscope. **(E)**

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ZY-211- General Zoology and Biological techniques- Part I

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ZY-212- Applied Zoology- Part-I

(Fisheries & Agricultural Pests and their Control)

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ZY-221- General Zoology and Biological Techniques-Part II

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ZY-222- Applied Zoology- Part- II

(Apiculture and Sericulture)

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ZY 223-Practicals based on corresponding theory courses

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Practical Skeleton Paper

Time: 11 a.m. onwards. **Max. Marks: 80**

Q.1. Dissect the starfish/ Scoliodon so as to expose .....system**.** **(15)**

Q.2. Make a temporary preparation of ----------from starfish / Scoliodon. **(05)**

Q.3. a) Write the principles of any two of the following: **(10)**

i) Colorimeter
ii) Electrophoresis
iii) Spectrophotometer
iv) Chromatography
V) pH meter
vi) Centrifugation

b) Prepare----------Normal solution of acid /alkali & standardize it**.** **(10)**

Q.4.Perform any one of the following experiment. **(15)**

i) Differential count of W.B.Cs.
ii) Total count of W.B.Cs.
iii) Total count of R.B.Cs.
iv) Amino acid separation by paper chromatography.

Q.5. Identification **(15)**

i) Identify & describe
ii) Identify & give its functions
iii) Identify, sketch & label
iv) Identify & describe

v) Identify & comment on type of tail /scale

Q.6. a)Viva-voce **(05)**

b) Tour report & certified journal **(05)**