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 2011-12)

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									
11ZL/MC/IV 14	Invertebrata	4	4	1	0	3	50	50	100
11ZL/MC/SB 13	Soil Biology	3	3	1	0	3	50	50	100
11ZL/MC/P1 12	Invertebrata - Practical	2	0	0	3	3	50	50	100
Allied Core Offered to the Department of Botany									
11ZL/AC/GZ 13	General Zoology - I	3	3	0	0	3	50	50	100
11ZL/AC/P1 11	General Zoology - I Practical	1	0	0	2	3	50	50	100
Semester - II									
11ZL/MC/CH 24	Chordata	4	4	1	0	3	50	50	100
11ZL/MC/P2 22	Chordata - Practical	2	0	0	3	3	50	50	100
11ZL/ME/CB 23	Conservation Biology	3	3	1	0	3	50	50	100
OR									
11ZL/ME/AZ 23	Applied Zoology (Skill Development Course)	3	3	0	1	3	50	50	100
Allied Core Offered to the Department of Botany									
11ZL/AC/GZ 23	General Zoology - II	3	3	0	0	3	50	50	100
11ZL/AC/P2 21	General Zoology - II Practical	1	0	0	2	3	50	50	100
11ZL/GC/ES 22	Environmental Studies	2	2	0	0	-	50	-	100
Semester - III									
11ZL/MC/GN 34	Genetics	4	4	1	0	3	50	50	100
11ZL/MC/CM 34	Cell and Molecular Biology	4	4	1	0	3	50	50	100
11ZL/MC/P3 32	Genetics & Cell and Molecular Biology - Practicals	2	0	0	3	3	50	50	100
Semester - IV									
11ZL/MC/MB 44	Microbiology	4	4	1	0	3	50	50	100
11ZL/MC/P4 42	Microbiology - Practical	2	0	0	3	3	50	50	100
11ZL/SL/HH 42	Health and Hygiene	2	2	0	0	-	50	-	100
Semester - V									
11ZL/MC/FB 54	Fundamentals of Biotechnology	4	4	1	0	3	50	50	100
11ZL/MC/LT 54	Medical Laboratory Technology	4	4	1	0	3	50	50	100
11ZL/MC/IM 54	Immunology	4	4	1	0	3	50	50	100
11ZL/MC/P5 53	Medical Laboratory Technology ,Immunology and Biotechnology - Practicals	3	0	0	6	3	50	50	100
11ZL/ME/EV 53	Evolution	3	3	1	0	3	50	50	100
OR									
11ZL/ME/AT 53	Animal Tissue Culture Techniques (Skill Development Course)	3	2	0	2	3	50	50	100

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(Effective from the Academic Year 2011-12)

CHOICE BASED CREDIT SYSTEM

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Semester - VI									
11ZL/MC/AB 64	Animal Behaviour	4	4	1	0	3	50	50	100
11ZL/MC/VP 64	Vertebrate Physiology	4	4	1	0	3	50	50	100
11ZL/MC/DB 64	Developmental Biology	4	4	1	0	3	50	50	100
11ZL/MC/EB 64	Environmental Biotechnology	4	4	1	0	3	50	50	100
11ZL/MC/P6 62	Physiology, Developmental Biology and Environmental Biology - Practicals	2	0	0	4	3	50	50	100
General Elective Courses									
11ZL/GE/PC 32	Pet Care	2	2	0	0	-	50	-	100
11ZL/GE/AW 32	Concepts in Animal Welfare	2	2	0	0	-	50	-	100
11ZL/GE/GD 44	Genes - Diseases - Society	4	4	0	0	3	50	50	100
11ZL/GE/ND 44	Nutrition and Diet Therapy	4	4	0	0	3	50	50	100
11ZL/GE/HR 44	Biology of Human Reproduction	4	4	0	0	3	50	50	100
Independent Elective Courses									
11ZL/UI/BM 23	Biomedical Instrumentation and Techniques	3	-	-	-	3	-	50	100
11ZL/UI/NF 23	Nutrition and Food Technology	3	-	-	-	3	-	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 2011 - 2012)

GENERAL ZOOLOGY – I PRACTICAL

CODE :11ZL/AC/P1 11 **CREDITS: 1**

L T P: 0 0 2

TOTAL HOURS: 26

1. Dissections

Invertebrata:

Periplaneta americana : Digestive and Nervous Systems

2. Mount : Mouth parts of Cockroach
Placoid Scales
Cycloid Scale

3. Computer Simulated Frog dissections - Chordata

4. Identification and description of the following Invertebrates and Chordates

Sponge	:	*Euplectella, Sycon*
Coelenterata	:	Sea Anemone, *Hydra*
Mollusca	:	Pearl Oyster, *Sepia*
Echinodermata	:	Star fish, Sea Urchin
Prochordate	:	*Amphioxus , Ascidia*
Pisces	:	Shark, *Exocoetus*
Amphibia	:	*Bufo melanostictus , Ambystoma*
Reptilia	:	Russell's Viper ,*Draco*
Aves	:	Wood pecker, Rose ringed parakeet
Mammalia	:	Pangolin, Bat

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 and Diagram)	15 marks
Question – III	Spotters (Four)	10 marks

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SYLLABUS

(Effective from the academic year 2011 - 2012)

GENERAL ZOOLOGY - I

CODE :11ZL/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 **(7 Hrs)**

1.1 Introduction: Outline classification of Animal Kingdom.

Invertebrata :

1.2 Protozoa –characteristic features; Type- *Paramecium caudatum*

Unit 2 **(10 Hrs)**

2.1 Aschelminthes – characteristic features; Type- *Ascaris lumbricoides*

2.2 Annelida – characteristic features; Type- *Lampito mauritii*

Unit 3 **(10 Hrs)**

3.1 Arthropoda– characteristic features; Type- *Penaeus indicus*

3.2 Echinodermata– characteristic features; Type-*Asterias sp.*

Unit 4 **(12 Hrs)**

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

4.1 Aves– characteristic features -Type-*Columba livia*

4.2 Mammalia– characteristic features -Type- *Oryctolagus cuniculus*

TEXT BOOK

Ekambaranath Ayyar, M. and T.N. Ananthakrishnan.. Outlines of Zoology, S. Viswanathan & Co, Madras. 1986.

BOOKS FOR REFERENCE

Dhami, P. S. and J.K. Dhami. Invertebrate Zoology. S. Chand and Co., New Delhi. 2009.

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

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

Jordan, E.L. and P.S. Verma.. Chordate Zoology**,** S. Chand & Co. New Delhi. 2009.

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

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

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

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

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 2011 - 2012)

GENERAL ZOOLOGY - I

CODE :11ZL/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 **(7 Hrs)**

1.2 Introduction: Outline classification of Animal Kingdom.

Invertebrata :

1.2 Protozoa –characteristic features; Type- *Paramecium caudatum*

Unit 2 **(10 Hrs)**

2.1 Aschelminthes – characteristic features; Type- *Ascaris lumbricoides*

2.2 Annelida – characteristic features; Type- *Lampito mauritii*

Unit 3 **(10 Hrs)**

3.1 Arthropoda– characteristic features; Type- *Penaeus indicus*

3.2 Echinodermata– characteristic features; Type-*Asterias sp.*

Unit 4 **(12 Hrs)**

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

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Ekambaranath Ayyar, M. and T.N. Ananthakrishnan.. Outlines of Zoology, S. Viswanathan & Co, Madras. 1986.

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Dhami, P. S. and J.K. Dhami. Invertebrate Zoology. S. Chand and Co., New Delhi. 2009.

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

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Jordan, E.L. and P.S. Verma.. Chordate Zoology**,** S. Chand & Co. New Delhi. 2009.

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

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

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

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 2011 - 2012)

INVERTEBRATA - PRACTICAL

CODE :11ZL/MC/P1 12 **CREDITS: 2**

L T P: 0 0 3

TOTAL HOURS: 39

SPOTTERS

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 Systems

MOUNT

Appendages of Shrimp
Fresh water zooplankton
Body setae in *Lampito mauritii*
Mouth parts of *Periplaneta americana, Apis spp, Musca spp & Anopheles spp*

SIMULATORS

Earthworm

CULTURE of *Paramecia sp.*

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 and Diagram)	15 marks
Question – III	Spotters (Five)	10 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

SOIL BIOLOGY

CODE : 11ZL/MC/SB 13 **CREDITS: 3**

L T P: 3 1 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

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

Unit 1 **(12 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
1.6 Types of Soils found in India, their characteristics and suitability to crops

Unit 2 **(10 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 **(10 Hrs)**

Ecosystem and Ecological Succession

3.1 Ecosystem – Structure and Function
3.2 Soil as an ecosystem
3.3 Energy flow - Food chain and Food web- Ecological energetics and ecological modelling
3.4 Types and General Process of Succession - Terrestrial Succession - (Psammosere) – Aquatic Succession

Unit 4 **(10 Hrs)**

Soil Communities and Soil Fertility

4.1. Soil Flora and Fauna
4.2. Role of soil communities in improving soil quality and fertility
4.3. Vermicomposting (Practicals – Identification of epigeics, anecics and endogeics)
4.4. Role of microbes in bioleaching

4.5. Extracting and sampling methods of Soil Fauna (with practicals)
4.6. Soil analysis – color – porosity - moisture – texture – pH – nitrates – carbonates – qualitative tests (with practicals).

Unit 5 **(10 Hrs)**

Soil Pollution and Conservation

5.1 Natural, Industrial and Agricultural Pollution – cause, effects and control measures
5.2 Saline and Sodic Soils; Soil Reclamation – case studies
5.3 Soil Erosion- Role of wetland and wasteland
5.4 Soil Conservation Measures

TEXT BOOKS

Sharma, P.D., Ecology and Environment**,** Rastogi Publications, Meerut. 1994.

Verma, P.S., & V. K. Agarwal, Environmental Biology**,** S.Chand & Co., New Delhi. 1998.

BOOKS FOR REFERENCE

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

Ajit, Varma, Oelmuller, Ralf (editors), Advanced Techniques in Soil Microbiology, Springer Publications. 2007.

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

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

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

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

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

Meuser, H., Contaminated Urban Soils, Springer Publications. 2010.

Mirsal, Ibrahim (editor), Soil Pollution – Origin, Monitoring and Remediation, Springer Publications. 2008

Tate, Robert.L., Soil Microbiology**,** Second edition, John Wiley and sons. 2000.

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= 30Marks (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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SYLLABUS

(Effective from the academic year 2011- 2012)

INVERTEBRATA

CODE :11ZL/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 order level with underlying principles and local examples

Unit 1 **(12 Hrs)**

Introduction and outline classification of animal kingdom upto order level.

Protozoa – Characteristic features - classification

1.1 Type : *Paramecium sp.*

1.2 Locomotion in protozoa

1.3 Parasitic Protozoans – *Entamoeba histolytica – Trypanosoma spp – Leishmania spp – Trichomonas spp – Giardia intestinalis – Plasmodium spp*

Unit 2 **(12 Hrs)**

Porifera and Coelenterata - Characteristic features - classification

2.1 Type : *Sycon*

2.2 Canal system in sponges – Economic importance of Porifera – Sponge Industry – Sponge fishing – Sponge cultivation

2.3 Type : *Obelia geniculata*

2.4 Polymorphism in coelenterates

2.5 Corals and coral reefs – Environmental impact - Conservation

Unit 3 **(14 Hrs)**

Helminthes and Annelida - Characteristic features - classification.

3.1 Type : *Taenia solium*

3.2 Helminth parasites in relation to human welfare – *Schistosoma haemotobium –Echinococcus spp – Hymenolepis spp – Ancylostoma duodenale – Wuchereria bancrofti – Dracunculus medinensis – Enterobius vermicularis – Trichuris trichura – Trichinella spiralis*

3.3 Type : *Hirudinaria granulosa –medicinal significance*

3.4 Metamerism in Annelida

3.5 Diversity of Annelids

Unit 4 **(14 Hrs)**

Arthropoda - Characteristic Features - classification.

4.1 Type : *Penaeus indicus,*
4.2 Structure and phylogenetic significance 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 **(13 Hrs)**

Mollusca and Echinodermata - Characteristic features – classification – phylogenetic significance.

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. Ananthakrishnan, Manual of Zoology. Vol.I, Part. **I** & II, S.Viswanathan & Co., Madras. 1994.

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

BOOKS FOR REFERENCE

Barnes, R. D., Invertebrate Zoology, Holt Saunders, Japan. 1982.

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

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

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

Kotpal. R.L., Modern Textbook of Zoology : Invertebrates, 9th edition, Meerut, Rastogi Publication, 2005.

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

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

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

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

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)

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

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B.A. / B.Sc. / B.Com / B.C.A. / B.V.A. / B.S.W. DEGREE

SYLLABUS

(Effective from the Academic Year 2011 – 2012)

ENVIRONMENTAL STUDIES

CODE : 11ZL/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 educate the students about conservation and management of natural resources
- To make the students ecosensitive and ecofriendly.

Unit 1 **(6 Hrs)**

Introduction

1.1 Components of the environment – Classification and characteristics of resources – Renewable and non – renewable resources

1.2 Need for Public awareness in conservation of natural resources

1.3 Energy Flow in ecosystems – aquatic and terrestirial – food chain and food web.

Unit 2 **(10 Hrs)**

Pollution and Socio Economic Aspects of the Environment

2.1. Types of pollution – Air, Water, Solid Waste, Noise

2.2. Problems - green house effect – depletion of the ozone layer – climate change

2.3. Bio diversity - Definition - Loss of bio diversity – Threats to biodiversity and Conservation of biodiversity.

2.4. Human behaviour: - Population – urbanization – poverty (as cause and result of pollution and degradation)

2.5. Technology: - Agriculture and industry – deforestation. Use, Misuse and Abuse of the resources

2.6. Effects and consequences of environmental problems.

Unit 3 **(10 Hrs)**

Sustainable Development, Remedies and Policy Implications

3.1 Environmental disasters natural and human made – Bhopal gas Tragedy – Chernobyl Accident – Fukushima Nuclear Crisis - Gulf War – Love Canal Episode – Tsunami – Volcanic eruptions.

3.2 Methods evolved to measure and check environmental degradation and pollution – carbon footprint, carbon credit, ecological footprint, and ecological shadow.

3.3 Environmental movements in India – Chipko movement, Narmada bachao Andolan, Sethu Samudram Project

3.4 Environmental Acts – Policy measures with respect to India.

3.5 International environmental agreement – Stockholm Conference – Montreal protocol – RIO Meet – Kyoto Conference – UN conference on Climate change (Copenhagen)

Field visit

Eco initiatives at the campus : Garbage segregation and Vermicomposting – Graywater recycling – Rainwater harvesting – Solar powered lights – Bio diversity.

TEXT BOOK

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

BOOKS FOR REFERENCE

Ignacimuthu, S. Environmental Awareness and Protection**,** New Delhi., Phoenic Publishing House, 1997.

Jadhav, H and V. M. Bhosale. Environmental Protection and Laws, New Delhi, Himalaya Publication House, 1995.

Odum, E.P. Fundamentals of Ecology**,** W.B. Sauders Co., U.S.A. 1971.

Mies, M. and V. Shiva. Ecofeminism, London. Zed Books, 1989.

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

PATTERN OF EVALUATION (Totally Internal)

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

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOMEDICAL INSTRUMENTATION AND TECHNIQUES

CODE :11ZL/IE/BM23 **CREDITS: 3**

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

Microscopy

1.1 Principles and applications of Light Microscopy (Bright field, Phase Contrast, Fluorescence)and Electron Microscopy (SEM and TEM)

1.2 Autoradiography – X ray diffraction, Flow cytometry and Cell sorting – FISH technique.

Unit 2

Separation Techniques

2.1 Chromatography – Types (Partition - Paper – TLC – GLC- Column (Permeation and Adsorption)

2.2 Electrophoresis – Agarose – PAGE – 2-D Gel Electrophoresis – Immunoelectrophoresis

2.3 Atomic Absorption Spectrophotometer-Types and applications

2.4 Cell fractionation – Homogenization – Centrifugation – Types.

Unit 3

DNA Diagnostic System

3.1 Hybridization probes – DNA Finger printing RAPD, RFLP

3.2 Autoanalyzer - Laser

Unit 4

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

Physiological Assist Devices

5.1 Pacemakers – Pacemaker batteries – Artificial heart valves

5.2 Hearing Aids

5.3 Nerve and Muscle stimulators – Heart – Lung machine – kidney machines -Safety Instrumentation (A brief outline) Radiation safety Instrumentation

5.4 Devices to protect against electrical hazards

BOOKS FOR REFERENCE

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

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

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

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

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

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

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

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

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

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 2011 – 2012)

NUTRITION AND FOOD TECHNOLOGY

CODE : 11 ZL/IE /NF23 **CREDITS : 3**

OBJECTIVES OF THE COURSE

- To have a fundamental knowledge of the requirements of Food Industry.
- To inculcate in the students an aptitude towards Entrepreneurship.

Unit 1

Food Chemistry and Nutrition

1.1 Introduction to Food chemistry

1.2 Food Guide and Usage,-Basic Five Food Groups- Malnutrition - Fortification

1.3 Diet therapy : Purpose and Principles-Diet in Diabetes mellitus and Cardiovascular diseases

1.4 Dietary Management

Unit 2

Food Microbiology and Sanitation and Hygiene

2.1 Food Contamination (Sources, causes and consequences)-Agricultural produce(Grains-Vegetables-Fruits),AnimalProduce (Milk, Meat and Sea food)

2.2 Importance of Environmental and personal Hygiene of food handler-Safety in food storage-handling and preparation

2.3 Methods of Food Preservation

2.4 Methods of Sterilization- use of detergents-heat and chemicals

Unit 3

Post Harvest Technology& Food packaging

3.1 Cereals and legumes-Oil seeds- Fruits and Vegetables-Meat fish and Poultry – IQF (Individual Quick Freezing)

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-Plastic: Shelf-Life

3.6 Quality testing of Packaging

Unit 4

Food Adulteraton & Food Toxicology

4.1 Detection of Food adulteration in Food grains, Dhal, Oil, Spices &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

Sensory Evaluation & 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

REFERENCES

Banwart, George J, Basic Food Microbiology, CBS Publication, New Delhi 1987

Swaminathan, M. Textbook on Food Chemistry, Vol.I & II Printing and Publishing. Co., Ltd., Bangalore .1997

Frazier , Food Microbiology, Mc Graw Hill Publications, New York.,1988,

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

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

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

Norman G. Marriot, Principles of Food Sanitation, AVI Publishing Co., Inc., Conneticut 1989

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 2011 - 2012)

GENERAL ZOOLOGY – II

CODE :11ZL/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 carp, *Catla catla* and any one exotic carp - economic importance

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 – AIDS - Hepatitis

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 **(15 Hrs)**

Human Genetics and Animal Behaviour

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

4.2 Hereditary diseases / syndromes – Albinism, Huntington disease, Haemophilia & Kearns – Sayre Syndrome – Down's syndrome, Turner's Syndrome and Klinefelter's syndrome.

4.3 Animal Behaviour - Types of Behaviour - Learning Behaviour -Abnormal behaviour in zoo animals

BOOKS FOR REFERENCE

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

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

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

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

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

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

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

Ridley, Mark, Animal Behaviour, Second Edition Blackwell Science Inc. 1995.

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

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

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 2011 - 2012)

GENERAL ZOOLOGY – II PRACTICAL

CODE :11ZL/AC/P1 21 **CREDITS: 1**

L T P: 0 0 2

TOTAL HOURS: 26

1. Apiculture and Sericulture

Structure and identification of different castes of *Apis indica.*
Equipments needed for Apiculture
Slides –Mouthparts & Legs of Honey Bee
Structure, identification and life history stages of *Bombyx mori*
Tools and Equipments of Sericulture
Economic importance of honey bees and silk worms.

2. Food Fishes

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

3. Haematology

ABO - Blood grouping
Rh – typing
Morphology of W.B.Cs

4. 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.

5. 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.

END SEMESTER EXAMINATION

Total Marks: 50 Duration: 3 Hours

QUESTION PAPER PATTERN

Question – I	ABO/Rh Typing	10 marks
Question – II	Spotters (Ten)	40 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

APPLIED ZOOLOGY

(Skill Development Course)

CODE :11ZL/ME/AZ23 **CREDITS: 3**

L T P: 3 1 0

TOTAL TEACHING HOURS: 52

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 **(10 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 **(10 Hrs)**

Soil enrichment

3.1 Economically important soil animals – earthworms – worm cast production – application in organic farming – soil fertility – vermitechnology – vermiculture, vermicomposting, vermiwash - biofertilizers.

3.2 Millipedes and centipedes – snails and slugs – their importance in soil ecosystem.

3.3 Termites – characteristics of mound soils – decomposition of organic matter – termatopheles – termite damage to crops and buildings – control measures.
3.4 Pesticides – effect on soil – soil fauma.
3.5 Setting up of a vermitech unit and preparation of vermiculture and vermiwash techniques.

Unit 4 (11 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 (11 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, Economic Zoology, Fourth edition, Rastogi Publications, Meerut. 2010.

BOOKS FOR REFERENCE

Ahsan, J. and S.P. Sinha. Handbook of Economic Zoology, Fourth edition, S. Chand and Co., New Delhi. 2000.

Ayyar, T.V. R., (1963), Handbook of Economic Entomology.For South India, Govt. Press, Madras.1985.

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

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

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

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

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

Hickling, C.F., Fish Culture, Faber and Faber, London. 1971.

Ismail, S.A. Vermicology : The Biology of Earthworms, Chennai, Orient Longman, 1007.

Jhinghran, V.G., Fish and Fisheries of India, Hindustan Publishing Corpn, New Delhi. 1982.

Jull, Morley. A, Poultry Husbandry, McGraw Hill Book Co., New York. 1987.

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

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

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

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

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

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

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

Singh, Rajendra, Elements of Entomology, 1st edition, Meerut, Rastogi Publication, 2010.

Shukla and Upadhyay, Economic Zoology 2nd edition, Meerut, Rastogi Publication, 2010.

Vasanthraj, B. And T.N. Ananthakrishnan, General and Applied Entomology, Tata McGraw Hill. 2004.

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 2011 - 2012)

CONSERVATION BIOLOGY

CODE :11ZL/ME/CB 23 **CREDITS: 3**

L T P: 3 1 0

TOTAL TEACHING HOURS: 52

OBJECTIVE OF THE COURSE

- To create among students an understanding of the major approaches to conservation, the ecological principles upon which conservation is based and how the principles can be applied to conservation.

Unit 1

Biological diversity (10 hrs)

1.1 Introduction; Ecological and Geological factors contributing to the occurrence of biodiversity ,species richness, evenness and equitability.

1.2 Geographical distribution of species, measurement of species number, species-area relationship, endemism

1.3 Biodiversity and community; metapopulations

1.4 Extinction over geological time

Unit 2

Threats to Biological Diversity (11 hrs)

2.1 Loss of biodiversity: Rate of loss, causes – natural and anthropogenic, consequences, perspectives - habitat degradation and fragmentation – overexploitation – overabundance – problem of exotic species-alien species - invasive species – pollution - disease, local versus global effects, global climate change; extinction rate,

2.2 Monitoring biodiversity

2.3 Biodiversity and Global Hotspots

2.4 Valuing Biological Diversity –issues, concerns management, economics and ethics.

Unit 3

Conservation (10 hrs)

3.1 A historical perspective.

3.2 Conservation – characteristics; species concept and conservation biology, strategies - past, present and future, attitudes about conservation, community level conservation, forging a national strategy, emerging conservation movements, role of institutions in conservation, molecular approaches to conservation

3.3 In situ and Ex situ Conservation Strategies – captive breeding and re-introductions, single species conservation.

Unit 4

Animal Protection Laws and Protected Areas (10 hrs)

4.1 Forest Conservation Act, Animal Welfare Act, Wildlife Act, Wildlife Protection Conservation Act, Wildlife Protection (Amendment Act), Biodiversity Act, Role of IUCN, UNESCO and MAB.

4.2 Islands biogeographic theory and conservation practice

4.3 Parks-Island Development Program - Creation of marine parks (Gulf of Mannar) – National Parks, nature reserves and wildlife sanctuaries, Biosphere Reserve

4.4 Importance of Wildlife corridors

Unit 5

Ecosystem management and Restoration Ecology (11 hrs)

5.1 Ecosystem stress

5.2 Traditional ecological management practices

5.3 Ecosystem management – managing forests - managing aquatic ecosystems

5.4 Restoration of damaged ecosystems and endangered populations; case studies in conservation management.

5.5 Monitoring restoration and conservation programs.

5.6 Sustainable development – challenges in the future

BOOKS FOR REFERENCE

Chazllani, V.K., Biodiversity and Conservation - International Perspectives, Manglam Publications. 2010.

Greipsson, Sigurdur, Restoration Ecology, Jones and Bartlett Learning.2011.

Groom, Martha.J., Meffe, Gary.K. and Carroll, Ronald.C., Principles of Conservation Biology, Third Edition, Sinauer Associates Inc. 2006.

Kumar Kartikeya, Biodiversity Extinction and Conservation, Aavishkar Publishers. 2005.

MacDonald, David and Katrina Service (ed.), Key Topics in Conservation Biology, Blackwell Publishing. 2007.

Meffe, Gary, Larry Nielsen, Knight, Richard.L. and Schenborn Dennis, Ecosystem Management: Adaptive, Community-based Conservation. Island Press. 2002.

Primack, Richard.B, Essentials of Conservation Biology, Fifth Edition, Sinauer Associates Inc. 2010.

Rosenzweig, Michael.L, Win-Win Ecology - How the earth's species can survive in the midst of human enterprise, Oxford University Press. 2003.

Trivedi, P.C. Biodiversity Assessment and Conservation, Agrobios (India). 2006.

Van Dyke, Fred, Conservation Biology – foundation, concepts, applications. Mc Graw Hill (Second Edition).2008.

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 2011 - 2012)

CHORDATA

CODE :11ZL/MC/CH 24 **CREDITS : 4**

L T P : 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVE 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 (11 Hrs)

2.1 Gnathostomata - General features - Super class Pisces

2.2 Type - *Scoliodon sorrakowah*.-highlight the differences with bony fishes (*Mugil sp*.)

2.3 Dipnoi and its affinities.

2.4 Accessory respiratory organs - airbladder - parental care.

Unit 3 (15 Hrs)

3.1 Amphibia - General features . Type – *Triton molge.* Neoteny in Urodela - Parental care in Amphibia

3.2 Evolution of Tetrapod limb

3.3 Reptilia - General features. Type - *Calotes versicolor.* Skull in reptiles as basis of classification – Poison apparatus and Biting mechanism - Snakes of South India.

Unit 4 (13 Hrs)

4.1 Aves - General features. Type - *Columba livia.*

4.2 Ratitae - Origin of birds - adaptations to flight - migration - palate in birds – song in birds.

Unit 5 (13 Hrs)

5.1 Mammalia - General features. Type - *Oryctolagus cuniculus.*

5.2 Egg laying mammals, Aquatic mammals, Dentition in mammals

TEXT BOOKS

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

Jordan, E.L. Chordate Zoology – 6th Edition S. Chand & Co., New Delhi. 2009.

BOOKS FOR REFERENCE

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

Kotpal, R.L. Modern Text Book of Zoology- Vertebrates. Rastogi Publications, Meerut. 2010.

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

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

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

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

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

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

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

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

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

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 2011 - 2012)

CHORDATA - PRACTICAL

CODE :11ZL/MC/P2 22 **CREDITS: 2**

L T P: 0 0 3

TOTAL HOURS: 39

1. Spotters

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

2. Dissections - Fish

Observation of the Viscera
Digestive System
Arterial system

3. Computer simulated frog dissection

.

4. Mount

Scales of fishes – Placoid, Ctenoid, Cycloid

5. Study of the fauna in the Stella Maris College Campus – A Report

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 / B.S.W. / B.V.A. Degree Programmes

SYLLABUS

(Effective from the academic year 2011 - 2012)

CONCEPTS IN ANIMAL WELFARE

CODE :11ZL/GE/AW32

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 (6 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

Human – Animal Interactions

1.10. Contributions of animals to human society Cultural and historical influences
1.11. Wildlife – companion animals – research animals – farm or food animals.
1.12. Conflict in attitudes to animals.
1.13. Relationship between animal abuse and human violence

Unit 2 (12 hrs)

Ethical concerns

Exploitation of animals

2.1 Introduction – CITES (Convention on International Trade in Endangered Species), AATA and IATA

2.2 Wildlife trade – Turtle trade – Fur – mink – bear farms – whaling – leather – snake skins – Exotic pet trade

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

Animal testing

2.4 Animals used for education and 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 – Animal Suffering

2.5 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 3 (8 hrs)

Animal welfare – national and international legislations.

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

3.2 CPCSEA (Committee for the Purpose of Control and Supervision on Experiments on Animals)

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

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

Humane approach to animals

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

3.6 Use of alternatives in education

BOOKS FOR REFERENCE

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

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

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

Smyth, D., Alternatives to Animal Experiemtns, Scolar Press, London. 1978.

WSPA – World Society for the protection of the Animals, Concepts in Animal Welfare Contents, Introduction, Explanatory notes and further resources, University of Bristol. 2010.

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

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

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

INTERNAL ASSESSMENT ONLY

Total Marks : 50

QUESTION PAPER PATTERN

Section A – 3x2=6 Marks (Objectives – All questions to be answered)

Section B – 3x3=9 Marks (3 out of 5 to be answered)

Section C – 2x5=10 Marks (2 out of 3 to be answered)

- **NO END SEMESTER 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 / B.S.W. / B.V.A. Degree Programmes

SYLLABUS

(Effective from the academic year 2011 - 2012)

PET CARE

CODE : 11ZL/GE/PC32 **CREDITS : 2**

L T P : 2 0 0

TOTAL TEACHING HOURS :26

OBJECTIVES OF THE COURSE

- To create an awareness among students on the general principles of pet care.

Unit 1 **(6 Hrs)**

Introduction to Animal Care

1.1 Laws and licenses

1.2 Animal Charities and Societies (eg. RSPCA, WSPA, Blue Cross)

1.3 Pet Care Needs (feeding, Watering, Shelter, Containment, Fencing, Caging, Protection)

Unit 2 **(10 Hrs)**

Routine Care for Fish and Birds

2.1 Fish Selection

2.2 Types of fish (Tropical, Marine, Cold Water)

2.3 Costs, Size, Equipment, Tanks, Ponds, Pumps, Aquariums, Lightings, Water quality management, Water exchange, Feed (Pelleted, microencapsulation diet and live feed –Daphnia and Brine Shrimp)

2.4 Diseases (Fungal, Bacterial, Parasites, Environmental) - Treatment

2.5 Bird Breeds (eg. Parrots, Pigeons, Canaries)

2.6 Bird Selection, Containment (Aviaries –selection, design, size, management), Feed, Watering, Grooming (Wing trim, Beak Trim, Nail Trim), Hygiene, Catching and Restraining

2.7 Caring for the Sick Bird, Signs of illness, Temperature, Supportive therapy, Common Ailments (eg. Abscesses, Alopecia, Apoplexy, Aspergillosis, Breathlessness, Constipation, Parasites) - Treatment

Unit 3 **(10 Hrs)**

Routine care for Cats and Dogs

3.1 Cat Breeds (Long Haired, Semi Long Haired, Short Haired, Oriental, Bombay Cross Breed)

3.2 Cat Selection, Allergies, Containment, Breeding, Newborn Kittens - Feed and nutrition

3.3 Common infections and Treatment

3.4. Dog Breeds (Pure and mixed)

3.5 Dog Selection, Varying size and temperament, Grooming, Skin care, Inherited traits (aggression, deafness), Containment, Breeding, Nutrition

3.6 Common infections and Treatment

BOOKS FOR REFERENCE

Alderton,D. The Illustrated Practical Guide to Small Pets & Pet Care, Lorenz Books. 2008.

Shojai, A. Complete Kitten Care, New American Library. 2010.

Hines, S. Holistic Pet Care,Outskirts Press. 2007.

Andrews,C.,A. Exell and N. Carrington. Manual of Fish Health, Firefly Books. 2003.

Brown,A. The Whole Pet Diet**,** Celestial Arts. 2006.

Levin,C.D. Dog's, Diet & Disease, Lantern Publications. 2001.

Puotinen,C.J.The Encyclopedia of Natural Pet Care, 2nd Edition, Mc Graw Hill. 2000.

Silverstein, D and K. Hopper. Small Animal Critical Care Medicine, Saunders Pub. 2008.

Jhingran,V.G. Fish and fisheries of India. Hindustan Publishing Corp. New Delhi.1982.

INTERNAL ASSESSMENT ONLY

Total Marks: 50

QUESTION PAPER PATTERN

Section A – 3 x 2 = 6 Marks (Objectives - All questions to be answered)

Section B – 3 x 3 = 9 Marks (3 out of 5 to be answered)

Section C – 2 x 5 = 10 Marks (2 out of 3 to be answered)

*** NO END SEMESTER EXAMINATION**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

CELL AND MOLECULAR BIOLOGY

CODE : 11ZL/MC/CM 34 **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 **(10 Hrs)**

Prokaryotic and Eukaryotic Cells and Cell Membrane

1.1. Structural and Functional organisation

1.2. Origin of Eukaryotic Cells – Endosymbiont theory

1.3. Cell membrane – Structural organization, asymmetry and fluidity, specializations in structure; transport across membranes

Unit 2 **(16 Hrs)**

Cell organelles, Cytoplasmic Vacuolar System , Cytoskeleton and Nucleus : Structure and Function

2.1 Cytoplasmic Vacuolar System – Endoplasmic Reticulum – Golgi Apparatus – Microtubules

2.2 Lysosomes - Microbodies – Mitochondria - Chloroplast

2.3 Ribosomes

2.4 Nuclear organization - Nucleolar genome

Unit 3

Physical Basis of Heredity **(15 Hrs)**

3.1 Chromosomes – Structure – Nucleosomes, and functions

3.2 Types of chromosomes – holokinetic, B chromosomes, giant chromosomes

3.3 Cell cycle: Mitosis, Meiosis, Regulation of cell cycle – altered cell cycle in Cancer, cell death

3.4 Oncology/Cancer Biology : Characteristics of a cancer cell – altered cell cycle in cancer cell

Unit 4 **(12 Hrs)**

Genes : Regulation and Expression in Prokaryotes and Eukaryotes

4.1 Structural Organization of Prokaryotic and Eukaryotic Genes

4.2 Regulation of Gene Expression in Bacteria – Operon Model

4.3 Transcription –Biosynthesis of various RNAs – Transcription Factors – Promoters and Enhancers – Post transcriptional modifications.

4.4 Mechanism of translation; Post Translational Modifications – Collagen and Insulin.

Unit 5 **(12 Hrs)**

Nucleic acids and the Human Genome Project

5.1 Nucleic Acids: Molecular Structure of DNA –DNA Replication, DNA Repair

5.2 Molecular structure of RNA, antisense RNA

5.3 DNA Sequencing and its Applications

5.4 The Human Genome Project

BOOKS FOR REFERENCE

Alberts, Bruce; Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter , Molecular Biology of the Cell**,** Fifth Edition, Garland Publishing, New York. 2007.

Alberts, Bruce, et.al., Essential Cell Biology, Second Edition by Julian Lewis. 2003

Clark, David.P , Academic Cell : Molecular Biology; Elsevier. 2010.

Cooper, Geoffrey.M and Hausman, Robert. E, Cell – A Molecular Approach, Third Edition, Sinauer Associates Inc, 2004.

De Robertis, E.D.P, Cell and Molecular Biology, 8th Edition. Lippincott Williams and Williams. 2008.

Karp, Gerald, Cell Biology, Sixth edition, John Wiley and Sons. 2010.

Karp, Gerald , Cell and Molecular Biology: Concepts and Experiments**,** Sixth Edition, John Wiley and sons., Inc., New Jersey. 2010.

Lodish, Harvey; David Baltimore and Arnold Bert. Molecular Cell Biology**,** Sixth Edition, W.H. Freeman and Company, New York. , 2007.

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

Wolfe, Stephen I., Molecular and Cellular Biology**, W**adsworth Publishing Company, California. 1993.

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 2011 - 2012)

GENETICS

CODE :11ZL/MC/GN 34 **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.

Unit 1 **(12 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 - phenocopy.

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 **(14 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 (P_{53}, RB, APC, BRCA1 & 2) – Carcinogens

5.4 Genetic regulation of development in *Drosophila*: developmental stages – three major classes of developmental genes (maternal effect genes, segmentation genes and homeotic genes)

TEXT BOOK

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

BOOKS FOR REFERENCE

Benjamin A. Pierce. Genetics – A conceptual approach. Third edition. W. H. Freeman and company, New York. 2008.

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

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

Jocelyn E. Krebs, Elliott S. Goldstein and Stephen T. Kilpatrick. Lewin's Genes X. Jones and Bartlett Publishers, Massachusetts. 2009.

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

Michael R. Cummings. Human Heredity – Principles and issues. Sixth edition. Thomson Brooks/Cole, Canada. 2003.

Peter J. Russel. iGenetics – A molecular approach. Third edition **,** Benjamin Cummings, San Francisco. 2011.

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

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

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

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 2011 - 2012)

GENETICS & CELL AND MOLECULAR BIOLOGY - PRACTICALS

CODE :11ZL/MC/P3 32 **CREDITS: 2**

L T P: 0 0 3

TOTAL HOURS: 39

CELL AND MOLECULAR BIOLOGY

Camera lucida
Micrometry
Mitosis - in onion root tip.
Meiosis - in grasshopper testis.
Squamous epithelium squash preparation
Chironomus - Salivary gland chromosome - squash preparation.
Genomic DNA extraction
Total RNA extraction
Agarose electrophoresis - Demonstration

GENETICS

Drosophila culture techniques
Drosophila mutants
ABO Blood Grouping
Rh Typing
Karyotyping – slides of normal and Down's Syndrome karyotype

Visit to a Molecular Biology 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 Course Offered by Department of Zoology to students of
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SYLLABUS
(Effective from the academic year 2011 - 2012)

GENES – DISEASES - SOCIETY

CODE :11ZL/GE/GD 44 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

- ✓ *Students of Zoology – not eligible*

OBJECTIVES OF THE COURSE

- To gain basic knowledge in Human Heredity and its basic principles and issues.
- To become familiar with the recent advances in the field of Genetics and the ethical and social implications of a range of new genetic technologies.

Unit 1 **(9 Hrs)**

1.1 Introduction - Human gametes and their role in heredity – DNA the genetic material - Human chromosomes – Sex Determination in Man – Genes and behaviour.

1.2 Mendelian inheritance: Monohybrid and Dihybrid cross experiments - Laws of inheritance – Identification of Mendelian traits in Man - Pedigree analysis

Unit 2 **(9 Hrs)**

2.1 Incomplete dominance (Hair, straight / curled) – Codominance (Sickle cell anemia)- Epistasis (Deaf Mutism)

2.2 Lethal genes,Types and inheritance.

2.3 Multiple allelic inheritance (ABO and Rh Blood groups in man)

2.4 Polygenic inheitance(Skin colour in Man).

Unit 3 **(10 Hrs)**

3.1 Autosomal recessive inheritane(Cystic fibrosis) - Autosomal dominant (Ehlers – Danlos Syndrome)

3.2 X-linked dominant inheritance – X-linked recessive inheritance (Haemophila) – Y-linked inheritance (Hypertrichosis) – Mitochondrial inheritance (Kearns sayre syndrome).

3.3 Sex Influenced and sex limited genes and their inheritance.

3.4 Teratogens and birth defects – Radiations, Infectious agents, Alcohol and Drugs.

Unit 4 **(12 Hrs)**

4.1 Disorders with genetic predisposition: Diabetes, Obesity, Hypercholestremia Breast Cancer, Autism and Alzheimer's disease.

4.2 Chromosomal disorders: Down Syndrome, Turner syndrome, Klinefelter Syndrome, Cat cry Syndrome and Philadelphia Chromosome.

4.3 Metabolic disorders: Phenylketonuria, Albinism, Taysach's disorder, Huntington disease and Lactose intolerance

4.4 Genetic counselling – Eugenics – Consanguineous marriage and its impact in the society.

Unit 5 (12 hr)

5.1 A fundamental understanding of recent advances in the field of Genetics – Genetic engineering, basic steps and applications.

5.2 Genetically modified organisms – Gene therapy – Gene Cloning.

5.3 Predictive Genetic Testing: DNA Finger printing and Blood group analysis – Case Study

5.4 The Human Genome Project: Objectives and applications.

5.5 Ethical, Legal and Societal Issues(ELSI) related to techniques in Genetics.

BOOKS FOR REFERENCE

Benjamin A. Pierce. Genetics – A conceptual approach. Third edition. W. H. Freeman and company, New York. 2008.

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

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

Jocelyn E. Krebs, Elliott S. Goldstein and Stephen T. Kilpatrick. Lewin's Genes X. Jones and Bartlett Publishers, Massachusetts. 2009.

Michael R. Cummings. Human Heredity – Principles and issues. Sixth edition. Thomson Brooks/Cole, Canada. 2003.

Peter J. Russel. iGentics – A molecular approach. Third edition **,** Benjamin Cummings, San Francisco. 2011.

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

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

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 4 = 40 Marks (All questions to be answered)

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

Section C – 2 x 15 = 30 Marks (2 out of 4 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 Programmes

SYLLABUS

(Effective from the academic year 2011 - 2012)

BIOLOGY OF HUMAN REPRODUCTION

CODE :11ZL/GE/HR44 **CREDITS: 4**

L T P : 4 0 0

TOTAL TEACHING HOURS: 52

- ✓ *Students of Zoology – not eligible*

OBJECTIVES OF THE COURSE

- To enable students to gain insights into the human reproductive system and functions in health and disease .
- To introduce the biological aspects of sexuality from a structural , functional & evolutionary standpoint

Unit 1

Human reproductive organs **(10 hrs)**

1.1 Male reproductive organs – testis – testicular functions
1.2 Female reproductive organs – the ovary – ovulation – menstrual cycle
1.3 Hormonal control of reproduction.
1.4 The course of Human development -Procreation – Fertilization - Implantation- Placentation - - Embryonic and Foetal development - Pregnancy – Parturition and lactation .
1.5 Sex determination – Foetal sex differentiation – mutation –Amniocentesis

Unit 2

The H – P – G Axis **(10 hrs)**

2.1 Brain and reproduction
2.2 Puberty
2.3 Stress and reproduction
2.4 Aging and reproduction – menopause - andropause
2.5 Disorders of Sexual development-fetal loss and birth defects

Unit 3

Infertility and Sexually Transmitted Diseases **(10 hrs)**

3.1 Male Infertility
3.2 Female Infertility
3.3 Smoking and Infertility - Obesity and infertility
3.4 Artificial control of fertility –contraception-abstinence
3.5 Sexually Transmitted Diseases - AIDS – Gonorrhoea – Syphilis – Genital warts – Genital Herpes

Unit 4

Assisted Reproductive Technolgy Diseases **(10 hrs)**

4.1 Artificial Insemination – GIFT- ZIFT- TET-Test tube babies
4.2 Surrogate mother hood

4.3 Methods of Preservation of Gametes and Embryos
4.4 Cloned babies

Unit 5 (12 hrs)

Ethical, Societal & Legal Issues associated with Assisted Reproductive Technology

5.1 Ethical and policy issues involving sperm banks and egg donors
5.2 Social context of surrogate parenting - Ethical and policy issues in surrogate parenting
5.3 Adoption
54 Ethical and policy issues in human cloning option
5.5 Human Embryo research
5.6 Consanguinity - Genetic Counselling
5.7.Alcoholism and reproduction
5.8 Psychoactive drugs and reproduction

REFERENCE BOOKS

Cassan, A. Human Reproduction and Development (Inside the Human Body) , Chelsea Clubhouse. 2005.

Ellison Peter, T. On Fertile Ground: A Natural History of Human Reproduction, Houghton Mifflin Company. 2001.

Heffner, Linda J. & Danny J. Schust. The Reproductive System at a Glance, 3rd edition Wiley-Blackwell. 2010.

Johnson, Martin H. Essential Reproduction (Essentials); 6th edition, Wiley-Blackwell. 2007.

Jones, Richard E. Human Reproductive Biology, Third Edition, Elsevier Inc. 2006.

Pinon , Ramon. Biology of Human Reproduction, University Science Books. 2002.

Rand, Casey. Human Reproduction (Sci-Hi: Life Science) , Heinemann-Raintree. 2009.

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 4 = 40 Marks (All questions to be answered)
Section B – 5 x 6= 30 Marks (5 out of 7 to be answered)
Section C – 2 x 15 = 30 Marks (2 out of 4 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 Programmes

SYLLABUS

(Effective from the academic year 2011 – 2012)

NUTRITION AND DIET THERAPY

CODE : 11ZI/GE/ND44 **CREDITS: 4**

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To gain knowledge about nutrition, food safety and nutritional disorders.
- To provide an overview of principles involved in Diet Therapy.

Unit 1 **(9 Hrs)**

Nutrition Basics

1.1 Sources and functions of Carbohydrates, Proteins and Lipids

1.2 Balanced diet-Food Groups and Food Guide

1.3 Malnutrition-PEM-Iodine deficiency-Vitamin A deficiency-Iron deficiency-Other micronutrients

1.4 Nutrigenomics

Unit 2 **(10 Hrs)**

Food Safety

2.1 Food Contamination (Sources, causes and consequences)-Agricultural produce (Grains-Vegetables-Fruits), AnimalProduce (Milk, Meat and Sea food)

2.2 Importance of Environmental and personal Hygiene of food handler-Safety in food storage-handling and preparation

2.3 Methods of Food Preservation

Unit 3 **(12 Hrs)**

Diet and health

3.1 Eating Disorder Continuum-Anorexia nervosa-Bulimia nervosa- Binge Eating disorder-Night Eating Syndrome

3.2 Overweight and Obesity-Hypertension-Osteoporosis

3.3 Nutritional Concerns of Childhood

3.4 Nutritional –related Concerns of Mature Adults

Unit 4 **(12 Hrs)**

Principles of Diet therapy and Therapeutic Nutrition

4.1 Diet therapy: Purpose and Principles - Food acceptance in illness-therapeutic diets –Tube feeding –Parenteral feeding

4.2 Diet in Diabetus mellitus, Gastrointestinal Disorders-Ulcer, Diarrhoeaand

Constipation) Cardiovascular diseases

4.3 Diet therapy for Addictive Behaviors in Anorexia Nervosa, Bulimia and Alcoholism

4.4 Food allergies-Classification and Dietary Management

Unit 5 **(9 Hrs)**

Sensory Evaluation and Quality Control

5.1 Factors affecting food acceptance –sensory

5.2 Objective methods of Sensory Evaluation

5.3 Adulteration in Food

5.4 Quality control and its importance-Food laws and Food Administration

BOOKS FOR REFERENCE

Paul Insel, R. ElaineTurner, Don Ross, Nutrition 3rd Edition, American Dietetic Association, Jones and Bartlett Publishers. 2007,

Mudambi, S.R. and M.V. Rajagopal , Fundamentals of foods, Nutrition and Diet therapy, 5th edition, New Age international (P) Ltd., Publishers 2009

Srilakshmi B, Human Nutrition, New Age international (P) Ltd., Publishers 2009

Srilakshmi, B Nutrition Science New Age international (P) Ltd., Publishers 2009

Gordon M.Wardlaw and Jeffrey S. Hampl, Perspectives in Nutrition ,7th edition, Mc Graw Hill Inc., New York. 2007

Brian A. fox and Allan G. Cameron, Food Science Nutrition and health . Arnold Publishers.1997.

Brown Judith E., Nutrition Now, 3rd Edition, Watsworth Thomson Learning Canada. 2003.

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 4 = 40 Marks (All questions to be answered)

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

Section C – 2 x 15 = 30 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 2011 - 2012)

MICROBIOLOGY

CODE :11ZL/MC/MB 44 **CREDITS: 4**

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

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

Unit 1 **(12 Hrs)**

1.1 Introduction : The history and scope of microbiology

1.2 Outline classification of microorganisms with special reference to bacteria and viruses - Prokaryotes and Eukaryotes, characteristic features

1.3 Microbiological techniques: Microscopy, specimen preparation, staining techniques - Media Preparation and types of culture media – preservation of culture – pure culture techniques - methods of identification of microorganisms in culture

Unit 2 **(13 Hrs)**

2.1 Archaea – characteristics (brief outline)

2.2 Bacteria : Gross morphology of bacterial cells - size, shape and arrangement- Structure of Bacterial cells – Capsule - Cell wall, chemical composition and characteristics - plasma membrane – Flagellum, Structure and arrangement – Fimbriae, Structure and types - Cytoplasmic organelles and inclusions – Nucleoid, Molecular structure – Plasmids, types and functions – Mesosomes - Endospore, Structure and significance.

2.3 Viruses : General properties – isolation and cultivation of viruses - structure and reproduction of T_4 phage – structure and multiplication of an animal virus, viroids and prions.

Unit 3 **(15 Hrs)**

3.1 Bacterial Growth : Reproduction and growth of bacterial population - growth curve – measurement of microbial growth – the continuous culture of microorganisms. Physical conditions required for growth of bacteria - temperature, oxygen and pH requirements. Nutritional requirements - General nutritional classification of bacteria.

3.2 Recombination in bacteria: Types – Transformation – Conjugation – Transduction – Transposition and IS elements.

3.3 Microbial control : Importance of microbial control – Control of micro-organisms by physical and chemical agents - Probiotics -Antibiotics and other chemotherapeutic agents.

Unit 4 **(13 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, pneumonia, measles, hepatitis B)- Foodborne and Waterborne (typhoid, cholera, polio) – Zoonotic (swine flu, dengue fever, Leptospirosis) - Fomite borne – Nosocomial and Sexually transmitted diseases (genital herpes, gonorrhoea, syphilis).

4.3 Oncogenic viruses – papilloma virus and genital warts

Unit 5 **(12 Hrs)**

5.1 Air: enumeration of microorganisms in air – significance – control of airborne microorganisms

5.2 Water: hydrologic cyclic – classification of water – bacteriological examination of domestic water – purification of water – sewage and its disposal

5.3 Milk: sources and types of microorganisms in milk – pasteurization of milk - dairy products (fermented milk and cheese)

5.4 Food: microbial spoilage of food and its control – fermented food – food poisoning.

5.5 Microbial degradation of materials – fabric, metals and cosmetics.

TEXT BOOK

Dubey, R.C. and Maheshwari, D.K. A Text Book of Microbiology, S.Chand & Co. Ltd. New Delhi. 2005.

BOOKS FOR REFERENCE

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

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

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

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

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

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

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

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

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

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

Tortora, Gerard, J.,Berdelle R. Funk and Christine L Case. Microbiology – An Introduction, 9th edition. Pearson - Benjamin Cummings San Francisco. 2007.

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 2011 - 2012)

MICROBIOLOGY - PRACTICAL

CODE : 11ZL/MC/P4 42 **CREDITS: 2**

L T P: 0 0 3

TOTAL HOURS: 39

1. Identification of Microbes.
2. Observation of bacteria motility – hanging drop preparation.
3. Methods of sterilisation by heat, Flaming, Hot air oven, Autoclave and Laminar flow - an observation.
4. Preparation of nutrient agar and McConkey agar.
5. Isolation of bacteria by pure culture - streak plate - pour plate methods.
6. Coliform count in drinking water samples by membrane filter technique.
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. Study of antibiotics - classification based on their biological origin and mode of action and their applications.

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 VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2011 - 2012)

FUNDAMENTALS OF BIOTECHNOLOGY

CODE :11ZL/MC/FB 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 techniques in biotechnology

Unit 1 (12 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

1.4 Basic concept of Bioinformatics – Proteomics and Genomics

1.5 Principles of Genetic engineering

Unit 2 (15 Hrs)

Techniques of Genetic engineering

2.1 Electrophoresis - Northern, Southern and Western blots - PCR Technique.

2.2 Cloning in prokaryotes.

2.3 Cloning in eukaryotes - Cloning with *Agrobacterium* plasmids.

2.4 Methods of transfer of foreign DNA into cells - Electroporation - Particle bombardment gun – Microinjection.

2.5 Site - directed mutagenesis.

Unit 3 (16 Hrs)

Genetic engineering for human welfare

3.1 Gene cloning in medicine – Insulin, HGH, vaccines

3.2 Antibiotic production – Penicillin and Streptomycin

3.3 Diagnosis and cure of disease - Diagnosis with DNA probe, ELISA technique, Hybridoma technology – Monoclonal antibodies - DNA finger printing - Gene therapy – Case study of ADA.

3.4 Production of transgenic animals and plants - IVF technology in farm animals and humans.

3.5 Animal cell and tissue culture techniques – culture media – natural and artificial – primary and secondary cell lines – culture methods – merits and demerits

3.6 Stem Cell Culture & Applications

3.7 Types of Industrial Fermenters – Common Fermenter, Cylindro-conical Fermenter, Tower Fermenter, Air – lift Fermenter, Deep Jet Fermenter

Unit 4 (11 Hrs)

Enzyme Technology

4.1 Methods of Enzyme production
4.2 Immobilised Enzymes – Enzyme engineering
4.3 Applications of Enzymes

Unit 5 (11 Hrs)

Applications of Biotechnology

5.1 Benefits and Hazards of Genetic engineering
5.2 Role of genetically engineered microorganisms – Super Bug
5.3 Single Cell Protein (SCP)

TEXT BOOK

Dubey, R.C. A Text Book of Biotechnology**,** S.Chand & Company Ltd., New Delhi. 2005.

BOOKS FOR REFERENCE

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

Mahesh, S. Biotechnology IV, New Age International, India. 2006.

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

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

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

Steven P Mcgiffen . Biotechnology, Pluto Press, USA. 2005.

Young Lisa. Biotechnology and Genetic Engineering**,** Facts on Files Publishers, 2004.

Ying, S. Generation of cDNA libraries – Methods & Protocols, 1st Edition. Humana Press. 2003

McCabe,L.L., E.R.B. McCabe. DNA: Promise & Peril- 1st Edition. Univ of California Press. 2010.

Haryry,M. Rationality & the Genetic Challenge. Cambridge Univ Press.2010.

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 2011 - 2012)

IMMUNOLOGY

CODE :11ZL/MC/IM 54 **CREDITS: 4**

L T P : 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

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

Unit 1 **(15 Hrs)**

Organisation of Immune System and Basic Concepts of Immunity

1.1 Introduction - History and Basics of Immunology.
1.2 Cells and molecules of the immune system: types, source and salient functions
1.3 Primary and Secondary Lymphoid tissues / organs; B and T cell functions
1.4 Characteristics of immune responses: Primary and secondary immune responses.
1.5 Types of immunity: cellular and humoral immunity; natural and acquired immunity.
1.6 Types of acquired immunity: active and passive immunity with examples.

Unit 2 **(12 Hrs)**

Antigens and Antibodies

2.1 Antigens: definition, classification, functional characteristic(immunogen, hapten, antigenic determinants, epitopes)
2.2 Antibody: primary structure, classification and functions
2.3 Antigen - Antibody reaction: nature and consequences

Unit 3 **(14 Hrs)**

Immune Response

3.1 Complement system in innate and acquired immunity
3.2 Hypersensitivity reactions: types and immune reactivity
3.3 Transplant rejection : types of transplant/graft, causes for rejection and immuno-suppression

Unit 4 **(14 Hrs)**

Mediators of Immune System And Immune-Regulation

4.1 Cytokines:Definition, properties, receptors, role of two major Cytokines in Immune response.
4.2 Immune reactions in Viral, Bacterial and Parasitic infections.

Unit 5 **(10 Hrs)**

Vaccines and Prophylaxis

5.1 Principles and types of vaccines used in Humans.

5.2 Use of Immune serum for therapy – anti-venom, anti-tetanus and anti - D sera.

TEXT BOOK

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

BOOKS FOR REFERENCE

Coico,R., G. Sunshine. Immunology – 6th Edition.Wiley – Blackwell Pub. 2009.

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

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

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

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

Paul, W.E. Fundamental Immunology**,** Raven Press, New York . 1989.

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

Roitt, I.M. Essential Immunology, Blackwell Scientific, Oxford. 1994

Srivastava, R., Ram, B.P. and P.Tyle. Molecular mechanisms of Immune regulation**.** VCH Publisher Inc., New York.1991.

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

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 2011 - 2012)

MEDICAL LABORATORY TECHNOLOGY

CODE :11ZL/MC/LT 54 **CREDITS: 4**

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

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 **(8Hrs)**

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 **(15 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.

Unit 3

Immunohaematology **(10 hrs)**

3.1 Immunohaematological studies - Blood groups and Rh-types. Blood grouping and Rh- typing.

3.2 Blood transfusion.

Blood coagulation

3.3 Blood coagulation - process and theory - bleeding time - clotting time - Prothrombin Time.

Unit 4 (20 Hrs)

Pathology

4.1 Urine - Macroscopic, microscopic and chemical analysis.

4.2 Motion analysis for common protozoan and helminthic intestinal parasites.

4.3 Analysis of Cerebrospinal fluid.

4.4 Analysis of seminal fluid.

4.5 Examination of blood smear for malarial parasite and microfilaria - life history stages.

4.6 Pathology of AIDS, TB and Hepatitis - mode of infection - pathological changes and symptoms.

4.7 Biomedical Wastes – Classification – Characteristics and potential health hazards – Biomedical Waste (BMW) management – rules and regulations

Unit 5 (12 Hrs)

Clinical Biochemistry

5.1 Blood glucose, Blood Urea and Total Serum Cholesterol estimation - ranges in health and disease and interpretation.

5.2 Physiology and biochemistry of the serum enzymes – Aspartate Transaminase (AST) and Alanine Transaminase (ALT)

Clinical Immunology

5.3 Laboratory Pregnancy tests

5.4 Principles of ELISA, RIA and Western Blot

TEXT BOOK

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

BOOKS FOR REFERENCE

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

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

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

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

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

Kumar, P.J., and M.L. Clark, Clinical Medicine A Text Book for Medical Students and Doctors, ELBS.1990.
Mukherjee, K.L., Medical Laboratory Technology, (Vol. I, II & III), Tata McGraw - Hill Publishing Co., Ltd., New Delhi. 1991.

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

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

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 2011 - 2012)

MEDICAL LABORATORY TECHNOLOGY, IMMUNOLOGY AND BIOTECHNOLOGY PRACTICALS

CODE :11ZL/MC/P5 53 **CREDITS: 3**

L T P: 0 0 6

TOTAL HOURS: 78

MEDICAL LABORATORY TECHNOLOGY

Estimation of RBC Count

Estimation of WBC Count

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

Morphology of Blood Cells

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

Isolation of Lymphocytes

Demonstration – Anatomical location of various immune tissues and organs

BIOTECHNOLOGY

Demonstration of:

PCR Technique
Isolation of Plasmid DNA

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	Spotters (Five)	15 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

EVOLUTION

CODE :11ZL/ME/EV53 **CREDITS: 4**

L T P: 3 1 0

TOTAL TEACHING HOURS: 52

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 **(13 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 **(13 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 **(8 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 **(8 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, Revised Edition, Principles of Organic Evolution, Pearl Publications, Madras – 40. 1995.

BOOKS FOR REFERENCE

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

Bryson, Bill., A short history of nearly everything, 1st edition, Random House Inc. 2003.

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

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

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

Dawkins, Richard, The Ancestor's Tale: A pilgrimage to the dawn of evolution, Houghton Muffin Co., 2004.

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

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

Futuyma, D. J., Evolution**,** Sinauer Associates inc., Suder land, Massachausetts, U.S.A. 2005.

Graur, Dan and Wen Hsiung Li, Fundamentals of Molecular Evolution**,** Sinauer Associates Inc., Suuder land, Massachausetts, U.S.A. 2000.
Li, W.H., Molecular Evolution**,** Sinauer Associates Inc., Suuder land, Massachausetts, U.S.A. 1997.

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

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

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

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

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

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 2011 - 2012)

ANIMAL TISSUE CULTURE TECHNIQUES

CODE :11ZL/ME/AT53 **CREDITS : 3**

L T P : 2 0 2

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To acquaint the students to the field of Animal Cell Culture.
- To impart knowledge in Animal Tissue Culture techniques and to encourage students to work in Animal Tissue Culture Laboratories.

Unit 1

Introduction to Cell Culture (10 Hours)

1.1 Introduction to tissue culture
1.2 Applications & limitations of tissue culture
1.3 Designing the tissue culture lab
1.4 Washing, sterilization & storage area
1.5 Sterile tissue culture room

Unit 2

Organization of Tissue Culture Lab (11 Hours)

2.1 Equipments needed for tissue culture
2.2 Glassware and other devices needed for tissue culture
2.3 Media used in Animal tissue cultures
2.4 Growth factors, sera, antibiotics & enzymes used
2.5 Sterilization of objects &media used in cell culture

Unit 3

Tissue Culture Techniques (11 Hours)

3.1 Primary cell culture techniques
3.2 Adherent & suspension cultures
3.3 Cell lines & maintenance of cell lines
3.4 Viable cell count
3.5 Cryopreservation of cells

Unit 4

Primary Cell - Lecture cum demonstration (10 Hours)

4.1 Preparation of tissue culture media
4.2 Sterilization of culture media
4.3 Primary explants culture
4.4 Trypsinization & chick embryo fibroblast culture

Unit 5 (10 Hours)

Subculture and Maintenance of Cell lines - Lecture cum demonstration

5.1 Culture of Lymphocytes from Blood
5.2 PHA stimulation of Lymphocytes
5.3 Comparison of stimulated & unstimulated culture density
5.4 Viable cell count using hemocytometer

TEXT AND REFERENCE BOOKS

Ian Freshne R . Culture of Animal Cells, Wiley & Sons, New Jersey. 2006.

Clare Wise . Epitheial cell culture protocols, Human Press Inc, New Jersey. 2004.

Cheryl D Helgason and Cindy Miller . Basic cell culture protocols, Human Press Inc., New Jersey. 2004.

Martin W., Tissue culture techniques: An introduction, Birkhauser, Boston. 1994.

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)

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

ANIMAL BEHAVIOUR

CODE :11ZL/MC/AB 64 **CREDITS: 4**

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To study a large and diverge 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 **(12 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 **(12 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 **(14 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 **(12 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 (**15 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 –

5.3 Abnormal behaviour in man - Neurotic disorder, (Anxiety disorder). Eg. Phobic disorder and Obsessive - compulsive disorder - Psychotic disorder eg. Schizophrenia.

BOOKS FOR REFERENCE

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

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

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

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

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

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

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

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

Mandal Fatik Baran, Textbook of Animal Behaviour, New Delhi, PHI Learning Private Limited, 2010.

Mathur, Reena, Animal Behaviour, 3rd edition, Meerut, Rastogi Publication, 2010.

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

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

Reena Mathur, Animal Behaviour**,** Rastogi and Company, Subbash Bazar, Meerut. 1996.

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

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

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

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)

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

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

SYLLABUS

(Effective from the academic year 2011 - 2012)

DEVELOPMENTAL BIOLOGY

CODE :11ZL/MC/DB64 **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 (13 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 (14 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 – Stem cell therapy

Unit 3 (14 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 **(12 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 .

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 –Invitro Fertilization - Embryo transplants.

TEXT BOOKS

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

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

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

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

Gilbert, Scott, F., 8th ed., Developmental Biology**,** Sinauer Associaates, Inc., Secuderland, Massachusetts. 2006.

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

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

Kiessling, A and C. Anderson, Human Embryonic Stem Cells – An Introduction to the Science and Therapeutic Potential**,** Jones and Barlett Publications, New York. 2003.

Miglani, G.. S., Developmental Genetics**,** J.K. Interantional Publishing House Pvt. Ltd. 2006.

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

Saunders, John Warren, Developmental Biology**,** Macmillan Publishing Co., Inc., New York and collier Macmillan Canada, Ltd. 1982.

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

Sastry, K.V. and Vineeta Shukal, Developmental Biology, 1st edition, Meerut, Rastogi Publication, 2010.

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

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 2011 - 2012)

ENVIRONMENTAL BIOTECHNOLOGY

CODE : 11ZL/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 make the students aware of the importance of further research into and development of practices ensuring environmental sustainability.

Unit 1 (15 Hrs)

Environmental Monitoring

1.1 Introduction – Need for monitoring
1.2 Sampling – Air, Soil and Water
1.3 Analysis of samples – Physical, Chemical and Biological
1.4 Determination of biodegradable organic material
1.5 Monitoring pollution
1.6 Toxicity testing using biological material.
1.7 Bio indicators, Biomarkers and Biosensors

Unit 2 (12 Hrs)

Bioremediation

2.1 Introduction : Synthetic compounds – Petrochemical compounds and Inorganic wastes in the Environment (A brief outline)
2.2 Bioremediation strategies – Bioaugmentation – Genetically manipulated organisms.
2.3 Bioremediation techniques : Ex-situ and In-situ.
2.4 Phytoremediation
2.5 Metal Bioremediation
2.6 Gaseous Bioremediation
2.7 Case studies : Exxon Valdez Oil Spill, Acidic mine drainage in Yellowstone National Park

Unit 3 (15 Hrs)

Waste Treatment

3.1 Functions of the waste treatment system
3.2 Sewage – treatment methods
3.3 Removal of nitrogen and phosphorus
3.4 Sludge treatment and disposal; Anaerobic digestion.
3.5 Agricultural and Industrial waste ; Treatment of industrial effluents: Distillery – Dairy – Tannery – Textile and Sugar industries.

Unit 4 **(13 Hrs)**

Towards Sustainable Development

4.1 Biofertilizers
4.2 Biopesticides
4.3 Biopolymers and Bioplastics
4.4 Biofuels – biogas, biodiesel, ethanol, hydrogen

Unit 5 **(10 Hrs)**

Natural Resource Recovery

5.1 Introduction – need for recovery of resources
5.2 Oil Recovery; enhanced oil recovery, microbially enhanced oil recovery.
5.3 Recovery of Metals – Bioleaching; extraction of copper, uranium and gold

BOOKS FOR REFERENCE

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

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

Maier Raina. M., Ian L Pepper, Charles.P.Gerba, Environmental Microbiology, Second Edition, Elsevier Publishing. 2009.

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

Mohapatra, Pradipta Kumar, Textbook of Environmental Biotechnology, I.K.International Publishing House Pvt. Ltd., 2006.

Nester, Eugene. W., Anderson, Denise. J., Roberts, Evans. C . Jr., Pearsall, Nancy.N. and Nester, Martha.T, Microbiology: (A Human Perspective), Sixth Edition, Mc Graw Hill Higer Education. 2008.

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

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

Thakur Indu Shekhar, Environmental Biotechnology – Basic Concepts and Applications, I.K International Pvt. Limited, 2006.

Thieman, Bill and Palladino, Michael, Introduction to Biotechnology, Pearson Benjamin Cummings, 2010.

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

QUESTION PAPER PATTERN

Section A – 10 x 3 = 30 Marks (All questions to be answered)
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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 2011 - 2012)

PHYSIOLOGY, ENVIRONMENTAL BIOLOGY AND DEVELOPMENTAL

BIOLOGY - PRACTICALS

CODE :11 ZL/MC/P6 62 **CREDITS: 2**
L T P: 0 0 4
TOTAL HOURS: 52

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

Estimation of the following parameters in different water samples:

a. Dissolved Oxygen
b. pH
c. Salinity
d. Calcium
e. Free CO_2, CO_3 and HCO_3
f. Determination of BOD

Soil pH - Carbonates - Nitrates.
Marine Zooplankton.
Spotters - Rocky Shore fauna
Spotters - Sandy Shore fauna
Animal Associations – one example for each type.

Demonstration :
Estimation of Na and K content – Flame Photometer

DEVELOPMENTAL BIOLOGY

Examination of prepared slides of testis and ovary of a mammal to study the

maturation stages of the gametes.

Examination of different kinds of vertebrate eggs - frog, chick and mammal.

Study of prepared slides of sperms of frog, bird and mammal.

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

Observation and examination of prepared slides (whole mounts) of 18, 24, 33, 48, 72 and 96 hours chick.

Study of organogenesis using prepared slides with reference to the development of brain, heart, eye and ear of Frog.

Identification of placenta of Sheep, Pig and Yolk Sac Placenta of Shark.

Experimental Studies :

Regeneration in Tadpoles
Role of Thyroxine and Iodine in Metamorphosis of Frog.
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 VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2011 - 2012)

VERTEBRATE PHYSIOLOGY

CODE :11ZL/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 Energy balance – sources of energy input – metabolic rate – neutral, positive and negative energy balance – control of food intake.

Unit 2 **(12 Hrs)**

Respiration and Circulation

2.1 Respiratory system - Physiology of respiration in human - Oxygen transport - dissociation curve - CO_2 transport - Chloride Shift.

2.2 Adaptations to diving and high altitudes.

2.3 Anaerobiosis.

2.4 Circulatory system - Physiology of circulation in human - regulation of heart beat and blood pressure - 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 **(15 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 - Autonomic nervous system – Neurotransmitters - E.E.G. principle
4.5 Structure and Physiology of Photo, Phono and Chemoreceptors of a mammal - Pain and Thermo receptors of Vertebrates.
4.6 Colour changes – Bioluminescence – Electric Organs of vertebrates

Unit 5 (15 Hrs)

Hormonal Control, Reproductive physiology and Ageing

5.1 Endocrine glands of a mammal – Mechanism of steroid and peptide hormones action.
5.2 Structure, Function and regulation of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal and Gonads.
5.3 Structure and Physiology of Male and female reproductive system of mammal.
5.4 Menstrual cycle – pregnancy
5.5 Physiology of ageing – causes and theories.

TEXT BOOKS

Verma P.S., V.K. Agarwal, & B.S. Tyagi, Animal Physiology, S.Chand and Co., New Delhi. 2005.

BOOKS FOR REFERENCE

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

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

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

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

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

Lauralee Sherwood. Human Physiology – From cells to Systems. 3rd edition. Wadsworth Publishing Company, USA. 1997.

Lauralee Sherwood, Hillar Klandorf and Paul Yancey. Textbook of Animal Physiology. India Edition. Cengage Learning India Pvt. Ltd. New Delhi. 2011.

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Robert K. Clark. Anatomy and Physiology – Understanding the human body. South Asian student edition. Jones and Bartlett India Pvt. Ltd. New Delhi 2010

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Sobti, R.C., Animal Physiology, Narosa Publishing House, New Delhi. 2008.

END SEMESTER EXAMINATION

Total Marks: 100 Duration: 3 Hours

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