MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Zoology
(Choice Based Credit System)
(with effect from the academic year 2026-2027 onwards)

Semester-I				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
I	LANGUAGE	TAMIL/MALAYALAM	H1TL11/ H1MY11	3
II	ENGLISH	ENGLISH	H2EN11	3
III	CORE	INVERTEBRATA	HCZO11	5
III	CORE	LAB ON INVERTEBRATA	HCZOP1	3
III	ELECTIVE	ALLIED BOTANY I	HEBO11	3
III	ELECTIVE	LAB ON ALLIED BOTANY	HEBOP1	2
IV	SEC 1	ORNAMENTAL FISH FARMING AND MANAGEMENT	HSZO11	2
IV	FC	INTRODUCTION TO ZOOLOGY	HFZO11	2

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA $<$ 5.0

PART - I பொதுத்தமிழ் I
நீதி இலக்கியங்களும் பக்தி இலக்கியங்களும்

அலகு 1

இலக்கிய அறிமுகம்

அ. நீதி இலக்கியங்கள் அறிமுகம் பதினெண் கீழ்க்கணக்கு நூல்கள்

1. திருக்குறள்
2. நாலடியார்
3. நான்மணிக்கடிகை
4. இன்னா நாற்பது
5. இனியவை நாற்பது
6. திரிகடுகம்
7. ஆசாரக் கோவை
8. பழமொழி
9. சிறுபஞ்சமூலம்
10. ஏலாதி
11. முதுமொழிக்காஞ்சி
12. கார் நாற்பது
13. ஐந்திணை எழுபது
14. ஐந்திணை ஐம்பது
15. திணைமொழி ஐம்பது
16. திலைமாலை நூற்றைம்பது
17. கைந்நிலை
18. களவழி நாற்பது

பிற நீதிநூல்கள்

1. ஆத்திசூடி - ஔவையார்
2. கொன்றைவேந்தன் - ஔவையார்
3. மூதுரை - ஔவையார்
4. நல்வழி - ஔவையார்
5. அறநெறிச்சாரம் - முனைப்பாடியார்
6. வெற்றிவேற்கை - அதிவீரராம பாண்டியர்
7. நீதிநெறிவிளக்கம் - குமரகுருபரர்
8. நன்னெறி - துரைமங்கலம் சிவப்பிரகாசர்
9. உலகநீதி - உலகநாதன்
10. நீதிநூல் - மாயூரம் வேதநாயகம்பிள்ளை

புதிய ஆத்திசூடிகள்

1. புதிய ஆத்திசூடி - பாரதியார்
2. இளையார் ஆத்திசூடி - பாரதிதாசன்
3. தமிழ்சூடி - வ.சுப.மாணிக்கம்
4. நெறிசூடி - நாரா. நாச்சியப்பன்
5. அறிவியல்சூடி - ச.மெய்யப்பன்
6. ஆய்வுகுடி - தமிழண்ணல்
7. நீதிசூடி - புலவர் சோம. இளவரசு

ஆ. பக்தி இலக்கியங்கள் அறிமுகம்

1. பன்னிரு திருமுறைகள்
2. சைவத் திருமடங்கள்
3. நாலாயிரத் திவ்வியப் பிரபந்தம்
4. கிறித்துவ சமயத் தமிழ் இலக்கிய வளர்ச்சி
5. இஸ்லாம் சமயத் தமிழ் இலக்கிய வளர்ச்சி

அலகு 2

நீதி இலக்கியங்கள் (செய்யுள்))

1. திருக்குறள் அறன் வலியுறுத்தல் (4 வது அதிகாரம்) 10 குறள்கள்
2. நாலடியார் - கல்வி (14 ஆவது அதிகாரம்) 10 பாடல்கள்
3. நான்மணிக்கடிகை நிலத்துக்கு அணிஎன்ப - 9ஆவது பாடல்
4. பழமொழி நானூறு தந் நடைநோக்கார் - 288 ஆவது பாடல்
5. இனியவை நாற்பது இளமையை மூப்பென்று -37ஆவது பாடல்
6. முதுமொழிக்காஞ்சி எளிய பத்து 10 பாடல்கள்
7. நல்வழி முதல் ஐந்து பாடல்கள்
8. நீதிநெறி விளக்கம் முதல் ஐந்து பாடல்கள்

அலகு -3

பக்தி இலக்கியங்கள்

1. முதல் 3 பாடல்கள் 1 திருநாவுக்கரசர் நின்ற திருத்தாண்டகம்
2. மாணிக்கவாசகர் - சிவபுராணம் முதல் 10 வரிகள்
3. பொய்கையாழ்வார் முதல் திருவந்தாதி - முதல் 2 பாடல்கள்
4. பூதத்தாழ்வார் இரண்டாம் திருவந்தாதி முதல் 3 பாடல்கள்
5. ஆண்டாள் - திருப்பாவை முதலாவது பாடல்
6. திரு.வி.க - கிறிஸ்து மொழிக்குறள் - 5 குறள்கள்
7. குணங்குடி மஸ்தான் சாகிபு பராபரக்கண்ணி 5 கண்ணிகள்

அலகு -4

உரைநடை

நூற்றாண்டு கண்ட ஆளுமைகள் த.அறம் (1-4)

1. இலக்கியப் பேரொளி தொ.மு.சி. ரகுநாதன்
2. திசைகாட்டி கு.அழகிரிசாமி
3. பொதுவுடைமைக் கவிஞர் தமிழ் ஒளி
4. கரிசல் இலக்கியத் தந்தை கி ராஜநாராயணன்
5. சங்க இலக்கியத்தில் குலக்குறியீடு பேராசிரியர் பா. ஆனந்தகுமார்.

அலகு -5

மொழிப்பயிற்சி ஒற்றுப்பிழைத் தவிர்த்தல்

1. வல்லினம் மிகும் இடங்கள்
2. வல்லினம் மிகா இடங்கள்
3. ஈர்ஒற்று வரும் இடங்கள்
4. ஒரு.ஒர் வரும் இடங்கள்
5. அதுஇ அஃது வரும் இடங்கள்
6. தான்இ தாம் வரும் இடங்கள்

MALAYALAM
PAPER I- PROSE, COMPOSITION AND TRANSLATION

Unit 1

This unit focus on the importance of Malayalam fiction, -the origin and development of Malayalam Short story –renaissance in short story—Thakazhi-Basheer-Karoor- -Navothana katha:

For detailed study:

1. Marappavakal- Karoor Neelakantappilla.
2. Uthuppante kinar.-Karoor Neelakantappilla.
3. Ezhunnallathuduty-Karoor Neelakantappilla.

Unit II

Kathayum adhunikathayum- To familiarize – Romanticism -Modernism, Plot and narration in modern short stories

For detailed study:

1. Neippayasam –Madhavikutty
2. Kadaltheerathu-.O.V.Vijayan
3. Radha radhamathram-M.Mukundan

Unit III

Samakala katha– Post modernism- Globalization-Women –Dalit- Cyber – Environmental issues in short stories- The theme, structure and narrative style of the authors -comparison-

For detailed study:

1. Viyarppadayalangal-Sara Joseph
2. Jwala - Priya .A.S
3. Vartha sareeram –Santhosh Echikkanam
4. Otta vaikkol viplavam –V.J.James

Unit IV

This unit briefs the history of Malayalm Novel- major works, romantic period- of M T Vasudevan Nair , narrative style of Nalukettu- craft and characterization in Nalukettu

Unit V

This unit focus on Translation, Word level and syntactic level and also discuss the writing style of Essay- introduce proverbs and paraphrasing in Malayalam

Recommened Texts

1. Marappavakalum mattu kathakalum – Karoor Neelakantapilla. (only 3 stories (a.)Marappavakal (b)Uthuppante kinar (c) Ezhunnallathuduty))
2. Nalukettu- .Novel -M.T.Vasudevan Nair

Reading list (print and online)

1. Adhunika Malayala Sahithya Charithram Prasthanangalilude – Dr. K.M.George (Ed.)
2. Cherukadha Innale Innu - M.Achuthan
3. Kadha Thedunna Kadha - N.Prabhakaran
4. M.T. Vakkinte Vismayam – V.R.Sudheesh
5. Kadhayum Kalavum –K.S.Ravikumar
6. Malayala Novalilee Desakaalangal- E. Ramkrishnan
7. Maranunna Malayala Noval- K.P. Appan
8. Andhanaya Daivam- P.K.Rajasekharan
9. Shyalee shilppam- Dr.K.M. Prabhakra Warier
10. Bhasha gadhyam- C.V. Vasudeva Bhattathiri
11. Karur Kadha patanam- M.M.Basheer

PART - II GENERAL ENGLISH - I

UNIT – I
PROSE

1. The Power of Prayer - APJ Abdul Kalam
2. On the love of life - William Hazlitt
3. Nature (Chapter 1) - R. W. Emerson
4. Forgetting - Robert Lynd

UNIT – II
POETRY

1. The Flower-School - Rabindranath Tagore
2. Love After Love - Derek Walcott
3. Don't Quit - Edgar Albert Guest
4. Night - Wole Soyinka

UNIT – III
SHORT STORY

1. The Missing Mail - R K Narayan
2. Two Gentlemen of Verona - A.J. Cronin.
3. A Real Durban - Jhumpa Lahiri
4. Girls at War - Chinua Achebe

UNIT – IV
GRAMMAR PARTS OF SPEECH

1. Noun, Kinds of Nouns, Gender, Number, Case
2. Pronoun - Personal, Emphatic, Demonstrative, Indefinite, distributive, Relative and Interrogative
3. Adjective, kinds of Adjectives - Degrees of Comparison

UNIT – V
COMPOSITION

1. Paragraph Writing
2. Story Writing (Hints Developing)
3. Reproduction of a Story Poem
4. Letter Writing

TEXT BOOKS & WEB RESOURCES

1. Web Resources
   Extract from Dr. A.P.J. Abdul Kalam's autobiography, Wings of Fire Hazlitt, William. “On the love of life.” . Quotidiana. Ed. Patrick Madden. 29 Sep 2006. 14 Jun 2026 https://essays.quotidiana.org/hazlitt/love_of_life/
   Nature:https://www.gutenberg.org/files/29433/29433-h/29433-h.htm
   Forgetting:https://archive.org/stream/in.ernet.dli.2015.73174/2015.73174.English-Essays-Of-Today_djvu.txt
2. Wren & Martin High School English Grammar and Composition

INVERTEBRATA

UNIT I

Protozoa: Introduction to Classification, taxonomy and nomenclature. General characters and classification of Phylum Protozoa up to classes. Type study: *Paramecium* - Parasitic protozoans (*Entamoeba*, *Trypanosoma* & *Leishmania*) - Nutrition in protozoa - Host-parasitic interactions in *Entamoeba* and *Plasmodium* - Locomotion in protozoa

UNIT II

Porifera: General characters and classification up to Classes. Type study: Sycon-Canal system in sponges. Reproduction in sponges

Coelenterata: General characters and classification up to classes – Type study: Obelia - Corals and coral reefs - Economic importance of corals and coral reefs - Polymorphism in Hydrozoa.

UNIT III

Platyhelminthes: General characters and classification of up to classes. Type study: *Fasciola hepatica*. Parasitic adaptations.

Aschelminthes: General characters and classification of up to classes - Type study: *Ascaris lumbricoides*. Nematode Parasites and diseases - *Wuchereria bancrofti*, *Enterobius vermicularis, Ancylostoma duodenale*. - Parasitic adaptations.

UNIT IV

Annelida: General characters and classification up to Classes. Type study: *Nereis*, - Metamerism - Modes of life in Annelids.

Arthropoda: General characters and classification of Phylum Arthropoda up to Classes. Detailed study: *Penaeus indicus*. Affinities of *Peripatus* – Larval forms in Crustacea.

UNIT V

Mollusca: General characters and classification of Phylum Mollusca up to Classes. Detailed study: *Pila globosa*. Foot and torsion in Mollusca. Economic importance of Cephalopods.

Echinodermata: General characters and classification of Phylum Echinodermata up to Classes. Detailed study: *Asterias*. Water vascular system in Echinodermata – Larval forms of Echinoderms.

Text Books (Latest Editions)

1. Ekambaranatha Iyer, 2000. A Manual of Zoology, 10th edition, Viswanathan, S., Printers & Publishers Pvt Ltd

2. Jordan, E.L. and Verma P.S, 1995. Invertebrate Zoology, 12th edn. S. Chand& Co.
3. Kotpal, R.L, 1992. Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata.

Reference Books (Latest editions, and the style as given below must be strictly adhered to)

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
3. Barrington, E.J.W. (1979). Invertebrate Structure and Functions, II Edition, E.L.B.S. and Nelson
4. Hyman L.H, 1955. The invertebrates - Vol. I to Vol. VII – Mc Graw Hill Book Co.
5. Parker, J. and Haswell , 1978. A text book of Zoology Vol. I - Williams and Williams.

Web Resources

1. https://www.nationalgeographic.com/animals/invertebrates/
2. https://www.britannica.com/science/parasitic-disease
3. https://www.nio.res.in/
4. https://greatbarrierreef.org/

LAB ON INVERTEBRATA

UNIT I

Dissection:

1. Cockroach: Nervous system
2. Cockroach: Reproductive system

UNIT II

Dissection:

3. Cockroach: Digestive system

UNIT III

Mounting:

1. Mouth Parts – Cockroach
2. Mouth Parts - Honey bee, Mosquito
3. Prawn appendages
4. Earth worm – body setae, penial setae (Demo)

UNIT IV

Spotters: (i). **Protozoa**: Amoeba, Paramoecium, Paramoecium Binary fission and Conjugation, Entamoeba histolytica, Plasmodium vivax (ii). **Porifera**: Sycon (iii). **Coelenterata**: Obelia – Colony & Medusa, Aurelia, Physalia, Gorgonia, (iv). **Platyhelminthes**: Planaria, Fasciola hepatica, Fasciola larval forms – Redia, Cercaria, Taenia solium, (v). **Nemathelminthes**: Ascaris (Male & Female), vi). **Annelida**: Nereis, Chaetopteurs, (vii). **Arthropoda**: Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Larvae - Nauplius, Mysis, Zoea,. (viii). **Mollusca**: Chiton, Pila, Unio, Sepia, Octopus, (ix). **Echinodermata**: Asterias, Ophiothrix, Cucumaria, Bipinnaria larva

UNIT V

Record / Observation Note (SUBMISSION IS MANDATORY)

Text Books (Latest Editions)

1. Ekambaranatha Iyyar and T. N. Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai
2. Ganguly, Sinha an d Adhikari , 2011 . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp.
3. Sinha, Chatterjee and Chattopadhyay, 2014. Advanced Practical Zoology, Books & Allied Ltd; 3rd Revised edition, 1 07 0 pp.
4. Lal ,S. S, 2016 . Practical Zoology Invertebrate, Rastogi Publications.
5. Verma, P. S. 2010. A Manual of Practical Zoology: Invertebates, S Chand, New Delhi

Reference Books (Latest editions, and the style as given below must be strictly adhered to)

1. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
2. Barnes, R.D. (1982). Invertebrate Zoology, V Edition. Holt Saunders International Edition.
3. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson
4. Boradale, L.A. and Potts, E.A. (1961). Invertebrates: A Manual for the use of Students. Asia Publishing Home.
5. Lal, S.S. 2005. A text Book of Practical Zoology: Invertebrate, Rastogi, Meerut

Web Resources

1. https://nbb.gov.in/
2. https://www.agshoney.com/training.htm
3. https://icar.org.in/
4. https://nisa.icar.gov.in/
5. https://www.nationalgeographic.com/animals/invertebrates/

ALLIED BOTANY-I

Unit I

Algae and Fungi:

General characters of algae, structure, reproduction and life cycle of Sargassum, Economic importance of algae.

General characters of fungi, structure, reproduction and life cycle of Mucor. Economic importance of fungi.

Unit II

Lichen and Bryophytes:

General characters of Lichen, thallus types and Economic importance of lichen.

General characters of Bryophytes, Structure and life cycle of Marchantia Economic importance of Bryophytes

Unit III

Pteridophytes and Gymnosperms

General characters of Pteridophytes, Structure and life cycle of Selaginella Economic importance of Pteridophytes.

General characters of Gymnosperms, Structure and life cycle of Cycas. Economic importance of Gymnosperms

Unit IV

Medicinal Botany:

Morphology, Useful parts, Active principles and medicinal uses of the following plants: *Azadirachta indica*, *Aloe vera*, *Curcuma longa*, *Syzygium aromaticum*, *Piper nigrum*, *Vinca rosea*

Unit V

Plant Biotechnology:

Plant tissue culture, totipotency, Nutrient medium, preparation and composition (M.S medium), Callus culture, Meristem culture, Application of Plant biotechnology

Recommended Text

1. Singh, V., Pande, P.C and Jain, D.K. 2021. A Text Book of Botany. Rastogi Publications, Meerut.
2. Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru.
3. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd. Delhi.
4. Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi.
5. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany,S. Viswanathan Pvt. Ltd., Madras.

Reference Books

1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes - Surjeet Publications, Delhi.
2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd.
3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi.
4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.
1. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.
2. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi.
3. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.

Website and e-Learning Source

1. https://www.kobo.com/us/en/ebook/the-algae-world
2. http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html
3. http://scitec.uwichill.edu.bb/bcs/bl14apl/bryo1.htm
4. https://www.toppr.com/guides/biology/plant-kingdom/pteridophytes/
5. https://arboretum.harvard.edu/wp-content/uploads/2013-70-4-beyondpine-cones-an-introduction-to-gymnosperms.pdf
6. https://www.us.elsevierhealth.com/medicine/cell-biology
7. https://www.us.elsevierhealth.com/medicine/genetics
8. https://www.kobo.com/us/en/ebook/plant-biotechnology-1

ALLIED BOTANY PRACTICALS - I

UNIT I

Micro-preparation of Sargassum stipe and leaf, Marchantia thallus
Selaginella rhizome Cycas rachis and leaflet

UNIT II

Identification of microslides

Sargassum male and female conceptacles, Mucor mycelium
Marchantia Gemma, sporophyte Selaginella male and female cone, Cycas ovule

UNIT III

Identification of Specimen / Photograph

Sargassum Thallus, Marchantia Thallus, Selaginella plant, Cycas - male and female cone
Callus culture, Meristem culture

UNIT IV

Medicinal Botany

Identification, parts used, active principles and medicinal uses of Azadirachta indica, Aloe vera, Curcuma longa, Syzygium aromaticum, Piper nigrum, Vinca rosea

UNIT V

Field trip to study plants in their natural habitat

Recommended Text

1. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd, New Delhi.
2. Sharma, O.P. 2012. Pteridophyta, Tata McGraw-Hills Ltd, New Delhi.
3. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
4. Benjamin, A. Pierce. 2012. Genetics- A conceptual Approach. W.H. Freeman and Company, New York, England.
5. Noggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of India, New Delhi.

Reference Books

1. Strickberger, M.W. 2005. Genetics (III Ed). Prentice Hall, New Delhi, India.
2. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manual to algae identification field guide, Ottawa Agriculture and Agri food Canada publisher.
3. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual for Bryophytes and Pteridophytes. Lambert Academic Publishing.
4. Aler Gingauz. 2001. Medicinal Chemistry. Oxford University Press & Wiley Publications. Steward, F.C. 2012. Plant Physiology Academic Press, US

Website and e-Learning Source

1. https://www.amazon.in/Practical-Manual-Pteridophyta-RajanSundara/dp/8126106883
2. https://www.google.co.in/books/edition/Gymnosperms/3YrT5E3Erm8C?hl=en&gbpv=1&dq=gymnosperms&printsec=frontcover
3. https://www.amazon.in/ComputationalPhytochemistrySatyajitDeySarkerebook/dp/B07CV96NZJ
4. https://medlineplus.gov/genetocs/understanding/basics/cell/
5. https://apan.net/meetings/apan45/files/17/17-01-01-01.pdf
6. http://www.cuteri.eu/microbiologia/manuale_microbiologia_pratica.pdf

7. https://www.amazon.in/Manual-Practical-Bryophyta-Suresh-Kumar/dp/B0072GNFX4

ORNAMENTAL FISH FARMING AND MANAGEMNT

Unit I

Introduction to ornamental fish keeping: Scope and importance of ornamental fish culture. Identification of commercially important ornamental fishes - Indigenous and exotic varieties.

Unit II

Biology of egg layers and live bearers: Breeding, hatchery and nursery management of egg layers (eg. Goldfish) and live bearers (eg.Guppy).

Unit III

Aquarium plants and their propagation: Food and feeding in ornamental fishes. Formulated feed and Live feed; Live feed culture. Identification of locally available live feed organisms.

Unit IV

Aquarium design and construction: Accessories - aerators, filters and lighting Maintenance of aquarium and water quality management. Ornamental fish diseases, their prevention, control and treatment methods.

Unit V

Conditioning, packing, transport and quarantine methods. Economics, trade regulations, domestic and global export potential and marketing strategies.

References:

1. Swain SK., Sarangi N. and Ayyappan S. (2010). Ornamental fish farming. ICAR, New Delhi.
2. Living Jewels – A handbook on freshwater ornamental fish, (1999) MPEDA, Kochi.
3. Dey V.K.A. (1997). A handbook on aquafarming ornamental fishes. MPEDA, Kochi.
4. Ahilan, B., Felix N. and Santhanam R. (2008), Text book of aquariculture. Daya Publishing House, New Delhi.

Web Resources

1. http://ecoursesonline.iasri.res.in/course/view.php?id=297
2. https://www.ofish.org/
3. https://krishijagran.com/agripedia/income-generation-by-ornamental-fish-culture/
4. https://99businessideas.com/ornamental-fish-farming/

INTRODUCTION OF ZOOLOGY

UNIT 1

Animal Biodiversity and Systematics: Taxonomic hierarchy: Classification of animal kingdom- Two kingdoms and Five kingdom classification- Binomial nomenclature- Different phyla of animal kingdom

UNIT 2

Cell Biology & Genetics: Cell theory- Ultrastructure of a typical Prokaryotic and Eukaryotic cell. General Account on Mendelism and inheritance- DNA and RNA- Central dogma of Molecular Biology.

UNIT 3

Biochemistry and Physiology: Introduction to the role of essential biological Compounds- Proteins, Carbohydrates, Lipids. Introduction to organ system of vital physiological functions.

UNIT 4

Environmental Biology: Basics of atmosphere and components of ecosystem. **Developmental Biology**: General account of gametogenesis- fertilization and developmental stages. **Evolution**: Origin of life – Darwinism.

UNIT 5

Entrepreneurial Courses in Zoology: General introduction and applications: Aquaculture - Aquarium keeping - Apiculture - Sericulture - Vermiculture - Poultry keeping- Dairy farming- Biotechnology-Ecotourism.

References:

1. Ekambaranatha Iyer, (2000), A Manual of Zoology, 10th edition, Viswanathan, S., Printers & Publishers Pvt Ltd
2. Jordan, E.L. and Verma P.S, (1995), Invertebrate Zoology, 12th edn. S. Chand& Co.
3. Kotpal, R.L.(2019), Modern text book of Zoology: Invertebrates. Rastogi Publication, New Delhi.
4. Kotpal (2015). Modern Textbook of Zoology Vertebrates, Rastogi publishers, New Delhi.
5. H.C, Nigam. (2010), Biology of Chordates., Vishal Publications, New Delhi
6. Gupta. P.K., (2017), Cell and Molecular Biology, Fifth Revised Edition, Rastogi Publication, Meerut, India.

7. Singh. H.R, & Neeraj Kumar (2017), Animal Physiology and Biochemistry, Vishal Publishing Co.
8. Erach Bharucha. (2005). Text book of Environmental Studies for undergraduate courses, University Grants Commission, New Delhi.
9. Shukla, G.S. & Upadhyay, V.B. (2014). Applied and Economic Zoology, Rastogi Publications.
10. Cherian M.C. & Ramachandran, (1952), Bee keeping in South India – Govt.Press,Chennai.
11. Johnson and Jeyachandra, (2000), Apiculture –, Marthandam, TamilNadu.
12. Kesary, M and M.Johnson, (1998), Sericulture, Department of Zoology, N.M.. Christian College, Marthandam.
13. Ganga. G, (2019), Introduction to Sericulture, Oxford and IBH Publishing
14. Jhingaran, V.G., (1997), Fish and Fisheries of India, Hindustan Publishing Corporation (India).
15. Poultry farm manual: A reference guide for Central and State Poultry Farms, (2014),- www.dadf.gov.in and www.dadh.nic.inDelhi.
16. Gnanamani M.R, (2010), Modern aspects of commercial poultry keeping, Deepam Publications, Madurai.
17. Santhanakumar, G &A.M. Selvaraj. (1993), Concepts of Aquaculture. Meenam Publications. Nagercoil Lekshmi Papers, Thirumal Complex, Opp. Chakkaravarthi theatre. Chettikulam Jn., Nagercoil – 629 002.
18. Sundararaj, V. &B. Srikrishnadhas, Cultivable Aquatic Organisms, Narendra Publishing House,1417, Kishan Dutt street, Maliwara, Delhi – 110 006
19. Singh, Herbans and Earl Moore, (1968), Livestock and Poultry Production, Prentice Hallin India.
20. Seethaleksmy, M and Dr.Samthi, R, (2012),.Vermitechnology, Saras Publications , Nagercoil.

Web references:

1. http//lib.mylibrary.com/Open.aspx?id=463009
2. http://globalacademicgroup.com...pdf
3. http://tbmicollege.ac.in>gallery
4. http://www.researchgate.net>3473
5. http://www.periyaruniversity.ac.in
6. http://www.profitableventure.com>
7. http://www.thinkwithniche.cpm>five
8. http://www.99businessideas.com