

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE : BRANCH VI. A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY
COURSES OF STUDY OFFERED
(Effective from the academic year 2010 - 2011)
CHOICE BASED CREDIT SYSTEM

Subject Code	Title of Course	Credits	Total Hours			Exam Hours	Marks		
			Lecture Hours (L)	Tutorial Hours (T)	Practical Hours (P)		Continuous Assessment	End Semester	Maximum
Semester - I									
ZL/MC/IV 14	Invertebrata	4	4	1	0	3	50	50	100
ZL/MC/SB 12	Soil Biology	2	2	1	0	2½	50	50	100
ZL/MC/P1 12	Invertebrata - Practical	2	0	0	3	3	50	50	100
ZL/GC/ES12	Environmental Studies	2	2	0	0	2	50	50	100
Allied Core Offered to the Department of Botany									
ZL/AC/GZ 13	General Zoology - I	3	3	0	0	2½	50	50	100
ZL/AC/P1 22	General Zoology - Practical	-	0	0	2	-	-	-	-
Semester - II									
ZL/MC/CR 24	Chordata	4	4	1	0	3	50	50	100
ZL/MC/P2 22	Chordata - Practical	2	0	0	3	3	50	50	100
ZL/ME/FS 24	Fundamentals of Food Science	4	4	1	0	3	50	50	100
OR									
ZL/ME/AZ 24	Applied Zoology (Skill Development Course)	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Botany									
ZL/AC/GZ 23	General Zoology - II	3	3	0	0	2½	50	50	100
ZL/AC/P1 22	General Zoology - Practical	2	0	0	2	3	50	50	100
Semester - III									
ZL/MC/LT 34	Medical Laboratory Technology	4	4	0	0	3	50	50	100
ZL/MC/IM 34	Immunology	4	4	0	0	3	50	50	100
ZL/MC/P3 32	Medical Laboratory Technology and Immunology - Practicals	2	0	0	3	3	50	50	100
Semester - IV									
ZL/MC/MB 44	Microbiology	4	4	1	0	3	50	50	100
ZL/MC/P4 42	Microbiology Practical	2	0	0	3	3	50	50	100

1 Lecture Hour = 1 credit

2 Practical Hours = 1 credit / 3 Practical Hours = 2 credits

Semester - V									
ZL/MC/CM 54	Cell and Molecular Biology	4	4	1	0	3	50	50	100
ZL/MC/GS 54	Genetics	4	4	1	0	3	50	50	100
ZL/MC/GG 54	Genetic Engineering	4	4	1	0	3	50	50	100
ZL/MC/P5 53	Cell and Molecular Biology, Genetics and Genetic Engineering - Practicals	3	0	0	6	3	50	50	100
ZL/ME/EV 54	Evolution	4	4	1	0	3	50	50	100
OR									
ZL/ME/BM 54	Biomedical Instrumentation and Techniques	4	4	1	0	3	50	50	100
Semester - VI									
ZL/MC/VP 64	Vertebrate Physiology	4	4	1	0	3	50	50	100
ZL/MC/EB 64	Environmental Biotechnology	4	4	1	0	3	50	50	100
ZL/MC/DP 64	Developmental Biology	4	4	1	0	3	50	50	100
ZL/MC/P6 63	Vertebrate Physiology, Environmental Biology and Developmental Biology - Practicals	3	0	0	5	3	50	50	100
ZL/MC/AB 64	Animal Behaviour	4	4	1	0	3	50	50	100
General Electives									
ZL/GE/HG24	Human Health and Genetics	4	4	0	0	2	50	50	100
ZL/GE/EZ24	Essentials of Zoology	4	4	0	0	2	50	50	100
ZL/GE/PI32	Principles of Immunology	2	2	0	0	-	50	-	100
ZL/GE/AW32	Concepts in Animal Welfare	2	2	0	0	-	50	-	100
ZL/GE/AQ44	Aquaculture	4	4	0	0	2	50	50	100
ZL/GE/FP54	Food Packaging and Post Harvest Technology	4	4	0	0	2	50	50	100

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Offered by the Department of Zoology to students of Plant Biology and
Plant Biotechnology**

SYLLABUS

(Effective from the academic year 2010 - 2011)

GENERAL ZOOLOGY - I

CODE :ZL/AC/GZ 13

CREDITS: 3

L T P: 3 0 0

TOTAL TEACHING HOURS: 39

OBJECTIVE OF THE COURSE

- To introduce the basic concepts of Zoology to students studying Zoology as an allied subject.

Unit 1 (1 Hr)

Introduction: Outline classification of Animal Kingdom.

Unit 2 (4 Hrs)

Invertebrata I :Introduction - Characteristic features of the following phylum and the organization and life history of the following animal (to be studied briefly).

Protozoa - *Paramecium caudatum*

Unit 3 (7 Hrs)

Invertebrata II : Introduction - Characteristic features of the following phyla and the organization and life history of the following animals. (to be studied briefly).

3.1 Aschelminthes - *Ascaris lumbricoides*

3.2 Annelida - *Lampito mauritii*

Unit 4 (7 Hrs)

Invertebrata III : Introduction - Characteristic features of the following phyla and the organization and life history of the following animals (to be studied briefly).

4.1 Arthropoda - *Penaeus indicus*

4.2 Echinodermata - *Asterias spp.*

Unit 5 (20 Hrs)

Chordata : Introduction - characteristic features of different classes. - Study of the following animals with reference to digestive - respiratory - circulatory - nervous - urinogenital systems and adaptations.

5.1 Amphibia - *Rana hexadactyla*

5.2 Aves - *Columba livia*

5.3 Mammalia - *Oryctolagus cuniculus*

TEXT BOOK

Ekambaranath Ayyar, M. and T.N. Ananthkrishnan, (1986), **Outlines of Zoology**, S. Viswanathan & Co, Madras.

BOOKS FOR REFERENCE

Dhami, P. S. and J.K. Dhami, (1983), **Invertebrate Zoology**, S. Chand and Co., New Delhi.

Jollie, M., (1962), **Chordate Morphology** (Reinholt), East West Press Pvt. Ltd., New Delhi.

Jordan, E.L, (2002), **Chordate Zoology**, S. Chand & Co. New Delhi.

Jordan, E.L. and P.S. Verma, (1965), **Chordate Zoology**, S. Chand & Co. New Delhi.

Majupuria, T. C., (1985), **Invertebrate Zoology**, S. Nagin & Co, New Delhi.

Newman, H.H., (1981), **The Phylum Chordata**, Satish Book Depot, Agra.

Parker, T. J. and W.A. Haswell, (1960), **Text Book of Zoology**, Vol : I & II, Macmillan Revised.

Sedgewick, A., (1960), **A Student's Text Book of Zoology Vol I, II & III**, Central Book Depot, Allahabad.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.Sc. DEGREE

SYLLABUS

(Effective from the Academic Year 2010 – 2011)

ENVIRONMENTAL STUDIES

CODE : ZL/GC/ES 12

CREDIT : 2

L T P : 2 0 0

TOTAL TEACHING HOUR: 26

OBJECTIVES OF THE COURSE

- To create an awareness about current environmental issues
- To make the students eco-sensitive and eco-friendly.
- To educate the students about conservation and management of natural resources

Unit 1

Natural Resources

(7Hrs)

- 1.1. Renewable & non renewable resources
- 1.2. Forest resources – use and over exploitation
- 1.3. Water resources – use and over utilization of surface & ground water
- 1.4. Mineral resources – use and exploitation.
- 1.5. Food resources – world food problems – effects of modern agriculture – sustainable agriculture.
- 1.6. Energy resources – renewable and non renewable energy sources – use of alternative sources of energy.
- 1.7. Need for public awareness in conservation of natural resources.

Unit 2

Ecosystems and Biodiversity

(6Hrs)

- 2.1. Characteristic features of terrestrial and aquatic ecosystems – structure, function, food chain, food web & ecological pyramids.
- 2.2. Ecological succession. (a brief study)
- 2.3. Definition and levels of biodiversity
- 2.4. Hot spots of biodiversity
- 2.5. Threats to biodiversity – habitat loss – poaching of wildlife – man & wildlife conflicts.
- 2.6. Conservation of biodiversity – *in-situ* and *ex-situ* conservation methods

Unit 3

Environmental Pollution

(7Hrs)

- 3.1. Air Pollution : sources , effects and control
- 3.2. Water Pollution: sources, effects and control.
- 3.3. Soil Pollution : sources, effects and control
- 3.4. Noise Pollution : sources , effects and control

- 3.5. Nuclear Hazards
- 3.6. Environmental Impact Assessment
- 3.7. Role of individual, society and government in prevention of pollution.

Unit 4

Social Issues and the Environment

(6Hrs)

- 4.1 Multidisciplinary nature of environmental studies
- 4.2 Population explosion and its impact on environment
- 4.3 Water conservation – rain water harvesting – watershed management
- 4.4 Environmental ethics
- 4.5 Climate change and global warming
- 4.6 Role of information technology in environment

TEXT BOOK

Bharucha, E., (2005), **Textbook of Environmental Studies**, (1st edition), Universities Press, Hyderabad.

BOOKS FOR REFERENCE

Arul, P. (2004), **A Textbook of Environmental Studies**, (1st edition), Environment Agency, Chennai.

Asthara, D.K., M. Asthara, (2006), **A Textbook of Environmental Studies**, (1st edition), S. Chand and Co., Ltd, New Delhi.

Kaushik, A., C.P. Kaushick, (2006), **Perspectives in Environmental Studies**, (2nd edition), New Age International Pvt., Ltd., Publishers, New Delhi.

Singh, H.R., (2005), **Environmental Biology**, (1st edition), S.Chand and Co., Ltd., New Delhi.

END SEMESTER EXAMINATION

Total Marks : 50

Duration : 2 Hours

QUESTION PAPER PATTERN:

Section A

- Choose the correct answer 5 Marks
- State True or False 5 Marks
- Match the following 4 Marks

Section B – 6 x 2 = 12 marks (6 out of 10 questions to be answered in 30 words each)

Section C – 4 x 6 =24 marks (4 out of 6 questions to be answered in 200 words each)

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B.Sc. DEGREE : BRANCH VI. A. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

INVERTEBRATA

CODE :ZL/MC/IV 14

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To highlight the characteristic features of various phyla, with one type under each phylum.
- To study the organisation and the functioning of various systems in invertebrates.
- To study the classification of each phylum up to class level with underlying principles and local examples

Unit 1 (8 Hrs)

Introduction and outline classification of animal kingdom

Protozoa – Characteristic features - classification

1.1 Type : *Paramecium caudatum*

1.2 Locomotion in protozoa

1.3 Parasitism in protozoa – *Entamoeba histolytica* – *Trypanosoma spp* –
Leishmania spp – *Trichomonas spp* – *Giardia intestinalis* – *Plasmodium spp*

Unit 2 (11 Hrs)

Porifera and Coelenterata - Characteristic features - classification

2.1 Type : *Sycon*

2.2 Canal system in sponges

2.3 Type : *Obelia geniculata*

2.4 Polymorphism in coelenterates

2.5 Corals and coral reefs - Conservation

Unit 3 (16 Hrs)

Helminthes and Annelida - Characteristic features - classification.

3.1 Type : *Taenia solium*

3.2 *Ascaris lumbricoides*

3.3 Helminth parasites in relation to human welfare – *Schistosoma haematobium*
– *T. echinococcus* – *Hymenolepis spp* – *Ancylostoma duodenale* –
Wuchereria bancrofti – *Dracunculus medinensis* – *Enterobius vermicularis*
– *Trichuris trichura* – *Trichinella spiralis*

3.4 Type : *Nereis versicolor*

3.5 Metamerism

- Unit 4** (20 Hrs)
Arthropoda - Characteristic Features - classification.
4.1 Type : *Penaeus indicus*, *Periplaneta americana*
4.2 Structure and affinities of *Peripatus*
4.3 Mouthparts and their modification in insects
4.4 Social life in insects – Termites – Ants - Bees
4.5 Insects as vector of diseases – *Culex quinquefasciatus* – *Anopheles gambiae*
– *Aedes aegyptii* – *Glossina palpalis* – *Cimex rotundatus* – *Pediculus humanus* – *Xenopsylla cheopis*

- Unit 5** (10 Hrs)
Mollusca and Echinodermata - Characteristic features - classification.
5.1 Type : *Pila globosa*
5.2 Torsion in Gastropoda
5.3 Economic importance of molluscs.
5.4 Type : *Asterias spp*
5.5 Larval forms of Echinoderms and their significance.

TEXT BOOKS

Ekambaranatha Ayyar, M., and T.N. Ananthkrishnan, (1994), **Manual of Zoology. Vol.I, Part. I & II**, S.Viswanathan & Co., Madras.

Jordan, E. L. and P.S. Verma, (1995), **Invertebrate Zoology, Vol.I**, S.Chand & Co., New Delhi.

BOOKS FOR REFERENCE

Barnes, R. D., (1982), **Invertebrate Zoology**, Holt Saunders, Japan.

Bhamrah, H. S., and Kavita Juneja, (1991), **Recent Trends in Invertebrates. Vol.I - VIII**, Anmol Publications., New Delhi.

Dhami, P. S. and J.K. Dhami, (1983), **Invertebrate Zoology**, S.Chand & Co., NewDelhi.

Hyman, L. H., (1940), **The Invertebrata, Vols.I - VI**, Mc Graw Hill Book Co.,New York.

Majupuria,T.C., (1985), **Invertebrate Zoology**, S.Nagin & Co, New Delhi.

Prasad, S. N. (1971), **A Text Book of Invertebrate Zoology**, Kitab Mahal, Allahabad.

Sedgewick,A., (1960), **A Student's Text Book of Zoology , Vol I & III**, Central Book Depot, Allahabad.

Siebold, C. Th.u., (2007), **Anatomy of Invertebrate**, Hard Press, Inc., U.S.A.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

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B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

INVERTEBRATA - PRACTICAL

CODE :ZL/MC/P1 12

CREDITS: 2

L T P: 0 0 3

TOTAL HOURS: 39

Identification and description of specimens of all groups of invertebrates studied under the syllabus.

Dissections - *Periplaneta americana*
Digestive System
Nervous System
Male and Female Reproductive System

Mount
Appendages of Prawn.
Fresh water plankton
Body setae in *Lampito mauritii*
Mouth parts of *Periplaneta Americana*, *Apis spp*, *Musca spp* & *Anopheles spp*

Identification of different types (epigeic, anecic) of earthworms.

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	20 marks
Question – II	Minor Question(Mount and Diagram)	15 marks
Question – III	Spotters (Five)	10 marks
Question – IV	Fresh water plankton(any two)	5 marks

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B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

SOIL BIOLOGY

CODE :ZL/MC/SB 12

CREDITS: 2

L T P: 2 1 0

TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE

- To study the importance of soil as a natural resource, its formation and properties
- To highlight the dynamics of soil ecosystem.

Unit 1 (10 Hrs)

Introduction and Soil Structure

- 1.1 Scope, Concepts and Biosphere
- 1.2 Soil formation (Pedogenesis)
- 1.3 Soil Profile
- 1.4 Soil Properties
- 1.5 Soil Classification

Unit 2 (8 Hrs)

Biogeochemical Cycles

- 2.1 Nitrogen cycle
- 2.2 Carbon cycle
- 2.3 Sulphur cycle
- 2.4 Phosphorus cycle
- 2.5 Water cycle – water table

Unit 3 (5 Hrs)

Ecosystem and Ecological Succession

- 3.1 Ecosystem – Structure and Function – Soil Ecosystem
- 3.2 Energy flow - Food chain and Food web
- 3.3 Types and General Process of Succession - Terrestrial Succession (Psamosere)

Unit 4 (8 Hrs)

Soil Communities and Soil Fertility

- 4.1. Soil Flora, Microbes and Soil Fauna
- 4.2. Role of microbes in improving soil quality, fertility and bioleaching
- 4.3. Extracting and sampling methods of Soil Fauna
- 4.4. Soil analysis – moisture – texture – pH – nitrates – carbonates – qualitative tests.

Unit 5**(8 Hrs)****Soil Pollution and Conservation**

- 5.1 Natural, Industrial and Agricultural Pollution
- 5.2 Effects of Pollution and Control measures
- 5.3 Soil Reclamation
- 5.4 Afforestation

TEXT BOOKS

Sharma, P.D., (1994), **Ecology and Environment**, Rostogi Publications, Meerut.

Verma, P.S., & V. K. Agarwal, (1987), **Environmental Biology**, S.Chand & Co., New Delhi.

BOOKS FOR REFERENCE

Arumugam, N., (1995), **Concepts of Ecology and Environmental Biology**, Saras Publications, Kanyakumari Dist.

Bardget, R. D. (2005), **The Biology of Soil; A Community and Ecosystem Approach**, Cambridge University Press, U.K.

Bardget, R.D. Micheal B. Usher and David W. Hopkin, (2005), **Biological Diversity and Functions in Soils**, Cambridge University Press, U.K.

Brady, N.C., (1984), **The Nature and Properties of Soils**, 9th edition, Macmillan Publishing Co., New York, London.

Burges, A. and F. Raw, (1967), **Soil Biology**, Academic Press, London.

Dash, M. C., (1978), **The Role of Earthworm in the decomposer system.** , Int.Sci.Publ. Jaipur, India.

Gupta P.K., (2004), **Vermicompositing for Sustainable Agriculture**, Agrobios (India).

Gupta P.K., (1999), **Handbook of Soil, Fertilizer and Manure**, Agro Botanica, Bikaner.

Ismail, S.A. (1996), **Vermicology – The Biology of Earthworms**, Orient Longman.

Wallwork, J. A., (1970), **Ecology and Soil Animals**, Mc.Graw - Hill Book Company, New York.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 2½ Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 8 = 40 Marks (5 out of 7 to be answered in 300 words)

Section C – 2 x 15 = 30 Marks (2 out of 4 to be answered in 600 words)

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B.Sc. DEGREE : BRANCH VI.A. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY
SYLLABUS

(Effective from the academic year 2010 - 2011)

APPLIED ZOOLOGY
(Skill Development Course)

CODE : ZL/ME/AZ 24

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide the student with a basic knowledge of man's relationship with animals from the economic point of view
- To encourage students to take up small scale industries as a career.

Unit 1 (8 Hrs)

Beneficial Insects and their culture

- 1.1. Apiculture - different species - social organisation - equipment connected with bee-keeping - bee products - honey, beeswax, and their uses - diseases and enemies of bees - Apiculture in India.
- 1.2. Sericulture - Different types of silkworms used in sericulture - Life-history of *Bombyx mori* - Rearing and diseases of silkworms - economic importance.
- 1.3. Lac culture - Structure and life history of lac insect (*Tachardia lacca*) - cultivation of lac - enemies of lac cultivation - composition and properties of lac - economic importance.
- 1.4. Observation of tools and equipments of apiculture and sericulture - setting of Apiary and extraction of honey.

Unit 2 (10 Hrs)

Insect Pests

- 2.1 Outline study - Salient features - nature of destruction caused - control measures of pests of paddy - cotton - and stored food grains (Rice and pulses) - Sugar cane - (any three major pests per crop).
- 2.2 Identification of common pests of fruits and vegetables (any three pests)
- 2.3 Integrated Pest Management.

Unit 3 (9 Hrs)

Soil enrichment

- 3.1 Economically important soil animals - earthworms - worm cast production - application in organic farming - soil fertility - vermiculture - vermiculture, vermicomposting, vermiwash.
- 3.2 Millipedes and centipedes - snails and slugs - their importance in soil ecosystem.
- 3.3 Termites - characteristics of mound soils - decomposition of organic matter - termitophiles - termite damage to crops and buildings - control measures.
- 3.4 Pesticides - effect on soil - soil fauna.
- 3.5 Setting up of a vermiculture unit and preparation of vermiculture and vermiwash techniques.

- 3.6 Extraction of Soil organisms – Berlese funnel method – Isolation, identification and preparation of permanent slides of any five microarthropods isolated from soil.

Unit 4 (20 Hrs)

Aquaculture

- 4.1 Kinds of aquaculture - Mono - poly - extensive - semi-intensive - intensive - super intensive - monosex - sewage and integrated fish farming (a brief account)
- 4.2 Culture of selected species - Major Carps - Prawns - Oysters.
- 4.3 Culturable species of feed animals - *Daphnia* - *Rotifers* - *Artemia*
- 4.4 Recent trends in aquaculture – application of hormones - genetic engineering - genetic technologies for commercial aquaculture – hybridisation, sex control – transgenesis – hypophysation – eye stalk ablation
- 4.5 Fish Parasites and diseases – Bacteria – virus – fungi – parasites (three examples each)
- 4.6 Preservation and processing of Fish and Prawns - Chilling, Freezing, Freeze-drying - Smoking - Salting - Canning – By products.

Unit 5 (18 Hrs)

Economic Importance of Animals

- 5.1 Scorpion and Snake venom - economic importance
- 5.2 Poultry Science - Different breeds of fowls - selective breeding, housing and rearing - role of nutrition in egg laying - Common diseases - Economic importance – Quails and Ostrich farming.
- 5.3 Economic importance of Mammals - Indirect and direct value of mammals - Dairy and Piggery farming - Leather and wool industries.
- 5.4 Field visits to aquaculture farm, leather industry, CLRI and Poultry farm.

TEXT BOOK

Shukla, G.S., and V.B. Upadhyay, (1994), **Economic Zoology**, Rastogi Publications, Meerut.

BOOKS FOR REFERENCE

Ahsan, J. and S.P. Sinha, (1985), **Handbook of Economic Zoology**, S. Chand and Co., New Delhi.

Ayyar, T.V. R., (1963), **Handbook of Economic Entomology** For South India, Govt. Press, Madras.

Banerjee, G.C. (1992), Poultry, **Oxford and IBH Publishing Co.**, Pvt., Ltd., New Delhi.

Bardach, John. E., John H Ryther and William O Mc Larney., (1972), **Aquaculture**, John Wiley and Sons, Inc., New York.

Chatterjee, K.D., (1982), **Parasitology**, Chatterjee Medical Publishers, Calcutta.

David, A. (1984), **Tropical Fish Aquarium** : Fresh Water and Marine, The Warwick Press, London.

David, Vasantharaj. B. (1992), **Pest Management and Pesticides**, Namrutha Publications, Madras.

Ganga, G., and Sulochana, Chetty.,(1991), **An Introduction to Sericulture**, Oxford and IBH Publishing Co., Pvt., Ltd., New Delhi.

Hickling, C.F., (1971), **Fish Culture**, Faber and Faber, London.

Huffaker, C.B., (1980), **New Technology in Pest Control**, John Wiley and sons, New York.

Jhingran, V.G., (1982), **Fish and Fisheries of India**, Hindustan Publishing Corpn, New Delhi.

Jull, Morley. A, (1987) (7th Reprint), **Poultry Husbandry**, McGraw Hill Book Co., New York.

Kurien, C.V. and V.C. Sebastian, (1986), **Prawns Fisheries of India**, Hindustan Publishing Corpn, New Delhi.

Krishnan, N.T., (1993), **Economic Entomology**, J.J. Publications, Madurai

Mahanta, K.C., (1987), **Handbook of Animal Husbandry**, Omsons Publications.

Matthews, B.E. (2003), **Introduction to Parasitology**, Cambridge University Press, U.K.

Metcalf, C.V., W.P. Flint, (1962), **Destructive and useful insects**, Their Habit and Control, Tata McGraw Hill Company, New Delhi.

Mishra R.C., (2002), **Perspectives in Indian Apiculture**, Agrobios, Jodhpur.

Mohan Rao Madan, (1999), **Comprehensive Sericulture Manual**, B.S. Publications, Hyderabad.

Nayar, K.K. T.N. Anantha Krishnan, and B.V. David, (1990) **General and Applied Entomology**, Tata McGraw Hill Co., Ltd., New Delhi.

Noble, E.R. and G.A. Noble, (1973), **Parasitology - The Biology of Animal Parasites**, Lea and Febiger, Philadelphia.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

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B.Sc. DEGREE : BRANCH VI. A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

FUNDAMENTALS OF FOOD SCIENCE

CODE : ZL/ME/FS 24

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

- ✓ *Students who have not opted for Vocational Course on Food Science – not eligible.*

OBJECTIVES OF THE COURSE

- To provide a fundamental knowledge of food chemistry, food microbiology and food processing.
- To create awareness among students about food adulteration and quality control.

Unit 1 (8 Hrs)

Food Chemistry and Nutrition

- 1.1 Introduction to Food Chemistry
- 1.2 Food Guide and Usage – Basic Five Food Groups – Nutrition, health and Malnutrition.
- 1.3 Basal metabolism – Determination of BMR
- 1.4 Role of Minerals and Vitamins - Fortification

Unit 2 (16 Hrs)

Food Microbiology, Sanitation and Hygiene

- 2.1 Microbial growth – growth curve of bacteria
- 2.2 Food Contamination and Spoilage – Vegetables and Fruits
- 2.3 Fish and Other Sea food
- 2.4 Importance of personal Hygiene of food handler-Safety in food storage – handling and preparation.
- 2.5 Methods of Sterilization – use of detergents – heat and chemicals.

Unit 3 (18 Hrs)

Post Harvest Technology and Food Packaging

- 3.1 Cereals and legumes – Oil seeds – Fruits and Vegetables – Meat fish and Poultry.
- 3.2 Fermentation Technology
- 3.3 Fortification Technology – High Protein technology – extruded foods
- 3.4 Packaging functions and Packaging Materials.
- 3.5 Types of Packaging – Shrink – Strip – CFB – Glass – Tetrapak – Rigid Containers – Plastics : Shelf-Life.
- 3.6 Quality testing of Packaging

Unit 4 (13 Hrs)

Food Adulteration and Food Toxicology

- 4.1 Detection of Food adulteration in Food grains, Dhal, Oil, Spices and Ghee
- 4.2 Estimation of Benzoic acid and BOAA test
- 4.3 Food Toxicology – Naturally occurring Food toxicants.
- 4.4 Hazards of Pesticides and heavy metals in food
- 4.5 Food Labeling

Unit 5 (10 Hrs)

Sensory Evaluation and Quality Control

- 5.1 Factors affecting food acceptance – sensory, psychological
- 5.2 Objective methods of sensory evaluation
- 5.3 Quality Control and its importance – Food Laws

BOOKS FOR REFERENCE

Banwart, George, J., (1987), **Basic Food Microbiology**, CBS Publication, New Delhi.

Frazier, W.C., (1988), **Food Microbiology**, McGraw Hill Publications, New York.

James, M. Jay, (1996), **Modern Food Microbiology**, McGraw Hill, New York.

Maynard A., Rose Marie, P. Amerine and Edward B. Rossler, (1965), **Principles of Sensory Evaluation of Food**, Academic Press, New York.

Norman, G. Marriot, (1989), **Principles of Food Sanitation**, AVI Publishing Co., Inc., Connecticut.

Potter, Norman N and Joseph H. Hotchkis, (1999), **Food Science**, 5th Edition, Springer Science, U.S.

Swaminatha, M., (1993), **Text Book on Food Chemistry**, Printing and Publishing Co., Ltd., Bangalore.

Swaminathan, Geetha and Mary George, (2002), **Laboratory Chemical Methods in Food Analysis**, Margham Publications, Chennai.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

CHORDATA

CODE : ZL/MC/CR 24

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To enable students to understand the organization of different groups of chordates.

- Unit 1** (13 Hrs)
- 1.1 Introduction – An outline of classification - Characteristic features of the Phylum Chordata - Origin of chordates. (Classification upto the orders and their characteristic features with suitable examples as far as possible from the fauna of South India. All types to be dealt in detail. Study of endoskeleton to be limited to Mammals and Pigeon).
- 1.2 Prochordates - General features - Type : *Amphioxus* – affinities – Affinities of *Balanoglossus* – Retrogressive metamorphosis in Urochordata.
- 1.3 Agnatha - Cyclostomata - General features - Type - *Petromyzon* - affinities
- Unit 2** (10 Hrs)
- 2.1 Gnathostomata - General features - Super class Pisces
- 2.2 Type - *Scoliodon sorrakowah*.
- 2.3 Dipnoi and its affinities.
- 2.4 Accessory respiratory organs - airbladder - parental care.
- Unit 3** (20 Hrs)
- 3.1 Amphibia - General features . Type - *Rana hexadactyla*. Neoteny in Urodela - Parental care in Amphibia
- 3.2 Reptilia - General features. Type - *Calotes versicolor*. Skull in reptiles as basis of classification - Snakes of South India.
- Unit 4** (12 Hrs)
- 4.1 Aves - General features. Type - *Columba livia*.
- 4.2 Ratitae - Origin of birds - adaptations to flight - migration - palate in birds.
- Unit 5** (10 Hrs)
- 5.1 Mammalia - General features. Type - *Oryctolagus cuniculus*.
- 5.2 Egg laying mammals, Aquatic mammals, Dentition in mammals

TEXT BOOKS

Ekambaranatha Ayyar, M. (1994), **A Manual of Zoology**. Vol. II S. Viswanathan & Co., Chetpet.

Jordan, E.L., (2002), **Chordate Zoology**. S. Chand & Co., New Delhi.

BOOKS FOR REFERENCE

Hyman, L.H., (1968), **Comparative Vertebrate Anatomy**., McGraw Hill Book Company, New York, Toronto.

Kotpal, R.L. (1991), **Modern Text Book of Zoology- Vertebrates**. Rastogi Publications, Meerut.

Kluge, A.G. B.E. Frye, K. Johansen, K.F. Lieu, C.R. Noback, I.D.Olsen, and A.J. Waterman, (1977), **Chordate Structure and Function**. Macmillan Publishing Co., New York.

McFarland, W.N., F. Harvey Pough, T.J.Code, and J.B. Heiser, (1979), **Vertebrate Life**, Macmillan Publishing Co., Inc. New York.

McNeill Alexander, R., (1975), **The Chordates**. Vikas Publishing House, New Delhi.

Newman N.H. (1981), **The Phylum Chordata** - Satish Book Depot, Agra.

Orr, R.T., (1976), **Vertebrate Biology**. W.B. Saunder Company, Philadelphia, London, Toronto.

Parker. T.J. and W.A. Haswell, (1972), **A Text Book of Zoology**, - Vol. II, MacMillan Publishing Co., Inc. New York.

Romer, A.S. and T.S. Parson, (1986), **The Vertebrate Body**. Sixth edition. Saunders College Publishing, Philadelphia.

Sedgewick A. (1960), **A Text Book of Zoology** - Vol II & III. Central Book Dept. Allahabad.

Young. J.Z. (1978), **The Life of Vertebrates**. Oxford University Press, London, New York

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VI.A. – ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

CHORDATA - PRACTICAL

CODE :ZL/MC/P2 22

CREDITS: 2

L T P: 0 0 3

TOTAL HOURS: 39

Identification and description of specimens of all groups of chordates studied in the syllabus.

Dissections - *Rana hexadactyla*

Viscera

Digestive System

Urinogenital System

Venous system

Computer simulated frog dissection

Mount

Scales of fishes – Placoid, Ctenoid, Cycloid

Frog - Hyoid apparatus

Record Work

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	25 marks
Question – II	Minor Question(Mount + Diagram)	15 marks
Question – III	Spotters (Five)	10 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

General Elective Course Offered by Department of Zoology to students of
B A. / B.Sc. / B.Com. Degree

SYLLABUS

(Effective from the academic year 2010 - 2011)

ESSENTIALS OF ZOOLOGY

CODE :ZL/GE/EZ 24

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

✓ *Students of Zoology and students of Botany with Allied Zoology – not eligible.*

OBJECTIVE OF THE COURSE

- To give a general introduction to various branches of Zoology and to highlight their applications.

Unit 1 (10 Hrs)

Introduction

- 1.1 Classification - General characteristics of different phyla and classes.
- 1.2 Type study – *Oryctolagus cuniculus*

Unit 2 (8 Hrs)

Animal Behaviour

- 2.1. Sociobiology: communication in animals – chemical, auditory, tactile, visual and electrical
- 2.2. Behaviour and reproduction : courtship – parental care

Unit 3 (10 Hrs)

Applied Zoology

- 3.1 Diseases of Human : Amoebiasis - Malaria - Filariasis and Ascariasis.
- 3.2 Culture of economically important species - Apiculture - Sericulture and Pisciculture. (outline study)

Unit 4 (13 Hrs)

Genetics and Immunology - Introduction.

- 4.1 Blood Groups and their inheritance in man and applications
- 4.2 Klinefelter's, Down's and Turner's Syndromes
- 4.3 Immunology - Definition – Types of Antigen-Antigen- antibody reactions.
- 4.4 Cell mediated immunity – Humoral immunity
- 4.5 Vaccines - Immunisation schedule.

Unit 5 (11 Hrs)

Developmental Biology - Introduction

- 5.1 Rabbit : Gametogenesis - Fertilisation - Cleavage - Blastulation - Gastrulation and Organogenesis (brief study)
- 5.2 Placenta - Types and Function.

5.3 Recent Trends in reproductive biology - Induced ovulation and its applications. - Test tube babies. Cloned babies and embryo transfer.

BOOKS FOR REFERENCE

Ahsan,J.& S.P. Sinha, (1985), **Handbook of Economic Zoology**, S.Chand & Co., New Delhi.

Dhami, P. S & J.K. Dhami, (1983), **Invertebrate Zoology**, S.Chand & Co., New Delhi.

Ekambaranatha Ayyar,M. & T. N. Anantha Krishnan, (1987), **Outlines of Zoology Vol.I & II**, S.Viswanathan & Co., Madras.

Gardner, Eldon, J., Micheal, J. Simmons, and Peter D Snustand, (1991), **Principles of Genetics (8th ed.)**, John Wiley And Sons Inc., New York.

Jonathan Brostoff, David Male and Ivan M Roitt, (1994), **Immunology**, Karger, Barel.

Jordan, E. L. & P.S. Verma, (2002), **Chordate Zoology**, S.Chand & Co., New Delhi.

Majupuria,T. C., (1985), **Invertebrate Zoology**, S. Nagin & Co., New Delhi.

Rastogi,V. B. & M.S. Jayaraj, (1988), **Developmental Biology**, Kedarnath Ramnath Publishers, Meerut.

Shukla, G. S. & V.B. Upadhyay, (1994), **Economic Zoology**, Rastogi Publications, Meerut.

Verma, P. S, V.K. Agarwal,. & B.S. Tyagi, (1991), **Chordate Embryology**, S.Chand & Co., New Delhi.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 2 Hours

QUESTION PAPER PATTERN

Section A – 10 x 2 = 20 Marks (All questions to be answered)

Section B – 4 x 5 = 20 Marks (4 out of 6 to be answered)

Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
General Elective Course Offered by Department of Zoology to students of
B A. / B.Sc. / B.Com. Degree

SYLLABUS

(Effective from the academic year 2010 - 2011)

HUMAN HEALTH AND GENETICS

CODE :ZL/GE/HG 24

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

✓ *Students of Zoology – not eligible*

OBJECTIVES OF THE COURSE

- To highlight the various dimensions of human health with reference to nutrition, environment and disease.
- To gain basic knowledge in Human Genetics and recent advances in the field of Genetics

Unit 1 (5 Hrs)

Human Health

- 1.1. Nutritional requirements - Carbohydrates - Proteins - fats - vitamins – minerals – fibre – anti oxidants
- 1.2. Balanced diet
- 1.3. Deficiency diseases – hypoglycemia, Marasmus, Kwashiorkor, Anemia, Goiter, Osteoporosis and Deficiency diseases of vitamins.
- 1.4. Eating disorders – Anorexia nervosa and Bulimia nervosa.
- 1.5. Food hygiene

Unit 2 (8 Hrs)

Communicable diseases

- 2.1. Disease cycle – Vaccination
- 2.2. Bacterial diseases – Cholera, Tuberculosis, Syphilis, Leptospirosis
- 2.3. Viral diseases – Rabies, Hepatitis, AIDS, Pox virus
- 2.4. Protozoan disease – Amoebiasis, Malaria
- 2.5. Helminth diseases – filariasis, Ascariasis

Unit 3 (10 Hrs)

Non Communicable disease / disorders / conditions

- 3.1 Hyper tension, Diabetes, Obesity
- 3.2 Thyroid Disorders
- 3.3 Cancer (Breast and Cervical)
- 3.4 Neurotic disorder (Phobia), Psychotic disorder ((Schizophrenia)
- 3.5 Infertility in man – causes – Assisted Reproductive Technology

Unit 4 (13 Hrs)

Genetic material and types of inheritance

- 4.1 Human gametes and their role in heredity – Human chromosomes – DNA the genetic material

- 4.2 Mendelian Genetics (Brief outline) – Incomplete dominance (Hair, straight / curled) – Codominance (Sickle cell anemia) – Multiple allelic inheritance (Blood groups in man).
- 4.3 Different types of inheritance: Polygenic inheritance (Skin colour in man), X – linked inheritance (Haemophilia) Y – linked inheritance (Hypertrichosis) – Autosomal dominant (Huntington disease) – autosomal recessive (Albinism) – Mitochondrial inheritance (Kearns sayre syndrome).
- 4.4 Sex determination in Man.

Unit 5 (11 hr)

Genetic disorders and Genetic Engineering

- 5.1 Chromosomal disorders : Down Syndrome, Turner syndrome, Klinefelter Syndrome, Cat cry Syndrome and Philadelphia Chromosome.
- 5.2 Metabolic disorders : Phenylketonuria, Albinism, Tay Sachs's disorder, Huntington disease and Lactose intolerance
- 5.3 Genetic counselling – Eugenics
- 5.4 A fundamental understanding of recent advances in the field of Genetics – Genetic engineering – Genetically modified foods – Gene therapy

BOOKS FOR REFERENCE

Baumann, Robert, W., (2006), **Microbiology**, Pearson – Benjamin Cummings, San Francisco.

Brown Judith, E., (2003), **Nutrition Now**, 3rd edition, Wadsworth Thomson Learning, Canada.

Gardner, E.L., Michael. J. Simmons & Peter Snustad, D., (1991), **Principles of Genetics**, John Wiley & Sons, Inc. New York.

Group Nutrition Intervention, Management Manual, (1982), **Dept. of Food**, Ministry of Agriculture, Govt. of India.

Park, J.E. & K. Park, (1986), **A Textbook of Preventive and Social Medicine**, M/s. Banarsidas Bhanot Publishers, Jabalpur.

Raven, Peter, H. & George B. Johnson, (1994), **Understanding Biology**, Mosby Year Book, U.S.A.

Suzanne Le Quesne, (2006), **Nutrition – A Practical Approach**, Thomson Learning, U.K.

Swaminathan, M., (1993), **Advanced Text Book on Food and Nutrition** Vol I and II. The Bangalore printing & publishing Co., Ltd., Bangalore.

Winchester, A.M., (1974), **Genetics**, Oxford & IBH Publishing & Co., Calcutta.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 2 Hours

QUESTION PAPER PATTERN

Section A – 10 x 2 = 20 Marks (All questions to be answered)

Section B – 4 x 5 = 20 Marks (4 out of 6 to be answered)

Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Zoology to students of Plant Biology and Plant Biotechnology

SYLLABUS

(Effective from the academic year 2010 - 2011)

GENERAL ZOOLOGY – II

CODE :ZL/AC/GZ 23

CREDITS: 3

L T P: 3 0 0

TOTAL TEACHING HOURS: 39

OBJECTIVE OF THE COURSE

- To provide students with a basic knowledge of man's relationship with organisms from the economic point of view.

Unit 1 (6 Hrs)

Animals in Relation to Human Welfare

- 1.1 Introduction - Scope - Culture of economically important species
- 1.2 *Apis indica* – *Bombyx mori* – Culture of Indian major carps

Unit 2 (10 Hrs)

Human Pathogens

- 2.1 Introduction-Diseases of Human : Causative organism - mode of transmission - symptoms - diagnosis and control of the following :
- 2.2 Virus: Rabies - Japanese encephalitis - AIDS
- 2.3 Bacteria: Diphtheria - Pertussis – Tetanus – Tuberculosis - Cholera.
- 2.4 Protozoa: Amoebiasis - Malaria
- 2.5 Helminthes: Ancylostomiasis - Elephantiasis

Unit 3 (8 Hrs)

Developmental Biology : Introduction - Phases of Development.

- 3.1 Types of Vertebrate Eggs
- 3.2 Cleavage - blastulation and gastrulation in Rabbit
- 3.3 Placentation in mammals
- 3.4 Induced Ovulation and its applications.
- 3.5 Assisted reproductive technology – test tube babies – bioethical issues

Unit 4 (9 Hrs)

Human Physiology - Introduction

- 4.1 Respiration - Definition - Haemoglobin - Oxygen and Carbondioxide transport.
- 4.2 Circulation - Definition - Composition of blood - Structure and working of heart - regulation of the heart beat.
- 4.3 Excretion – Structure of Kidney – Nephron – Urea Cycle – Formation of Urine

Unit 5**(6 Hrs)****Human Genetics**

5.1 Human blood groups (A, B, AB, and O), Rh factor - Inheritance and their significance

5.2 Hereditary diseases / disorders – Albinism, Huntington disease, Haemophilia & Kearns – Sayre Syndrome – Down’s syndrome and Klinefelter’s syndrome.

BOOKS FOR REFERENCE

Ahsan, J. & S.P. Sinha, (1985), **Handbook of Economic Zoology**, S.Chand & Co, New Delhi.

Balinsky, B.I., (1981), **An Introduction to Embryology**, W. B. Saunders, Philadelphia.

Chatterjee, K. D., (1982), **Parasitology**, Chatterjee Medical Publishers, Calcutta.

Gardner, Eldon, J., Micheal J. Simmons, and Peter D. Snustand, (1991), **Principles of Genetics (8th ed.,)**, John Wiley and Sons Inc., New York.

Gardner, E.J. (1984), **Principles of Genetics**, John Wiley & Sons.

Guyton, A.C., and John E. Hall, (2005), **Human Physiology, Text book of Medical Physiology**, W B Saunders, Philadelphia.

Hoar, W.S., (1975), **General and Comparative Physiology**, Prentice Hall of India Pvt. Ltd., New Delhi.

Hole, J., (1994), **Essentials of Human Anatomy and Physiology**, Brown Publications.

Jhingran, V. G., (1982), **Fish and Fisheries of India**, Hindustan Publishing Corp., New Delhi.

Rastogi, V. B. and M.S. Jayaraj, (1988), **Development Biology**, Kedarnath Ramnath Publishers, Meerut.

Shukla, G. S. and V.B. Upadhyay, (1994), **Economic Zoology**, Rastogi Publications, Meerut.

Verma, P. S., V.K. Agarwal, and B.S.Tyagi, (1991), **Chordate Embryology**, S.Chand and Co., New Delhi.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Offered by the Department of Zoology to students of Plant Biology and
Plant Biotechnology**

SYLLABUS

(Effective from the academic year 2010 - 2011)

GENERAL ZOOLOGY – PRACTICAL

CODE :ZL/AC/P1 22

CREDITS: 2

L T P: 0 0 2*

TOTAL HOURS: 52

1. Dissections

Invertebrata:

Periplaneta americana : Digestive and Nervous Systems

Mounting : Mouth parts of Cockroach and Honey bee
Sting apparatus of Honey bee

Chordata:

Rana hexadactyla : Digestive and Urinogenital Systems

2. Identification and description of the following Invertebrates and Chordates

Sponge : *Euplectella*

Coelenterata : Sea Anemone

Mollusca : Pearl Oyster

Prochordate : *Amphioxus*

Pisces : Shark

Reptilia : Russell's Viper and Dryophis

3. Spotters

Structure and identification of different castes of *Apis indica*.

Equipment needed for Apiculture

Structure, identification and life history stages of *Bombyx mori*

Tools of Sericulture

Economic importance of honey bees and silk worms.

3. Food Fishes

Description of at least 4 important food fishes - *Catla catla* - *Mugil cephalus*
- *Sardinella longiceps* – *Rastralliger kanagurta*

4. Haematology

ABO - Blood grouping

Rh – typing

Morphology of W.B.Cs

5. Embryology

Examination of different kinds of vertebrate eggs - Frog, Chick and Mammal.

Study of prepared slides of cleavage, blastulation and gastrulation stages of Frog.

Placenta – Sheep – Pig.

6. **Parasitology** - Identification of - *Entamoeba histolytica* - *Plasmodium spp.* - *Taenia solium* - *Ascaris lumbricoides* - *Ancylostoma duodenale* - *Wuchereria bancrofti* and *Hirudinaria granulosa*.

Record Work

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

* Practicals – 2 hrs in I Semester and 2 hrs in the II Semester.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	25 marks
Question – II	Minor Question(Mount and Diagram)	15 marks
Question – III	Spotters (Five)	10 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Zoology to students of
B A. / B.Sc. / B.Com. Degree**

SYLLABUS

(Effective from the academic year 2010 - 2011)

CONCEPTS IN ANIMAL WELFARE

CODE :ZL/GE/AW 32

CREDITS: 2

L T P: 2 0 0

TOTAL TEACHING HOURS: 26

OBJECTIVES OF THE COURSE

- To promote a humane, caring attitude towards animals
- To encourage consideration for the physical and mental needs of animals
- To create an awareness about the use of non animal alternatives
- To reduce any stress, pain or fear inflicted upon animals by humans.

Unit 1 (13 Hrs)

Animal Welfare – Introduction and Behavioural Indicators

- 1.1. Science, Ethics and Law
- 1.2. Mental, Physical and Natural Welfare
- 1.3. Concepts of needs
- 1.4. Welfare and Death
- 1.5. Five Freedoms
- 1.6. Factors that contribute to animal behaviour
- 1.7. Animal choices
- 1.8. Recognition of normal behaviour
- 1.9. Possible causes of abnormal behaviour

Unit 2 (8 Hrs)

Human – Animal Interactions

- 2.1. The contributions of animals to human society – Cultural and historical influences
- 2.2. Wildlife – companion animals – research animals – farm or food animals.
- 2.3. Conflict in attitudes to animals.
- 2.4. Relationship between animal abuse and human violence

Unit 3 (15 Hrs)

Ethical concerns

Exploitation of animals

- 3.1 Introduction – CITES (Convention on International Trade in Endangered Species), AATA and IATA
- 3.2 Wildlife trade – Turtle trade – Fur – mink – bear farms – whaling – leather – snake skins – Exotic pet trade

3.3 Animals in sport / entertainment – jalli kattu, rekla, hunting, angling, horse races, circuses, horse and elephant polo – cock fight – insect fight – spider fight

Animal testing

3.4 Animals used for research – Regulatory tests using animals – drug testing – toxicology testing – LD50 – Draize test – Endocrine Disruptor Screening – Cosmetic product testing – Eye irritation – Skin irritation – Skin corrosion – Photo – toxicity – Photo – irritation – Percutaneous absorption – Animals used for education – Case Studies.

Animal Suffering

3.5 Behavioural assessment of animal pain – Dairy cows and veal calves – Egg – laying hens and chickens bred for meat – Transport towards death – Slaughter and death

Unit 4 (8 Hrs)

Environment protection and animal welfare – national and international legislations.

4.1 Animal protection laws – Animal Welfare Act – The Prevention of Cruelty to Animals Act

4.2 Wildlife Act – The Wild Life (Protection) Amendment Act

4.3 Forest Conservation Acts – Biodiversity Act

4.4 Animal Welfare Organizations – Blue cross – SPCA – WSPA – PETA – ANIMAL WELFARE BOARD OF INDIA – PFA – The International Fund for Animal Welfare (IFAW)

4.5 Deforestation and global warming – impact on wild life.

Unit 5 (8 Hr)

Humane approach to animals

5.1 Alternatives to animal testing – 3Rs – Reduction – Refinement – Replacement – use of alternative methods.

5.2 Use of alternatives in education

5.3 Cruelty free products – replacement for animal testing in cosmetic industry

5.4 Caring of animals – Basic Assessment of Animal Health and Welfare – First aid for animals – ABC DRILL – useful techniques in administering first aid.

BOOKS FOR REFERENCE

Gentle, M.J., (1992), **Pain in Birds**, Animal Welfare 1:242.

Gregory NG., (1998), **Animal Welfare and Meat Science**, CABI Publications.

Joyce D'Silva, (2002), **Farm Animal Genetic Engineering and Cloning**, Compassion in World Farming Trust.

Michael Fox., D.V.M., (1987), **Do Fish Have Feelings**, The Animals' Agenda. Pp.24-29.

Russel, W.M.S. and R.L. Burch, R.L., (1959), **The Principle of Humane Experimental Technique**, London.

Rutherford, K.M.D., (2002), **Assessing Pain in Animals**, Animal Welfare, 11, 31-53.

Smyth, D., (1978), **Alternatives to Animal Experiments**, Scolar Press, London.

WSPA – World Society for the protection of the Animals, Concepts in Animal Welfare Contents, Introduction, Explanatory notes and further resources, University of Bristol.

Animal Suffering in the Broiler Industry : A COK Report, Compassion in World Farming Trust.

Council of Europe, (1986), **European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes**, pp.51.

ALTWEB : Alternatives to animal testing, The Johns Hopkins Center for Alternatives to Animal Testing (CAAT)

PATTERN OF EVALUATION (Totally Internal)

CONTINUOUS ASSESSMENT (CA): 1 hr Test – 25 Marks
One Component – 25 Marks

This will be converted to 100 marks by Controller of Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

General Elective Course Offered by Department of Zoology to students of
B A. / B.Sc. / B.Com. Degree

SYLLABUS

(Effective from the academic year 2010 - 2011)

PRINCIPLES OF IMMUNOLOGY

CODE :ZL/GE/PI 32

CREDITS: 2

L T P: 2 0 0

TOTAL TEACHING HOURS: 26

✓ *Students of Zoology – not eligible.*

OBJECTIVE OF THE COURSE

- To introduce the students to the basic concepts of Immunology.

Unit 1 (15 Hrs)

Basics of Immunology

- 1.1 Introduction - History and Basics of Immunology, Types of antigen.
- 1.2 Natural and Acquired immunity.
- 1.3 Humoral and Cell mediated immunity.
- 1.4 Characteristics of immune responses.

Unit 2 (8 Hrs)

Cells and organs of the immune system

- 2.1 Cells and tissues of the immune system.
- 2.2 Primary and Secondary Lymphoid organs - B and T cell functions.

Unit 3 (5 Hrs)

Immunoglobulins

- 3.1 Structure - types and characteristics.

Unit 4 (15 Hrs)

Immune Response

- 4.1 Innate Immunity and complement system.
- 4.2 Hypersensitivity reactions – anaphylaxis – Delayed hypersensitivity

Unit 5 (9 Hrs)

Vaccines and Prophylaxis

- 5.1 Principles and types of vaccines used in Humans.
- 5.2 Use of Immune serum for therapy - antivenin, antitetanus serum and anti - D.
- 5.3 Hybridoma technology and uses of monoclonal antibodies.

TEXT BOOK

Ashim K. Chakravarthy, (1997), **Immunology**, Tata McGraw Hill Publishing Co., New Delhi.

BOOKS FOR REFERENCE

Coico, R., Sunshine, G and Benjamini, E., (2003), **Immunology**, John Wiley & Sons.

Goldsby, R.A., Thomas J. Kindt, Barbara A. Osborne, (2000), **Kuby Immunology**, 4th edition, W.H. Freeman and Company, New York.

Jonathan Brostoff, David Male, and Ivan M Roitt, (1994), **Immunology**, Karger, Barel.

Parslow, T.G., Stites, D.P., Terr, A.I and Imboden, J.B., (2001), **Medical Immunology**, Lange Medical Books / McGraw Hill,

Paul, W.E., (1989), **Fundamental Immunology**, Raven Press, New York, ISBN 0-88167.

Reeves, G and I. Todd, (2000), **Immunology**, Blackwell Science Co., Oxford.

Roitt, I.M, (1994), **Essential immunology**, Blackwell Science, Oxford..

Srivastava, R., Ram, B.P. and P.Tyle, (1991), **Molecular mechanisms of Immune regulation**. VCH Publisher Inc., New York, ISBN 3-527-28193-2

Slites, D.P., J.D. Stobo, H.H. Fundenberg, and J.V. Wells, (1984), **Basic and Clinical immunology** : 5th Edn. Large Medical Publication, USA, Maruzen Asia, Singapore.

Wise, D.J and G. R. Carter, (2002), **Immunology – A Comprehensive Review**, Blackwell Science Co., Oxford.

PATTERN OF EVALUATION (Totally Internal)

CONTINUOUS ASSESSMENT (CA): 1 hr Test – 25 Marks

One Component – 25 Marks

This will be converted to 100 marks by Controller of Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

IMMUNOLOGY

CODE :ZL/MC/IM 34

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVE OF THE COURSE

- To introduce the students to the basic concepts of Immunology.

Unit 1	(18 Hrs)
Basics of Immunology	
1.5 Introduction - History and Basics of Immunology, Types of antigen.	
1.6 Cells and tissues of the immune system.	
1.7 Primary and Secondary Lymphoid organs - B and T cell functions	
1.8 Natural and Acquired immunity.	
1.9 Humoral and Cell mediated immunity.	
1.10 Characteristics of immune responses.	
Unit 2	(10 Hrs)
Immunoglobulins	
2.1 Structure - types and characteristics	
2.2 Antigen – Antibody reaction	
Unit 3	(16 Hrs)
Immune Response	
3.1 Innate Immunity and complement system.	
3.2 Hypersensitivity reactions.	
3.3 Transplant rejection – causes – suppression	
Unit 4	(15 Hrs)
Mediators of Immune System And Immune-Regulation	
4.1 Cytokines – Properties – Receptors – Role of major Cytokines in Immune response.	
4.2 Immune reactions in Viral, Bacterial and Parasitic infections.	
Unit 5	(3 Hrs)
Vaccines and Prophylaxis	
5.4 Principles and types of vaccines used in Humans.	
5.5 Use of Immune serum for therapy - antivenin, antitetanus serum and anti - D.	

TEXT BOOK

Ashim K. Chakravarty, (1997), **Immunology**, Tata McGraw Hill Publishing Co., New Delhi.

BOOKS FOR REFERENCE

Coico, R., G. Sunshine, and E. Benjamini, (2003), **Immunology**, John Wiley & Sons.

Goldsby, R.A. Thomas J. Kindt, Barbara A. Osborne, (2000), **Kuby Immunology**, 4th edition, W.H. Freeman and Company, New York.

Jonathan Brostoff, David Male, and Ivan M Roitt, (1994), **Immunology**, Karger, Barel.

Parslow, T.G., D.P. Stites, A.I. Terr, and J.B. Imboden, (2001), **Medical Immunology**, Lange Medical Books / McGraw Hill,

Paul, W.E., (1989), **Fundamental Immunology**, Raven Press, New York, ISBN 0-88167.

Reeves, G and I. Todd, (2000), **Immunology**, Blackwell Science Co.,

Roitt, I.M, (1994), **Essential immunology**, Blackwell Scientific, Oxford, ISBN:0-632.

Srivastava, R., Ram, B.P. and P.Tyle, (1991), **Molecular mechanisms of Immune regulation**. VCH Publisher Inc., New York, ISBN 3-527-28193-2

Slites, D.P., Stobo, J.D., Fundenberg, H.H. and J.V. Wells, (1984), **Basic and Clinical immunology** : 5th Edn. Large Medical Publication, USA, Maruzen Asia, Singapore.

Wise, D.J and Carter, G.R., (2002), **Immunology – A Comprehensive Review**, Blackwell Science Co.,

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

MEDICAL LABORATORY TECHNOLOGY

CODE :ZL/MC/LT 34

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To teach a non-professional about the foundations of clinical theory and practice and to gain a general knowledge of the body structure and functions in health and disease.
- To enable students to understand the basic scientific principles of clinical instruments, protocol, data interpretation and analysis of the selected tests. (Experimental materials are samples of blood, urine and faeces).

Unit 1 (4 Hrs)

Introduction

- 1.1. Good Lab Practices (GLP)
- 1.2. Sterilisation of laboratory items
- 1.3. Preparation of Reagents - Preparation of R.B.C ; W.B.C. fluids, normal saline, Leishman's stain, Ringer solution.

Unit 2 (22 Hrs)

Haematology

- 2.1 Venous and Capillary blood collection techniques - anticoagulants - modes of action and uses.
- 2.2 Formed elements of blood - haemopoiesis - erythropoiesis - R.B.C - normal structure - total count - packed cell volume - Wintrobe's and Microhaematocrit Techniques – total reticulocyte count - Erythrocyte Sedimentation Rate - Westergren's Method - Haemoglobin estimation - Sahli's and Drabkin's methods - Different types of Anaemia - Polycythemia.
- 2.3 W.B.C. - Leucopoiesis - total W.B.C count - preparation of blood smear for differential count - different types of W.B.C - leucocytosis - leucopenia, leukemia.
- 2.4 Blood platelets - Platelet counting.
- 2.5 Immunohaematological studies - Blood groups and Rh-types. Blood grouping and Rh-typing.
- 2.6 Blood transfusion.
- 2.7 Blood coagulation - process and theory - bleeding time - clotting time - Prothrombin Time.

Unit 3 (18 Hrs)

Pathology

- 3.1 Urine - Macroscopic, microscopic and chemical analysis.
- 3.2 Motion analysis for common protozoan and helminthic intestinal parasites.
- 3.3 Analysis of Cerebrospinal fluid.
- 3.4 Analysis of seminal fluid.
- 3.5 Examination of blood smear for malarial parasite and microfilaria - life history stages.
- 3.6 Pathology of AIDS, TB and Hepatitis - mode of infection - pathological changes and symptoms.
- 3.7 Biomedical Wastes – Classification – Characteristics and potential health hazards – Biomedical Waste (BMW) management – rules and regulations

Unit 4 (6 Hrs)

Clinical Biochemistry

- 4.1 Blood glucose, Blood Urea and Total Serum Cholesterol estimation - ranges in health and disease and interpretation.
- 4.2 Physiology and biochemistry of the serum enzymes – Aspartate Transaminase (AST) and Alanine Transaminase (ALT)

Unit 5 (2 Hrs)

Clinical Immunology

- 5.1 Laboratory Pregnancy tests
- 5.2 Principles of ELISA, RIA Tests and Western Blot Test

TEXT BOOK

Sood, R., (1994), **Medical Laboratory Technology, Methods and Interpretations**, (4th ed.), Jaypee Brothers Medical Publishers, New Delhi.

BOOKS FOR REFERENCE

Baker, F.J., R.E. Silverton, and C.J. Pallister, (2001), **Baker and Silverton's Introduction to Medical Laboratory Technology**, 7th ed., Hodder Arnold Publication.

Bauer, J.D., (1990), **Clinical Laboratory Methods** (9th ed.), B.I. Publication Ltd., New Delhi, India.

Estridge B.H., A.P. Reynolds, and N.J. Walters. (2002), **Basic Medical Laboratory Techniques**, 4th ed., Delmar Thomas Learning, Africa and Australia.

Guyton, A.C., (1986), **A Text Book of Medical Physiology** (7th ed.), W.B.Saunders Co., Philadelphia, London, 1057pp.

Henry, J.B., (1989), **Clinical Diagnosis and Management by Laboratory Methods** (17th ed.), W.B. Saunders Co., Philadelphia. 1502pp.

Kumar, P.J., and M.L. Clark, (1990), **Clinical Medicine A Text Book for Medical Students and Doctors**, ELBS., 1116pp.

Mukherjee, K.L., (1991), **Medical Laboratory Technology**, (Vol. I, II & III), Tata McGraw - Hill Publishing Co., Ltd., New Delhi.

Polansky, V.D., (2003), **Medical Laboratory Technology**, Boston Medical Publishing Corporation, U.S.A.

Raphael, S.S., (1983), **Lynch's Medical Laboratory Technology**, W.B. Saunders Co., Philadelphia, London. 845pp.

Widmann, F.K., (1984), **Clinical Interpretation of Laboratory Tests**, P.G. Publishing Pvt., Ltd., Singapore. 602pp.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY
SYLLABUS

(Effective from the academic year 2010 - 2011)

MEDICAL LABORATORY TECHNOLOGY AND IMMUNOLOGY -
PRACTICALS

CODE :ZL/MC/P3 32

CREDITS: 2

L T P: 0 0 3

TOTAL HOURS: 52

MEDICAL LABORATORY TECHNOLOGY

Haemoglobin estimation by Drabkin's method.
Blood Glucose estimation.
Blood Urea estimation.
Estimation of Serum Creatinine.
Estimation of Serum Amylase Activity.
Estimation of Serum Cholesterol
Observation of slides - Malarial Parasite, Microfilaria.

IMMUNOLOGY

Widal Slide agglutination test for Typhoid
VDRL Slide Flocculation test for Syphilis
Anti-A and Anti-B titration test
Direct Coombs test
ELISA – Qualitative test for pregnancy
Passive agglutination – Agglutination inhibition method for Detection of HCG in Urine
Isolation of Lymphocytes

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	20 marks
Question – II	Minor Question	15 marks
Question – III	Quiz	10 marks
Question – IV	Spotters (Two)	5 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Sociology, Botany and Zoology
for
B.A. / B.Sc. / B.Com. Degree**

SYLLABUS

(Effective from the academic year 2008 - 2009)

ETHNOBIOLOGY

CODE: SC/GE/EB 44

CREDITS: 4

L T S: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To become familiar with the nature of ethnobiological knowledge
- To gain an understanding of the diversity of approaches to plant resources among different human groups, and of fundamental significance of plants for foods, medicines, and in technology among peoples of different cultures.
- To gain an understanding of the rich cultural knowledge that human societies have about animals
- To gain understanding of the relationship to the environment that characterize different human societies.
- To engage in critical analysis of contemporary issues of conservation of traditional resources, the effects of globalization and issues surrounding intellectual property of traditional and local peoples in the global market place.

Unit 1 (10 Hrs)

Introduction

1.11 Introduction to Ethnology – Culture – Processes of Culture – Diffusion, Acculturation, Assimilation – Components of Culture – Traditions, Norms, Folkways, Mores, Conventions, Values and Beliefs.

1.12 Introduction to Ethnobiology

1.13 Ethnobiology

Unit 2 (10 Hrs)

Ethnobotany

2.3 Plants as Foods

2.4 Plants as Medicines

2.5 Plants for Technology

Unit 3 (12 Hrs)

Ethnozoology – Ethnozoological life forms.

3.4 Ethnoentomology – insects in medicine – Entomophagy

3.5 Frogs in popular culture – Salamanders in mythology – toad licking.

3.6 Ethnoherpetology – Serpent symbolism – herpetofauna used for food and medicine

- 3.7 Ethnoornithology – birds used for food, medicine and personal adornment and in rituals – Ethnoornithology and conservation
3.8 Mammals – used for food and medicine.

Unit 4 (12 Hrs)

Traditional Cultural Institutions

- 4.3 Marriage : Forms of marriage: Monogamy, Polygamy, Polygyny and Polyandry.
4.4 Kinship: Kinship terms, classificatory and descriptive system of Kinship, Kinship usages.
4.5 Family: Types, Functions, Patterns of residence, patterns of descent and authority, patterns of inheritance.
4.6 Religion: Definition of religion, Religion beliefs and practices: Magic, sorcery, Difference between magic, religion, totem and taboo.
4.7 Theories: Animism, Manism and Naturalism, Functional theory of religion – Totemism, Sacred and Profane.

Unit 5 (8 Hrs)

Ecological Knowledge and Contemporary Issues

- 5.6 Ethno Genetics – cloning, issues of identity and discrimination, Ethnogenetics and Nationalism, Traditional Ecological knowledge and Traditional Environmental Management.
5.7 Contemporary Issues: Traditional Cultures, Resource Management and Conservation, and Traditional Knowledge and Intellectual Property.

BOOKS FOR REFERENCE

Belas, R. and Hoijer, H., (1960), **Introduction to Anthropology**, Mac Millan, New Delhi.

Berlin, Brent, (1992), **Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies**, Princeton University Press.

Carol R. Ember, Melvin Ember, (1992), **Anthropology – A Brief Introduction**, Prentice Hall, New Jersey.

Cotton, C.M., (1996), **Ethnobotany, Principles and Applications**, John Wiley and Sons.

Ellen, R., (ed.) (2006), **Ethnobiology and The Science of Humankind**, Oxford: Blackwell.

Hansen, Stephen and VanFleet, Justin, (2003), **Traditional Knowledge and Intellectual Property : A Handbook on Issues and Options for Traditional Knowledge Holders in Protecting their Intellectual Property and Maintaining Biological Diversity**, American Association for the Advancement of Science (AAAS), Washington.

Indraneil Dass, (1998), **The Serpent's Tongue : A Contribution to the Ethnoherpetology of India and adjacent countries**, Chimaira Publications.

Minnis, P.E., (ed.), (2000), **Ethnobotany: A reader**, Norman: University of Oklahoma Press.

CONTINUOUS ASSESSMENT (CA) : 1 Hour Test – 25 Marks
One Component – 25 Marks

END SEMESTER EXAMINATION: 2 Hours Test – 50 Marks

QUESTION PAPER PATTERN:

Section A – 5 x 2 = 10 marks (Answer all 5 questions in 50 words each)

Section B – 5 x 5 = 25 marks (5 out of 8 questions to be answered in 200 words each)

Section C – 1 x 15 = 15 marks (1 out of 2 questions to be answered in 750 words)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
General Elective Course Offered by Department of Zoology to students of
B A. / B.Sc. / B.Com. Degree

SYLLABUS

(Effective from the academic year 2010 - 2011)

AQUACULTURE

CODE :ZL/GE/AQ 44

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVE OF THE COURSE

- To acquire a basic knowledge of Aquacultural potential, their practices, and the need for augmenting food production.

Unit 1 (12 Hrs)

Introduction : A brief study of the Abiotic and Biotic factors of the aquatic environment.

- 1.1 Classification of Aquaculture - Monoculture - Polyculture – Extensive – Semi intensive - Intensive Culture - Monosex Culture – Integrated fish farming – Sewage fed fish culture.
- 1.2 Qualities of cultivable forms
- 1.3 Hatchery technology – Nutritional requirements – Culture of Live Feed – Chlorella, Artemia and Rotifer, Daphnia.
- 1.4 Construction and management of fish farms – nursery, rearing and stocking ponds – Breeding Techniques.
- 1.5 Seed resources – Seed collection – collection of brooders – transport of seed and brooders.

Unit 2 (16 Hrs)

Culture of Fin Fishes

- 2.1 Recent trends in aquaculture – application of hormones - genetic engineering - genetic technologies for commercial aquaculture – hybridisation, sex control – transgenesis – hypophysation – eye stalk ablation.
- 2.2 Culture of Major carps – catfishes - *Oreochromis* spp
- 2.3 Ornamental fishes.
- 2.4 Marketing

Unit 3 (15 Hrs)

Culture of Shell fishes

- 3.1 Prawn Culture – Shrimp culture and induced breeding – eye stalk ablation.
- 3.2 Culture of mussels & Oysters - Pearl Production Technology.
- 3.3 Marketing

Unit 4 (5 Hrs)

Fish Parasites and Diseases

- 4.1 Bacterial diseases – Haemorrhagic Septicaemia, Fin and Tail rot, Abdominal dropsy;
- 4.2 Viral diseases – Epizootic Ulcerative Syndrome (EUS), Infectious Pancreatic Necrosis, Piscine Erythrocytic Necrosis(PEN);
- 4.3 Fungal disease – Saprolegniasis, Branchio mycosis;
- 4.4 Parasitosis (one parasite of each) – Protozoa, Helminthes, Annelida, Arthropoda; Nutritional disorders – Environmental disorders.

Unit 5 (4 Hrs)

Preservation and Processing Techniques.

- 5.1 Chilling - Freezing - Freeze-drying - Smoking - Salting - Canning (Very elementary knowledge).
- 5.2 By-products of fishery industry.

TEXT BOOK

Santhana Kumar, G. & Selvaraj, A. M., 1995, **Concepts of Aquaculture**, Meenam Publications, Nagercoil.

BOOKS FOR REFERENCE

Hickling, C. F., (1971), **Fish Culture**, Faber & Faber, London.

Jhingran, V.G., (1982), **Fish & Fisheries of India**, Hindustan Publishing Corpn., New Delhi.

Kurien, C. V. & V.C. Sebastian, (1993), Prawns, **Prawn Fisheries of India**, Hindustan Publishing Corpn., Delhi.

Santhanam, R., N. Sukumaran, and P. Natarajan, (1990), **A Manual of Freshwater Aquaculture**, Oxford & IBH Publishing Co., New Delhi.

Sinha, V. R. P., (1993), **A Compendium of Aquaculture Technologies for developing countries**, Oxford & IBH Publishing Co., New Delhi.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 2 Hours

QUESTION PAPER PATTERN

Section A – 10 x 2 = 20 Marks (All questions to be answered)

Section B – 4 x 5 = 20 Marks (4 out of 6 to be answered)

Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

MICROBIOLOGY

CODE :ZL/MC/MB 44

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide a basic understanding of the various types of microbes and their role in everyday life
- To study the functional morphology and growth and reproduction of bacteria and viruses.
- To provide a fundamental knowledge about Microbial diseases and their control.

Unit 1 (10 Hrs)

- 1.1 Introduction : The History and scope of microbiology
- 1.2 Outline classification of microbes with special reference to bacteria and viruses - Prokaryotes and Eukaryotes, characteristic features
- 1.3 Microbiological techniques : Microscopy, specimen preparation, staining techniques and systematic study of pure cultures.(Culture techniques)

Unit 2 (15 Hrs)

- 2.1 Archaea – characteristics (brief outline)
- 2.2 Bacteria : Gross morphology of bacterial cells - size, shape and arrangement. Structure of Bacterium – Capsule - Cell wall - plasma membrane – Flagellum, Structure and arrangement – Fimbriae, Structure and types - Cytoplasmic organelles and inclusions – Nucleoid, Molecular structure – Plasmids, types and functions – Endospore, Structure and significance – General Morphology of *Escherichia coli*.
- 2.3 Viruses : General properties – isolation and cultivation of viruses - structure and reproduction of T₄ phage – structure and multiplication of an animal virus, viroids and prions.

Unit 3 (18 Hrs)

- 3.1 Bacterial Growth : Reproduction and growth of bacterial population - growth curve – measurement of microbial growth – the continuous culture of microorganism. Physical conditions required for growth of bacteria – temperature, oxygen and pH requirements. Nutritional requirements - General nutritional classification of bacteria.
- 3.2 Microbial control : Importance of microbial control - Control of micro-organisms by physical agents - Control of micro-organisms by chemical agents - Antibiotics and other chemotherapeutic agents.

- 3.3 Recombination in bacteria : Types – Transformation – Conjugation – Transduction - Transposons and IS elements.

Unit 4 (12 Hrs)

- 4.1 The normal micro-biota of the human body: mouth and oropharynx, stomach, skin and small intestine, large intestine, vagina and urethra(brief study)
- 4.2 Disease cycle of a communicable disease- the epidemiology of infectious diseases: Airborne (influenza, tuberculosis, streptococcal, pneumonia)- Foodborne and Waterborne (botulism, typhoid, cholera) - Arthropod borne(plague, dengue fever and typhus) - Fomite borne – Nosocomial and Sexually transmitted diseases.

Unit 5 (10 Hrs)

- 5.1 Microbiology in everyday life Soil: microorganisms in soil – significance – biogeochemical cycles(carbon, nitrogen, sulphur and phosphorus) - their role in nutrient cycling.
- 5.2 Air: enumeration of microorganisms in air – significance – control of airborne microorganisms
- 5.3 Water: hydrologic cyclic – classification of water – bacteriological examination of domestic water – purification of water – sewage and its disposal
- 5.4 Milk: sources and types of microorganisms in milk – pasteurization of milk - dairy products (fermented milk and cheese)
- 5.5 Food: microbial spoilage of food – fermented food – food poisoning.

BOOKS FOR REFERENCE

Ananthanarayan, E, and C.K. Panicker, (1986), **Text Book of Microbiology**, Orient and Longman Ltd, Madras

Baumam, Robert W., (2006), **Microbiology**, Pearson Benjamin Cummings, San Francisco.

Berguist L.M., and P. Barbara (2002), **Microbiology – Principles and Health Science Applications**, W.B. Saunders Company, Philadelphia.

Brande, Abraham, I., (1982), **Microbiology**, W.B. Saunders, Philadelphia.

Eleanor Lawrence, (1989), **A Guide to Modern Biology**, Genetics, Cells and Systems, John Wiley and Sons Inc., New York.

Frazier Wic, (1978), **Food Microbiology**, Tata McGraw Hill, New Delhi.

Greenwood David, Richard Slack, John Peutherer and Micheal R. Barer, (2002), **Medical Microbiology**, 16th ed., Churchil Livingstone, New York.

Harvey, Richard, A. Pamela C Champe and Bruce D Fisher, (2007), **Microbiology, Lippincotts' Illustrated Reviews**, 2nd edition, Lippincott William, and Wilkins, Baltimore, U.S.A.

Hotter, P., (2002), **Encyclopaedia of Environmental Microbiology**, Vol. 1, 2 & 3., IVY Publishing House, Delhi.

Joshua, Anna. K., (1985), **Microbiology**, Popular, Madras.

Madigan, Michael, T and John M Martinko, (2005), **Brook Biology of Microorganism**, 11th edition, Pearson Prentice Hall, U.S.A.

Mahanta K.C., (1984), **Daily Microbiology**, Omoons New Delhi.

Michael, J. Pelczar, Jr, and E.C.S. Chan, (1981), **Elements of Microbiology**, McGraw Hill International Book Company, New Delhi.

Nester, Eugene, W. Denise G Anderson, Roberts C. Evans and Martha T Nester, (2005), **Microbiology – A Human Perspective**, 4th edition, Mc Graw Hill, New York.

Pommervillie, Jeffrey C., (2004), **Alcamo's Fundamentals of Microbiology**, 7th edition, Jones and Bartlett publishers, U.S.A.

Prescott, L.M., J.P. Harley, and D.A. Klein, (2005), **Microbiology**, 8th edition, McGraw Hill Publication, New York.

Purohit S.S., (1994), **Microbiology**, Fundamentals and Applications, Agrobotanical Publisher, (India).

Strohl, W.A., Harrie Rouse, and Richard A Harvey, (2001), **Microbiology**, Lippincot Williams & Wilkins, USA

Sullia, S.B., and Shantharam, S., (2001), **General Microbiology**, Oxford and IBH Publishing Co., Pvt., LTd., New Delhi.

Tortora, Gerard, J.,Berdelle R. Funk and Christine L Case, (2003), **Microbiology – An Introduction**, 8th edition, Benjamin Cummings Publishing Company, California.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

MICROBIOLOGY - PRACTICAL

CODE :ZL/MC/P4 42

CREDITS: 2

L T P: 0 0 3

TOTAL HOURS: 39

1. Microscopic identification of Microbes
2. Observation of bacteria motility – hanging drop preparation
3. Methods of sterilisation by heat - Flaming - Hot air oven - Autoclave - an observation
4. Preparation of nutrient agar, MaConkey agar,
5. Isolation of bacteria by pure culture using animal and human specimens - streak plate - pour plate methods.
6. Coliform count (presumptive test; confirmatory test) in drinking water samples by membrane filter technique – MPN (Most Probable Number of Bacteria).
7. Staining and examination of bacteria - simple staining - gram staining
8. Spoilage of food items (viz) milk - bread - fruits and vegetables – (observation)
9. Examination of milk - Methylene blue reduction test.
10. Demonstration of bacterial growth curve.
11. Antibiotic sensitivity test - Kirby Bauer diffusion method – (observation)
12. Collection and observation of antibiotics - their application and classification based on their biological origin and mode of action

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	25 marks
Question – II	Minor Question	15 marks
Question – III	Spotters (Four)	10 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

BIOMEDICAL INSTRUMENTATION AND TECHNIQUES

CODE :ZL/ME/BM54

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide a thorough knowledge of the instruments used in biological research and in the field of medicine.
- To equip students with a knowledge on the principle, construction and working of the instruments.
- To impart a practical knowledge on the use of some of these equipments.

Unit 1 (13 Hrs)

Microscopy

- 1.1 Principles and applications of Light, Phase Contrast, Fluorescence, SEM and TEM and other advanced types.
- 1.2 Autoradiography – X ray diffraction, Flow Cytometry and Cell sorting – FISH technique.

Unit 2 (12 Hrs)

Separation Techniques

- 2.1 Chromatography – Types – Paper – TLC – Gas and HPLC
- 2.2 Electrophoresis – Agarose – SDS Page – 2-D Gel Electrophoresis – Immunoelectrophoresis – (Biorad) – AAS.
- 2.3 Cell fractionation – Homogenization – Centrifugation – Types.

Unit 3 (4 Hrs)

DNA Diagnostic System

- 3.1 Hybridization probes – DNA Finger printing RAPD, RFLP
- 3.2 Autoanalyzer - Laser

Unit 4 (5 Hrs)

Recording and Ultrasonic Imaging Systems

- 4.1 Biomedical Recorders : EMG – PCG_VCG
- 4.2 Ultrasonic Imaging : MRI-PET-CT
- 4.3 Radiotherapy : GM and Scintillation Counters – High voltage X-ray machine – Medical linear Accelerator.

Unit 5**(9 Hrs)****Physiological Assist Devices**

5.1 Pacemakers – Pacemaker batteries – Artificial heart valves

5.2 Nerve and Muscle stimulators – Heart – Lung machine – kidney machines

5.3 Safety Instrumentation (A brief outline) Radiation safety Instrumentation –
Devices to protect against (electrical)

Visit to a Biomedical Instrumentation Centre.

BOOKS FOR REFERENCE

Andrews, A., (1986), **Electrophoresis Theory, techniques and biochemical and clinical applications**, Oxford University Press, Oxford.

Arumugam, M. (2001), **Biomedical Instrumentation**, Anuradha Agencies Publishers,

Gerald D., Fashnion, (1990), **Practical Handbook of Biochemistry and Molecular Biology**, CRC Press.

Khandpur, R.S. (1987), **Handbook of Biomedical Instrumentation**, Tata McGraw Hill Company Inc., New Delhi.

Khandpur, R.S. (2005), **Biomedical Instrumentation: Technology and Applications**, Tata McGraw Hill Company Inc., New Delhi.

Murray – Moo – Young, (1989), **Animal Biotechnology**, Pergamon Press, Oxford.

Old, R.W. and S.B. Primrose, (2003), **Molecular Biotechnology, 6th edition**, Blackwell Publishers, London.

Spier, R.E., and J.B. Griffiths, (1988), **Animal Cell Biotechnology**, New York.

Wilson, K., and J.B. Walker, (2000), **Practical Biochemistry, 5th edition**, Cambridge University Press.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

EVOLUTION

CODE : ZL/ME/EV54

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide a basic understanding of the evolutionary process which includes a brief general account of theories and evidence, the genetic basis of the evolutionary process as seen from the study of population genetics, speciation and various patterns in evolution, and adaptive radiation seen in different groups in the animal kingdom.
- To study a brief account on zoogeography, and types and barriers of animal distribution.
- To provide a brief survey of the biological and cultural factors in the evolution of man.

Unit 1 (25 Hrs)

Growth of Evolutionary Concept and Evidences

- 1.1 Introduction.
- 1.2 Origin of Life - Chemical and biochemical evolution.
- 1.3 A general account of evidences for evolution from the fields of comparative anatomy, physiology, bio-chemistry, embryology, palaeontology Geological Time scale - fossilization - dating of fossils - Indian fossils - Living fossils.
- 1.4 Theories of evolution - Lamarckism - Neo-Lamarckism - Darwinism - Neo-Darwinism - Modern synthetic theory of natural selection - mutation theory of De Vries – genetic variation.

Unit 2 (15 Hrs)

The Genetic basis of evolution

- 2.1 The evolutionary process as seen from the study of population genetics - mutation - migration - genetic drift - selection - with examples of population changes.
- 2.2 Species concept - Speciation - allopatric and sympatric - subspecies - sibling species - isolation in speciation.

Unit 3 (10 Hrs)

Modes of Evolution - Zoogeography

- 3.1 Convergent - Divergent evolution - Adaptation.
- 3.2 Co-evolution.
- 3.3 Mimicry and Colouration.
- 3.4 Patterns and evolution - Micro, Macro and Mega evolution.

- 3.5 Types of distribution of animals.
- 3.6 Barriers and methods of dispersal of animals.
- 3.7 Zoogeographical realms of the world - Island life.

Unit 4 (9 Hrs)

Evolution of Mammal

- 4.1 Evolution of Horse, elephant – Significance.
- 4.2 Evolution of Man - Biological and racial history – Human – a cultural domain

Unit 5 (6 Hrs)

Molecular Evolution

- 5.1 Molecular data – DNA – proteins – transposons and molecular markers
- 5.2 Advantages of molecular data over morphological data
- 5.3 C value – evolution of genome size in Prokaryotes, Eukaryotes and C value paradox
- 5.4 Reconstruction of evolutionary trees.

TEXT BOOK

Gopalakrishnan, T.S., Itta Sambasiviah, and A.P. Kamalakara Rao, (1995), Revised Edition, **Principles of Organic Evolution**, Pearl Publications, Madras - 40

BOOKS FOR REFERENCE

Ayala, F.J., (1979), **Evolving - The Theory and Process of Organic Evolution**, Benjamin Cummings Pub., Company, Inc., Redwood city, California 94065.

Cain, A.J., (1954), **Animal Species and their Evolution**, Hutchinson University Library, London.

Charles, Darwin., (1909), **The Origin of Species**, John Murray, London.

Colbert, E.H. (1961), **Evolution of the Vertebrates**, Wiley Eastern Private Limited, New Delhi.

Dobzhansky, T. (1964), **Evolution, Genetics and Man**, John Wiley and sons, New York.

Dodson, E.O., (1960), **Evolution Process and Product**, Reinhold publishing Co., New York.

Ehrlich, P.R. and Richard, W.Holm. (1963). **The Process of Evolution**, McGraw Hill., New York.

Fisher, R.A., (1958), **The Genetical theory of Natural Selection**, Oxford, London.

Futuyma, D. J., (2005), **Evolution**, Sinauer Associates inc., Suuder land, Massachusetts, U.S.A.

Futuyma, D. J., (1997), **Evolutionary Biology**, Sinauer Associates inc., Suuder land, Massachusetts, U.S.A.

Graur, Dan and Wen Hsiung Li, (2000), **Fundamentals of Molecular Evolution**, Sinauer Associates Inc., Sunderland, Massachusetts, U.S.A.

Li, W.H., (1997), **Molecular Evolution**, Sinauer Associates Inc., Sunderland, Massachusetts, U.S.A.

Mayr, E., (1963), **Animal Species and Evolution**, Harvard University Press, Cambridge, M.A.

Moody, P.A., (1978), **Introduction to Evolution**, Harper and Bros., New York.

Napier, J.R., (1972), **Primates and their Adaptations**, Oxford University Press., London.

Pilbeam, D.R., (1970), **The Evolution of Man**, Thames and Hudson, London.

Simpson, G.G., (1969), **The Meaning of Evolution**, Oxford and IBH Publishing Co. (Revised Indian Edition), New Delhi - 1.

Sheppard, P.M., (1967), **Natural Selection and Heridity**, Hutchinson Univ.Library, London.

Stebbins, G.L., (1969), **Basis of Progressive Evolution**, The University of North Carolina Press, Chapel Hill.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

CELL AND MOLECULAR BIOLOGY

CODE :ZL/MC/CM 54

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide a comprehensive introduction to cellular and molecular biology; it deals with the essential principles and processes at cellular and molecular level.
- To impart a thorough knowledge about the structure and function of various cellular organelles and macromolecules at biochemical and molecular level.
- To equip the students preparing for a career in biology and related fields.

Unit 1 (11 Hrs)

Prokaryotic and Eukaryotic Cells

- 1.1. Structural and Functional organisation.
- 1.2. Origin of Eukaryotic Cells.

Unit 2 (7 Hrs)

Cytoplasmic cell Organelles : Structure and Function

- 2.1 Cell Membrane
- 2.2 Cytoplasmic Vacuolar System – Endoplasmic Reticulum – Golgi Apparatus – Microtubules
- 2.3 Lysosomes - Microbodies – Mitochondria and Chloroplast
- 2.4 Ribosomes

Unit 3 (21 Hrs)

Gene Expression and Protein Synthesis

- 3.1 Structural Organization of Prokaryotic and Eukaryotic Gene
- 3.2 Regulation of Gene Expression in Bacteria – Operon Model
- 3.3 Transcription – Structure and Biosynthesis of various RNAs – Transcription Factors – Promoters and Enhancers.
- 3.4 Post Transcriptional Modifications – Antisense RNA
- 3.5 Mechanism of Translation
- 3.6 Post Translational Modifications – Glycosylation and Phosphorylation – Collagen and Insulin.

Unit 4 (11 Hrs)

The Nucleus and Cell Cycle

- 4.1 Nuclear Organisation
- 4.2 Nucleolar Genome
- 4.3 Chromosome – Structure and Function

4.4 Cell Cycle and its Regulation

4.5 Nucleic Acids: Molecular Structure of DNA and RNA – Replication of DNA

Unit 5

(15 Hrs)

Applications of Molecular Biology

5.1 DNA Sequencing and its Applications

5.2 Molecular Medicine: Definition – Gene Therapy with SCID as example.

TEXT BOOK

Rastogi C.S. (2006), **Molecular Biology**, CBS Publishers, New Delhi.

BOOKS FOR REFERENCE

Alberts, Bruce, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter, (2002), **Molecular Biology of the Cell**, 4th Edition, Garland Publishing, New York.

Karp, Gerald, (2003), **Cell and Molecular Biology**, Third Edition, John Wiley and sons., Inc., New Jersey.

Lodish, Harvey, David Baltimore and Arnold Bert, (2004), **Molecular Cell Biology**, 5th Edition, W.H. Freeman and Company, New York.

Watson, J.D., Tania A Baker, Stephen P. Bell, Alexander Gann, Michael Levin and Richard Losick, (2007), **Molecular Biology of the Gene**, 6th Edition, The Benjamin Cummings, Publishing Company Inc., California.

Wolfe, Stephen., I., (1993), **Molecular and Cellular Biology**, Wadsworth Publishing Company, California.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

GENETIC ENGINEERING

CODE :ZL/MC/GG 54

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To enhance the study of biology and its utility to human welfare by studying biotechnology in general and genetic engineering in particular.
- To create an awareness on the principle, tools and technology of Genetic engineering

Unit 1 (20 Hrs)

Introduction to Genetic Engineering

- 1.1 Scope and importance.
- 1.2 Definition and areas of biotechnology.
- 1.3 Tools of genetic engineering - Enzymes recombinant DNA technology - Passenger DNA - Cloning vectors - cDNA library - Gene bank - Electrophoresis - Northern, Southern and Western blots - PCR Technique.
- 1.4 Basic concept of Bioinformatics – Proteomics and Genomics.

Unit 2 (10 Hrs)

Techniques of Genetic engineering

- 2.1 Cloning in prokaryotes.
- 2.2 Cloning in eukaryotes - Cloning with Agrobacterium plasmids.
- 2.3 Methods of transfer of foreign DNA into cells - Electroporation - Particle bombardment gun – Microinjection.
- 2.4 Site - directed mutagenesis.

Unit 3 (15 Hrs)

Genetic engineering for human welfare

- 3.1 Cloned genes and production of growth hormones, vaccines and commercial chemicals.
- 3.2 Prevention, diagnosis and cure of disease - Vaccines, Diagnosis with DNA probe, ELISA technique, Hybridoma technology – Monoclonal antibodies - DNA finger printing - Gene therapy.
- 3.3 Production of transgenic animals and plants - IVF technology in farm animals and humans.
- 3.4 Animal cell and tissue culture techniques – culture media – natural and artificial – primary and secondary cell lines – culture methods – merits and demerits

Unit 4 (12 Hrs)

Applications of Genetic Engineering

- 4.1 Principles of Genetic engineering
- 4.2 Benefits and Hazards of Genetic engineering
- 4.3 Role of genetically engineered microorganisms

Unit 5 (8 Hrs)

Human Genome Project

- 5.1 Ethics
- 5.2 Gene Manipulation
- 5.3 IPR and Patenting

TEXT BOOK

Dubey, R.C., (1995), **A Text Book of Biotechnology**, S.Chand & Company Ltd., New Delhi.

BOOKS FOR REFERENCE

Albert Sasson, (1984), **Biotechnologies, Challenges and Promises**, Oxford & IBH Publishing Co., Pvt., Ltd., New Delhi, India.

Bilgrami, K.S., & A.K. Pandey, (1992), **Introduction to Biotechnology**, B.S. Publishers & Distributors, New Delhi.

Bodmer, W.F. (1997), **The HGP and Quest to Discover our Genetic Heritage**, Oxford University, U.S.A.

Glick, B. R., and J.J. Pasternak, (1994), **Molecular Biotechnology – Principles and Applications of Recombinant DNA**, Panima Publishing Corporation, New Delhi and Bangalore

Fridell Ron, (2006), **Gentic Engineering**, Learner Publications Co. U.S.A.

Ignacimuthu, S., (1996), **Basic Biotechnology**, Tata McGraw Hill Publishing Company Ltd., New Delhi.

Keshav Trehan, (1991), **Biotechnology**, Wiley Eastern Ltd., New Delhi, India.

Kumar, H.D., (1993), **Molecular Biology and Biotechnology**, Vikas Publishing House Pvt., Ltd., New Delhi. India.

Mahesh, S., (2006), **Biotechnology IV**, New Age International, India.

Michael, A. Palladino, (2005), **Understanding HGP**, Benjamin Cummings Publishing Company, U.S.A.

Munshi, M & S.K. Supory, (2004), **Biotechnology – Applications and Careers**, Viva Books Pvt., Ltd., New Delhi.

Nicholl Desmond, S.T., (2002), **An Introduction to Genetic Engineering, (Studies in Biology)** Cambridge University Press, UK.

Old, R.W. and S.B. Primrose, (1994), **Principles of Gene Manipulation : An Introduction to Genetic Engineering**, Blackwell Science, U.K.

Prakash S. Lohar, (2005), **Biotechnology**, MJP Publishers, India.

Purohit, S, S. and S.K. Mathur, (2000), **Biotechnology – Fundamentals and Applications**, Agrobios – India

Rashidi Hooman, H. and Lukas K. Buehler, (1999), **Bioinformatics Basics: Applications and Biological Science and Medicine**, C.R. Publishers.

Reddy S.M., H.P. Srivatsava, Purohit, S Ram Reddy, (1997), **Microbial Biotechnology**, Scientific Publishers Jodhpur, India.

Steven P McGiffen, (2005), **Biotechnology**, Pluto Press, USA.

Yount Lisa, (2004), **Biotechnology and Genetic Engineering**, Facts on Files Publishers,

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

GENETICS

CODE :ZL/MC/GS 54

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To study the rules of inheritance in cells, individuals and population, and the molecular mechanism by which genes control the growth, development and appearance of an organism.
- To understand how genes control cellular processes & determine the course of evolution.
- To prepare the students for higher levels of courses and to help them in the areas of Molecular biology and Biotechnology.

Unit 1 (11 Hrs)

- 1.1. Introduction : Mendel and his work - Monohybrid and dihybrid experiments - Law of dominance, Law of Segregation and Law of Independent assortment - Back cross / Test cross.
- 1.2. Interaction of Genes : Incomplete dominance – Co-dominance - Lethal Genes - Epistasis – (Dominant and recessive) - Penetrance and Expressivity.
- 1.3. Extra Chromosomal Inheritance : Cytoplasmic inheritance - Plasmid inheritance in *Mirabilis jalapa* and Petite colonies in Yeast - Maternal influence - Shell coiling in *Limnaea*.

Unit 2 (12 Hrs)

- 2.1 Multiple Gene Inheritance : Characteristics - Examples - Ear length in maize and Skin colour in man. Transgressive variation - Weight in Chicken.
- 2.2 Multiple alleles : Characteristics - Example - Human blood groups (A, B, AB, O, M, N and H) -Rh factor - Inheritance and significance.
- 2.3 Linkage and Crossing over : Coupling and repulsion hypothesis - complete and incomplete linkage in *Drosophila* - Cytological proof of crossing over, example - *Drosophila* – Linkage Mapping.

Unit 3 (13 Hrs)

- 3.1 **Sex determination : Chromosomal mechanisms of sex determination - Sex determination in *Drosophila* - Genic balance mechanism – Gynandromorphs - Sex determination in human - Barr body - Importance of Y Chromosome - Klinefelters' and Turners' Syndromes - Environmental factors affecting sex determination - Male haploidy.**
- 3.2 Sex Linkage : *Drosophila* – Eye colour. Man - Colour blindness and Haemophilia. Incomplete sex linkage, Y- linked genes - Sex influenced and sex limited genes in man.

Unit 4 (14 Hrs)

- 4.1 Mutations : Different types. Point mutations - Molecular basis. Chromosomal aberrations - Numerical Variations.
- 4.2 Detection of mutations - CLB – method in *Drosophila* –detection in bacteria (Auxotrophic mutation and Ames test) - Mutagens.
- 4.3 Inbreeding – Outbreeding – Hybrid vigour.

Unit 5 (15 Hrs)

- 5.1 Human Chromosomes - Inborn errors of metabolism - Genetic counselling and Eugenics.
- 5.2 Role of genes in Antibody production – Antibody structure – Rearrangement of Kappa - light chain gene, Lambda - light chain gene and Heavy chain gene.
- 5.3 Genes and cancer – Molecular basis of cancer – oncogenes – Tumor suppressor genes – Examples (P₅₃, RB, APC, BRCA1 & 2) – Carcinogens
- 5.4 Genetic regulation of development in *Drosophila*: *Drosophila* developmental stages – three major classes of developmental genes(maternal effect genes, segmentation genes and homeotic genes)

TEXT BOOKS

Gupta, P.K., (1992), **Genetics (2nd ed)**, Rastogi Publications, Meerut.

Verma P.S., & V.K. Agarwal (2005), **Genetics, (8th ed)**, S. Chand and company, New Delhi.

BOOKS FOR REFERENCE

Aternburg, E., (1970), **Genetics**, Oxford IBH Publishing Co., New Delhi.

Ayala, Fransisco. J., and John A. Kiger, (1984), **Modern Genetics (2nd ed)**, The Benjamin Cummings Publishing Company Inc., California.

Burns, George W., and Paul J Botto, (1989), **The Science of Genetics (6th ed)**, Macmillian Publishing Company, New York.

Fairbanks Daniel J. and W. Ralph Andersen, (1999), **Genetics, The Continuity of Life**, Cole Publishing Company, USA.

Freifelder, David, (1987), **Molecular Biology (2nd ed)**, Jones and Bartlett Publishers Inc., Boston.

Gardner, Eldon, J., Micheal J. Simmons, and Peter D. Snustand, (1991), **Principles of Genetics (8th ed)**, John Wiley And Sons Inc., New York.

Goldsby R.A. Thomas J. Kindt, Barbara Osborne, (2006), **Kuby Immunology, (5th ed.)**, W.H. Freeman and Company, New York.

Good enough, Ursula, (1984), **Genetics, 3rd Edition**, Saunders College Publishing, Philadelphia.

Klug, William, S. Micheal Cummings and Charlotte Spencer, (2006), **Concepts of Genetics**, 8th Edition, Pearson Education. Inc., New Jersey.

Lewin, Benjamin, (2007), **Genes XI**, Jones and Barrlett Publishers, Canada.

Peter J. Russel, (2003), **Essential Genetics**, Pearson Education Inc., San Francisco.

Roitte, Ivan M., Jonathan Brostoff, and David K. Male, (2001), **Immunology**, 10th edition, J.B. Lippincott Company, Philadelphia.

Sinnot E.W., L.C.Dunn, & T. Dobshansky, (1973), **Principles of Genetics**, 5th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi.

Strickberger M.W., (1985), **Genetics**, 3rd edition, Mac Millan Publishing Company, New York.

Winchester A.M., (1967), **Genetics**, Oxford and IBH Publishing Co., New Delhi

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

CELL AND MOLECULAR BIOLOGY, GENETICS, AND GENETIC ENGINEERING - PRACTICALS

CODE :ZL/MC/P5 53

CREDITS: 3

L T P: 0 0 6

TOTAL HOURS: 78

Microscope - Camera lucida
Micrometry
Mitosis - in onion root tip.
Meiosis - in grasshopper testis.
Total W.B.C count using haemocytometer.
Total R.B.C count using haemocytometer.
Morphology of blood cells – observation of prepared slide
Squamous epithelium squash preparation
Chironomus - Salivary gland chromosome - squash preparation.
Drosophila culture technique – *Drosophila* mutants
ABO Blood group testing and Rh – typing
Isolation of plasmid DNA
Demonstration of :
 PCR technique
 Blotting techniques - Southern blot
Instrumentation – components and application of instruments – centrifuge – electrophoresis – colorimeter.
DNA extraction – RNA extraction
Agarose – gel electrophoresis – determination of molecular weight of plasmid DNA

Visit to a Biotechnology Laboratory

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	25 marks
Question – II	Minor Question(Mount(10) Diagram(5)	15 marks
Question – III	Spotters (Four)	10 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Offered by the Department of Zoology
to students of B.A. / B.Sc. / B.Com. Degree**

SYLLABUS

(Effective from the academic year 2010 - 2011)

FOOD PACKAGING AND POST HARVEST TECHNOLOGY

CODE : ZL/GE/FP54

CREDITS : 4

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

Pre-requisite

Students who have taken Biology at the +2 level only are eligible

OBJECTIVES OF THE COURSE

- To expose the students to the available functional packaging materials, the technologies involved in scientific packaging of food products like bakery products, milk products, sea foods, spices, etc.
- To provide an overview of the physical and chemical principles involved in food processing.
- To gain knowledge about the post harvest technologies and quality control.

Unit 1 (10 Hrs)

Introduction

- 1.1 Introduction : Packaging functions
- 1.2 Packaging Materials: Flexible Laminates- Plastics-Corrugated fibre Board-Tetrapak- Shelf life

Unit 2 (8 Hrs)

Packaging of Food Products

- 2.1 Packaging of Bakery Products
- 2.2 Packaging of Meat Fish and sea food
- 2.3 Packaging of Spices

Unit 3 (8 Hrs)

Principles of food processing

- 3.1 Thermal
- 3.2 Refrigeration
- 3.3 Freezing
- 3.4 Ionizing radiation

Unit 4 (20 Hrs)

Post Harvest Technology

- 4.1 Cereals and legumes- Fruits and vegetables- Milk and milk products, Fish, Poultry and Egg
- 4.2 Enrichment of Food : High Protein Technology – Extruded foods, Fermented foods – Sauerkraut, Kimchi

Unit 5

(6 hrs)

Quality control

5.1 Quality testing of Packaging

5.2 Testing and certifying finished products

TEXT BOOK

Norman. N. Potter, (1987) **Food Science**, III Edition, CBS Publishers & Distributors, New Delhi

BOOKS FOR REFERENCE

Norman. N. Potter, (1987) **Food Science**, III Edition, CBS Publishers & Distributors, New Delhi

Marie Kravse. V. (1964), **Food Nutrition and Diet Therapy**, W.B. Saunders Co., London.

Jane Bowers, (1972), **Food theory and Applications** (II edition), Maxwell Macmillan International Editions - New York.

Home scale Processing and preservation of fruits and Vegetables - (CFTRI Mysore).

Banwart, George J, (1987), **Basic Food Microbiology**, CBS Publications, New Delhi.

Frazier, W.C. (1978), **Food Microbiology** (Ed III), Tata McGraw Hill, New Delhi.

Jay, James M. (1987), **Modern Food Microbiology** Ed.3, CBS Publishers, New Delhi.

Mahadeviah M., and Gowramma, R.V., (1996). **Food Packaging Materials**, Tata McGraw Hill Publishing Company Limited, New Delhi.

Packaging of Food Products, (1986), Prepared by IIP, Bombay.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 2 Hours

QUESTION PAPER PATTERN:

Section A – 10 x 2 = 20 marks (All questions to be answered)

Section B – 4 x 5 = 20 marks (4 out of 6 questions to be answered)

Section C – 1 x 10 = 10 marks (1 out of 2 questions to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

ANIMAL BEHAVIOUR

CODE :ZL/MC/AB 64

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To study a large and diverse array of topics within the fields of animal behaviour.
- To stimulate the interest of the students in this field by giving an outline of the subject.

Unit 1 (7 Hrs)

- 1.1 Introduction : Behaviour - its causes and significance - Ethology – History.
- 1.2 Concepts and terms - Motivation - Fixed Action Pattern (FAP) - Sign Stimulus - Innate Releasing Mechanism (IRM) - Action Specific Energy (ASE) - Concept of behavioural genetics - Concept of Evolution of behaviour.
- 1.3 Methods of Studying Behaviour : Studies in laboratories - Studies in wild - Observation – Identification and location of individuals - Describing - recording and cataloguing - interpreting and presenting data.

Unit 2 (14 Hrs)

- 2.1 Basic and Maintenance Behaviour : Rhythms - Sleep - Locomotion - Maintenance and related behaviour - Foraging and Caching - Shelter seeking and construction.
- 2.2 Finding a Place to Live : Habitat selection and territory – Homing – Migration.

Unit 3 (16 Hrs)

- 3.1 Sociobiology : Communication - Methods of study - Modes and mechanisms - Chemical - auditory - tactile - visual – electrical - Social behaviour in bees- Social organisation in primates.
- 3.2 Behaviour and Reproduction : Courtship - Breeding patterns - Parental care.

Unit 4 (10 Hrs)

- 4.1 Interspecific Behaviour : Aggregations – Commensalism – Mutualism – Parasitism – Predation
- 4.2 Play : General attributes of play - Examples / Descriptions of play behaviour - Theories.

Unit 5

(18 Hrs)

- 5.1 Internal Control of Behaviour - Physiological and Psychological Aspects :
Nervous system and behaviour - Hormones neurochemicals and behaviour -
Psychoactive drugs and human behaviour – Sensory worlds - Animal learning
- different forms of learning - phylogenetic survey of learning
- 5.2 Abnormal Behaviour : Examples - Wild animals under natural condition -
Animals in Zoo - Domestic livestock - Domestic pets - Causes of Abnormal
behaviour - Preventing, correcting and curing abnormal behaviour - Abnormal
behaviour in man - Neurotic disorder, (Anxiety disorder). Eg. Phobic
disorder and Obsessive - compulsive disorder - Psychotic disorder eg.
Schizophrenia.

BOOKS FOR REFERENCE

Aubrey Manning, (1980), **An Introduction to Animal Behaviour**, (3rd ed.), ELBS and Edward Arnold (Publishers) Ltd.,

Cecie Starr and Ralph Taggart, (1992), **Biology**, Wadsworth Publishing Company, California.

Clifford, T. Morgan, and Richard A. King, (1986), **Introduction to Psychology**, (7th ed.) McGraw Hill Book Company, New York.

David, McFarland, (1985), **Animal Behaviour - Psychology - Ethology & Evolution**, University of Oxford, ELBS / Longman.

Diwan, A.P., and Arora D.K., (1995), **Ecology of Behaviour**, Anmol Publications Pvt., Ltd., New Delhi.

Gundevia, H.S., and Harne Govind Singh, (1996), **Text Book of Animal Behaviour**, Anmol Publications, New Delhi.

Harjindra Singh, (1990), **A Text Book of Animal Behaviour**, Anmol publications, New Delhi.

James, W. Grier., (1984), **Biology of Animal Behaviour**, Times Mirror / Mosby College Publishing, Missouri.

James, W. Kalat, (1996), **Introduction to Psychology**, (4th ed.), Brooks / Cole Publishing Company, U.S.A.

John Alcock, (1989), **Animal Behaviour - An Evolutionary Approach** (4th ed.), Sinauer Associates, Inc., Publishers Sunderland, Massachusetts.

Peter, H., Raven and George B. Johnson, (1991), **Understanding Biology**, (2nd ed.), Mosby Year Book, St. Louis.

Pierre Pfeffer, (1985), **Predators and Predation**, Ed. Facts on File, New York.

Ranga, M.M., (1994), **Animal Behaviour**, Agro Botanical Publishers (India), Bikaner.

Reena Mathur, (1996), **Animal Behaviour**, Rastogi and Company, Subbash Bazar, Merrut.

Robert S Feldman, (1997), **Essentials of Understanding Psychology**, (3rd ed.), McGraw Hill Companies Inc., New York.

Scott, G., (2005), **Essential Animal Behaviour**, Blackwell Publishing Ltd., USA.

Slater, P.J.B., (1985), **An Introduction to Ethology**, Cambridge University Press, Cambridge.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

DEVELOPMENTAL BIOLOGY

CODE :ZL/MC/DP64

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To enable students to understand a brief history, fundamental aspects and basic patterns of animal development from gametogenesis, processes of fertilization, cleavage, gastrulation and organogenesis.
- To motivate them to analyse the recent advances and Bioethical issues involved in development.

Unit 1

(7 Hrs)

Introduction

- 1.1 Brief history of the science of Developmental biology - theories of preformation - epigenesis - pangenesis - recapitulation - germplasm, mosaic and regulative - gradient and organisers.
- 1.2 Metamorphosis in insects and amphibians.
- 1.3 Regeneration - mechanism and types.
- 1.4 Relationship of embryology and evolution.

Unit 2

(18 Hrs)

Early Development

- 2.1 Gametogenesis : Spermatogenesis - Sperm - morphology and types.
Oogenesis - eggs - morphology - types – Membranes - Polarity and symmetry.
Ovulation - Induced Ovulation and its applications.
- 2.2 Fertilization : Physico-chemical aspects – Theories - Parthenogenesis - Types - Natural and Artificial.
- 2.3 Embryonic Adaptations : Extra - embryonic membranes - Mammals - foetal membranes - Placenta - Types and functions.
- 2.4 Totipotency in animals – exceptions to genome constancy – gene amplification – (Xenopus and Drosophila) – Differentiation – Types – Control of differentiation during Transcription and Translation levels.
- 2.5 Stem Cells : nature – adult stem cells – embryonic stem cells – foetal stem cells – applications in diseases

Unit 3

(18 Hrs)

Patterns of Development

- 3.1 Cleavage - Patterns – Types - Mechanism - Influence of yolk – Blastulation.
- 3.2 Gastrulation – General morphogenetic movements in Chordate Embryos –

Comparative study of gastrulation in *Amphioxus* - Frog – Chick.
3.3 Cell – lineage-Fate-maps-Significance.

Unit 4 (10 Hrs)

Organogenesis

Frog and Mammal - Comparative study of origin and development

4.1 Ectodermal derivatives – Brain – Sense organ (eye, ear).

4.2 Mesodermal derivatives – Heart and Blood.

4.3 Endodermal derivatives – Digestive tract and its derivatives.

Unit 5 (12 Hrs)

Cell Interaction and Reproductive Technology

Simple experimental studies relevant to the themes of :

5.1 Organiser - Experimental evidences - Theories – Competence - Gradient's - experimental evidences - mechanism - Theories - Nuclear transplantation - Nucleo cytoplasmic interactions – aging – causes – theories.

5.2 Test-Tube babies - Surrogate motherhood - Freezing human embryos - Grafts and transplants – Cloned babies.

5.3 Ethical issues relating to: Stem cells - Artificial insemination –In vitro Fertilization - Embryo transplants.

TEXT BOOKS

Rastogi, V.B., and M.S. Jayaraj, (1992), Revised Edition, **Developmental Biology**, Kedarnath Ramnath Publishers, Meerut, Delhi.

Verma, P.S., V.K. Agarwal, and B.S. Tyagi, (1990), **Chordate Embryology**, S. Chand and Company Ltd., New Delhi.

BOOKS FOR REFERENCE

Abbott, A., (2004), **Aging; Growing old gracefully Nature 428 : 116 – 118.**

Balinsky, B.I., (1981), **An Introduction to Embryology**, 5th Ed., Holt-Saunders Japan Ltd.,

Berrill, N.J. and Gerald Karp., (1976), **Development**, McGraw Hill, New York.

Biroc, Sandra Lyn., (1986), **Developmental Biology**, Macmillan Publishing Company, New York, and Collier Macmillan Canada, Inc.

Browder, L.W., (1980), **Developmental Biology**, Holt-Rinehart and Winston, Inc., New York.

Dalela R.C., and S.R. Verma, (1978), **A Text Book of Chordate Embryology**, Jai Prakash Nath and Co.,

Gilbert, Scott, F., (2006), 8th ed., **Developmental Biology**, Sinauer Associates, Inc., Sunderland, Massachusetts.

Gurdon, J.B., (1974), **The Control of Gene expression in Animal Development**, Clarendon Press, Oxford.

Jain, P.C., (1982), **Elements of Chordate Embryology**, Vishal Publications, Delhi.

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Patten, B.M., (1974), **Foundation of Embryology**, McGraw Hill, New York.

Rattan, S.I.S., (1989), **DNA Damage and Repair during Cellular aging**, International Review Cytology, 116 : 47 – 88.

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Spratt, N.T., (1964), **Introduction to Cell Differentiation**, Reinhold Publication Corp., London.

Starr, Cecie, and Ralph Taggart., (1992), **Biology : The Unity and diversity of life**, 6th ed., Wadsworth Publishing Company, Inc., New York.

Sylvia, Mader S., (1988), **Human Biology**, W M.C., Brown Publishers.

Wolpert, L., Jim Smith, Tom Jessel, Peter Lawrence, Elizabeth Robertson and Elliot Meyerowitz, (2006), **Principles of Development**, 3rd edition, Current Biology Ltd., London, New York, and Oxford University press, Oxford, New York.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2010 - 2011)

ENVIRONMENTAL BIOTECHNOLOGY

CODE :ZL/MC/EB 64

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To study how biotechnology can be applied to environmental problems and issues.
- To kindle interest among students for sustaining the environment for future generation.

Unit 1 (15 Hrs)

Environmental Monitoring

Introduction – Sampling

Physical Analysis – Chemical Analysis – Biological Analysis.

Determination of biodegradable organic material

Monitoring pollution

Bio indicators – Biomarkers and Biosensors

Toxicity testing using biological material.

Unit 2 (12 Hrs)

Waste Treatment

2.1. Functions of the waste treatment system

2.2. Sewage – treatment methods

2.3. Removal of nitrogen and phosphorus

2.4. Sludge treatment and disposal; Anaerobic digestion.

2.5. Agricultural and Industrial waste

Unit 3 (15 Hrs)

Bioremediation

3.1 Introduction : Synthetic compounds – Petrochemical compounds and Inorganic wastes in the Environment (A brief outline)

3.2 Bioremediation strategies – Bioaugmentation – Genetically manipulated organisms.

3.3 Bioremediation techniques : Ex-situ and In-situ.

3.4 Phytoremediation

3.5 Metal Bioremediation

3.6 Gaseous Bioremediation

- Unit 4** (10 Hrs)
Cleaning-up Technology and Pollution Prevention
4.1 Treatment of industrial effluents: Distillery – Dairy – Tannery – Textile and sugar industries.
4.2 Biofertilizers – Biopesticides – Bioleaching of Ores.

- Unit 5** (13 Hrs)
Natural Resource Recovery
5.1 Introduction
5.2 Oil Recovery
5.3 Enhanced Oil Recovery
5.4 Microbially Enhanced Oil Recovery – Microbial Polymers
5.5 Recovery of Metals

BOOKS FOR REFERENCE

Alan Scragg, (2007), **Environmental Biotechnology**, 2nd edition, Oxford University Press, New York.

Evans, Gareth, M. and Judith C. Furlong, (2002), **Environmental Biotechnology: Theory and Applications**, Wiley – VCH.

Hans – Joachim Jordening and Joseph Winter, (2005), **Environmental Biotechnology: Concepts and Applications**, Wiley – VCH.

Mishra, C. S. K and Asha A. Juarkar, (2007), **Environmental Biotechnology**, A. P. H. Publishing Corporation.

Rastogi, S.C., Shivani Rastogi, (2006), **Introduction to Biotechnology**, First edition, CBS Publishers, New Delhi.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2010 - 2011)

**VERTEBRATE PHYSIOLOGY, ENVIRONMENTAL BIOLOGY AND
DEVELOPMENTAL BIOLOGY - PRACTICALS**

CODE :ZL/MC/P6 63

CREDITS: 3

L T P: 0 0 5

TOTAL HOURS: 65

PHYSIOLOGY

- Oxygen consumption in an aquatic animal with reference to body weight.
- Detection of nitrogenous waste products, qualitative estimation of Ammonia, (fish) Urea (mammalian kidney) and Uric acid (bird excreta and cockroach)
- Survey of digestive enzymes in *Periplaneta americana*.
- Ciliary activity in fresh water mussel in relation to temperature.

ENVIRONMENTAL BIOLOGY

1. Estimation of the following parameters in different water samples:
 - a. Dissolved Oxygen
 - b. pH
 - c. Salinity
 - d. Calcium
 - e. Free CO₂, CO₃ and HCO₃
 - f. Estimation of Na and K content – Flame Photometer
 - g. Determination of BOD
2. Soil pH - Carbonates - Nitrates.
3. Marine plankton.
4. Spotters - Rocky Shore fauna
5. Spotters - Sandy Shore fauna
6. Animal Associations – one example for each type.

DEVELOPMENTAL BIOLOGY

1. Examination of prepared slides of testis and ovary of a mammal to study the maturation stages of the gametes.
2. Examination of different kinds of vertebrate eggs - frog, chick and mammal.
3. Study of prepared slides of sperms of frog, bird and mammal.
4. Study of prepared slides of blastulation and gastrulation stages of Frog.

5. Observation and examination of prepared slides (whole mounts) of 18, 24, 33, 48, 72 and 96 hours chick.
6. Study of organogenesis using prepared slides with reference to the development of brain, heart, eye and ear of Frog.
7. Identification of placenta of Sheep, Pig and Yolk Sac Placenta of Shark.
8. Experimental Studies :
 - a. Regeneration in Tadpoles
 - b. Role of Thyroxine and Iodine in Metamorphosis of Frog.
 - c. Induced ovulation in fish using hormones (HCG / Ovaprim)

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

END SEMESTER EXAMINATION:

Total Marks: 50

Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	Major Question	25 marks
Question – II	Minor Question	15 marks
Question – III	Spotters (Four)	10 marks

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B.Sc. DEGREE : BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2010 - 2011)

VERTEBRATE PHYSIOLOGY

CODE :ZL/MC/VP 64

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the concept of the body's internal environment, the nature of biological control systems, the body's various co-ordinated functions -circulation and respiration, and the properties of major specialized cell types - nerve and muscle.

Unit 1 (11 Hrs)

Introduction – Nutrition and Metabolism

- 1.1 Food requirements - Proteins, Carbohydrates, Fats, Vitamins, trace elements – anti oxidants and fibre.
- 1.2 Digestive System of human - Physiology of digestion - absorption
- 1.3 Metabolism of Carbohydrates - Proteins – Fats – Basal metabolism

Unit 2 (12 Hrs)

Respiration and Circulation

- 2.1 Respiratory Organs - Physiology of respiration in human - Oxygen transport - dissociation curve - CO₂ transport - Chloride Shift.
- 2.2 Adaptations to diving and high altitudes.
- 2.3 Anaerobiosis.
- 2.4 Organs of Circulation - Physiology of circulation in human - regulation of heart beat and blood vessels - Electrocardiogram – principle.
- 2.5 Lymph – composition - circulation - functions.

Unit 3 (12 Hrs)

Thermoregulation, Osmoregulation and Excretion

- 3.1 Thermoregulatory mechanisms in poikilotherms and homeotherms
- 3.2 Osmoregulators and Osmoconformers.
- 3.3 Osmoregulatory mechanism in Vertebrates.
- 3.4 Formation of nitrogenous waste - ammonotelism - uricotelism - ureotelism.
- 3.5 Excretory System - Physiology and regulation of excretion in human.

Unit 4 (14 Hrs)

Movements and Neural Co-ordination

- 4.1 Types of muscles - cardiac – unstriated - striated - Ultrastructure of the striated muscle - properties of muscles.
- 4.2 Muscle contraction - theories - chemical changes.

- 4.3 Neurons - nerve fibres - Nerve impulse - conduction – properties
- 4.4 Reflex action - cranial and spinal.
- 4.5 Autonomic nervous system.
- 4.6 Neurotransmitters.
- 4.7 E.E.G. principle.

Unit 5 (16 Hrs)

Sensory Perception, Hormonal Control and Reproduction

- 5.1 Structure and Physiology of Photo, Phono and Chemoreceptors of a mammal.
- 5.2 Mechano and Thermo receptors of Vertebrates.
- 5.3 Colour changes – Bioluminescence – Electric Organs of vertebrates.
- 5.4 Endocrine Organs of a mammal - Structure and Function - Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal and Gonads.
- 5.5 Reproductive physiology.

TEXT BOOKS

Verma P.S., V.K. Agarwal, & B.S. Tyagi, (1980), **Animal Physiology**, S.Chand and Co., New Delhi.

BOOKS FOR REFERENCE

Brown Judith, E., (2003), **Nutrition Now**, 3rd edition, Watsworth Thomson Learning, Canada.

Gnanamuthu, C.P, (1962), **Animal Physiology**, C.S. Press, Madras.

Gordan, M.S., (1971), **Animal Physiology - Principles and Adaptations**, Collier Mac Millan International Edn.

Guyton, A.C. (1991), **Text Book of Medical Physiology**, (8th ed.,) W.B. Saunders & Co., Philadelphia, London.

Hain worth, F.R., (1984), **Animal Physiology - Adaptations in Functions**, Addison Wesley Pub. Co.,

Hoar, W.S., (1975), **General and Comparative Physiology**, Prentice Hall of India Pvt. Ltd., New Delhi.

Hole J. W. (1992), **Essentials of Human Anatomy Physiology**, Wim. C. Brown Publishers,

Johnson, Leonard, R. (2006), **Essential Medical Physiology**, 3rd edition, Academic Press, U.S.A.

Knut, Schmidt, Nielson, (1963), **Animal Physiology**, Prentice Hall of India Pvt., Ltd., New Delhi.

Lauralee Sherwood, (1997), **Human Physiology From Cells to Systems**, (3rd ed.,) Wadsworth Publishing Company, U.S.A.

Prosser, C.L., (1973), **Comparative Animal Physiology**, W.B. Saunders Co.,

Rastogi, S.C., (1988), **Animal Physiology**, S.C. Chand & Co., Ltd., New Delhi.

Solomon, Eldra, P. Diana W. Martin and Linda Berg, (2005), **Biology**, 7th edition, Thomson Books/cole, U.S.A.

Weller Harry and Ronald L. Wiley, (1985), **Basic Human Physiology**, (2nd ed.,) Prindle, Weber and Schmidt, Boston.

END SEMESTER EXAMINATION:

Total Marks: 100

Duration: 3 Hours

QUESTION PAPER PATTERN

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