Vidyasagar University
Midnapore-721102, West Bengal

The draft SYLLABUS for

M. Sc.

in

FISHERIES SCIENCE

[w.e.f. 2025-26]

PREAMBLE

Fisheries sector plays an important role in the socio-economic development of the country in view of its potential contribution to national income, food security, social objectives and sustainable large export earnings. India's future fisheries development plans aim at increasing fish production, improving the welfare of fishermen, promoting export earnings and providing food security. In this context, the trained manpower has been identified as a critical input to fisheries development. The mandate of the Vidyasagar University is to plan, undertake, aid, promote and co-ordinate education, research and extension in Fisheries Science for the livelihood generation of a large section of the region and our university will play a key role in fisheries education and research in the state of West Bengal, in particular and India or outside India in general.

PROGRAMME OUTLINES

1. The M.Sc. in Fisheries Science is a regular postgraduate program of two years' duration, organized over four semesters, encompassing a total of 88 credits along with one non-credit course.

2. Each semester carries a total of 275 Marks (22 credits).

    - Semester-I: 07 courses/papers [03 Discipline Specific Core (DSC) Course and 02 Discipline Specific Elective (DSE) Course with 05 theory courses and 01 practical courses and 01 non-credit course].

    - Semester-II: 06 courses/papers (02 DSC, 03 DSE and one Field based course/paper)

    - Semester-III: 4 courses/papers (04 DSC, 01 MOOC course and 01 Community service paper).

    - Semester- IV: 05 DSC Course (2 DSC theoretical, 01 DSC (practical) i.e. 4 weeks Internship (4 credit), a dissertation/Research project course/paper (practical)- 8 credits and one Grant writing and Seminar on Innovation & Incubation/Research/ Entrepreneurship/Start-up - 2 credits.

3. Each core theory course will be assessed through internal evaluation, of 5 marks. The internal assessment for each theory course will be based on a MCQ/written test/seminar presentation.

4. Semester-IV includes two theory-based DSC courses of 4 credits each along with field-oriented internship programs (2 credits) and a dissertation work (8 credits). Each student must complete an 8-credit research project, evaluated through a written report, seminar presentation, and viva-voce. Additionally, a 2-credit DSC course equips students with grant writing skills and seminar presentations focused on innovation, research, entrepreneurship, incubation, or start-up activities.

PROGRAM OUTCOMES

The **M.Sc. in Fisheries Science** programme, designed in alignment with the principles of the National Education Policy (NEP) 2020**,** aims to nurture skilled, innovative, and socially responsible professionals capable of contributing to the sustainable development of the fisheries and aquaculture sectors. The programme provides an advanced understanding of finfish and shellfish reproduction, nutrition, genetics, and health management, integrated with modern aquaculture technologies, biotechnology, and aquatic microbiology. Students will gain scientific competence in the use of advanced tools such as Remote Sensing, GIS, ICT, and Artificial Intelligence for fisheries resource assessment, management, and innovation.

The curriculum emphasizes experiential learning through practicals, field visits, internships, and dissertation projects, enabling students to translate theoretical knowledge into real-world applications. Training in research methodology, statistics, and bioinformatics strengthens analytical, problem-solving, and data interpretation skills, while exposure to fisheries engineering, product development, and value addition builds technical proficiency and industrial relevance.

Grounded in the ethos of the Indian Knowledge System (IKS) and inspired by the philosophy of holistic education, the programme promotes ethical, inclusive, and sustainable fisheries practices. It also encourages entrepreneurship, innovation, and community engagement, fostering leadership qualities and a commitment to social and environmental responsibility. Graduates will emerge as competent researchers, academicians, and entrepreneurs capable of addressing emerging challenges in fisheries, aquaculture, and allied sectors, thereby contributing to national food security, livelihood enhancement, and the blue economy.

The **Department of Fishery Sciences, Vidyasagar University**, is committed to advancing education, research, and extension in Fisheries Science to support livelihood generation, particularly for the weaker sections of society in the southern region of West Bengal. The course curriculum has been designed to enhance the employability of graduates in both corporate and government sectors. The thrust areas included in the syllabus are: aquatic resources and their management, aquatic environment and climate change, biomechanics, fish physiology and biochemistry, aquatic microbiology and public health fisheries, genetic engineering and biotechnology, fish pathology and disease management, fisheries technology, and harbor engineering. Moreover, the detailed courses in each semester are structured to provide career-oriented knowledge and skills for effective placement in the fisheries sector.

PROGRAM SPECIFIC OUTCOMES

After the successful completion of M. Sc. in Applied Mathematics program, the students are expected to:	
PSO1	Develop comprehensive understanding of finfish and shellfish reproduction, genetics, breeding, hatchery management, aquatic microbiology, fish health management, and modern aquaculture technologies, enabling the application of theoretical knowledge to practical fisheries challenges.
PSO2	Acquire proficiency in laboratory techniques, field-based practices, and hands-on aquaculture operations, including the use of biotechnological tools, bioinformatics, ICT, and AI applications, to conduct experiments and solve complex problems in fisheries science.
PSO3	Design and implement aquatic animal nutrition programs, manage fish health, and apply therapeutic measures for disease prevention and control, contributing to sustainable aquaculture production.
PSO4	Capable of utilizing fisheries engineering tools, remote sensing, GIS, and statistical methods for monitoring, analysis, and optimization of aquaculture systems, ensuring evidence-based decision-making and efficient resource management.
PSO5	To be skilled to develop fish products, implement value addition and packaging strategies, understand fisheries economics, marketing, policies, and trade, and promote entrepreneurship and extension services in the fisheries sector.
PSO6	Develop research aptitude, including experimental design, data analysis, report writing, grant preparation, and ethical conduct in research, fostering innovation and integrity in fisheries science.
PSO7	Acquire indigenous knowledge systems, ethical considerations, and societal responsibilities, integrating sustainable practices and community engagement into fisheries management and policy implementation.

M. Sc. in Fisheries Science

(For the students admitted during the academic year 2025 - 26 onwards)

M. Sc. 1st Year

Semester	Course Code	Title of the Course	Credit	Marks
Semester -I	**DSC 1T**	Reproduction in Finfish & Shellfish	2	25 (20+5)
	DSC 1P	Practical	2	25
	DSC 2T	Advanced Aquatic Animal Nutrition	2	25 (20+5)
	DSC 2P	Practical	2	25
	DSC 3T	Research Methodology and Ethics	4	50 (40+10)
	DSE 1aT	Statistics and Bioinformatics	2	25 (20+5)
	DSE 1bT	Remote Sensing & GIS	2	25 (20+5)
	DSE 2T	Ornamental Fish and Aquarium Management	2	25 (20+5)
	DSE 2P	Practical	2	25
	FSC-IKS-T	Indian Knowledge System (IKS)	2	25
	FSC-VLP-T	Vidyasagar: Life and Philosophy	Compulsory non-Credit course (Available in University LMS)	
Total			**22**	**275**
Semester -II	**DSC 4T**	Genetics, Breeding and Hatchery Management	2	25 (20+5)
	DSC 4P	Practical	2	25
	DSE 3T	Aquatic Microbiology	2	25 (20+5)
	DSE 3P	Practical	2	25
	DSE 4T	Fisheries Engineering	2	25 (20+5)
	DSE 4P	Practical	2	25
	DSE 5T	ICT and AI Application in Fisheries	2	25 (20+5)
	DSE 5P	Practical	2	25
	DSC 5T	Modern Aquaculture Technologies	2	25 (20+5)
	DSC 5P	Practical	2	25
	FSC-Field Visit	Field Visit/Industry Visit/Case Study/ Hands-on Practical	2	25
Total			**22**	**275**
Total: 1st Year of M. Sc.			**44**	**550**

M. Sc. 2nd Year				
Semester	**Course Code**	**Title of the Course**	**Credit**	**Marks**
Semester -III	**DSC 6T**	Therapeutics and Fish Health Management	2	25 (20+5)
	DSC 6P	Practical	2	25
	DSC 7T	Fish Product Development, Value Addition and Packaging	2	25 (20+5)
	DSC 7P	Practical	**2**	**25**
	DSC 8T	Biotechniques and Fish Biotechnology	2	25 (20+5)
	DSC 8P	Practical	2	25
	DSC 9T	Fisheries Economics & Marketing	4	50 (40+10)
		MOOCs	4	50
		Social Service/Community Engagement	2	25
	Total		**22**	**275**
Semester -IV	**DSC 10T**	Fisheries Policies, Laws, International Trade& Intellectual Property Right (IPR)	4	50
	DSC 11T	Fisheries Extension and Entrepreneurship Development	4	50
	DSC12P	Research Project/Dissertation (3 months)	8	100
	DSC13P	Internship (4 weeks)	4	50
	DSC14P	Grant writing and Seminar (Innovation & Incubation/Research/Entrepreneurship/ Start-up)	2	25
Total			**22**	**275**
Total: 2nd Year of M. Sc.			**44**	**550**

DETAILS OF THE COURSES
Semester- I

DSC 1T: Reproduction in Finfish and Shellfish (Credit-2; Marks- 25)

Sexuality in fishes, Sexual dimorphism. Courtship and mating. Reproductive strategies, Reproductive cycle, fecundity and spawning. Development of gonads, Gametogenesis. Gonad anatomy and reproductive mechanisms in important finfish and shellfish species. Environmental influence and control. Endocrine and neuroendocrine regulation of reproduction in finfish and shellfish. Role of pheromones in reproduction. Factors affecting maturation and spawning. Artificial propagation technique. Brood husbandry: brood raising, captive rearing and maturation, brood health care and stress management, brood transport. Nutritional and environmental requirement for broodstocks and for early maturation.

DSC 1P: Practical (Credit-2; Marks- 25)

1. Demonstration of reproductive system (male and female) of fish.
2. Dissection and display of pituitary gland.
3. Study of reproductive phase, gonado-somatic index and condition factor of fish.
4. Studies on oocyte development and stages of oocytes.
5. Study of fecundity, ova diameter of different fishes.
6. Study of morpho-histology of gonads, pituitary gland and other related tissues
7. Broodstock management practices by handling, transport, and stress care
8. Seminar talk
9. Field visit

Course outcome: In recent years, major problems facing aquaculture today is the lack of knowledge of complete life cycles and mass production of seedling of targeted species. So, there is need of domestication of diversified aquaculture species. As there is a depletion of natural fish resources for various reasons, there is a need for evolving species specific technologies to culture commercially important finfish and shellfish species. The basic requirement of successful culture of any species of fish is the availability of healthy seedling in desired quantity. As the availability of seed primarily depends on the efficient functioning of the reproductive organs, it is utmost necessary for the students to understand the basic concepts of reproduction in fish and reproductive technology.

Suggested reading:

1. Fish Neuroendocrinology by Reinecke, Zaccone & Kapoor. CRC Press. 2006.
2. Fish Physiology (V.IXB) by Hoar, Randall & Donaldson. Academic Press, New York, 1983.
3. Fish Reproduction by Arukwe, Kapoor and Rocha, CRC Press, NW. 2008.

4. Fish Reproduction by N.K. Agarwal. APH publication New Delhi. 2008.
5. Fish Reproductive Biology by Jacobsen. John Wiley. 2016.

DSC 2T: Advanced Aquatic Animal Nutrition (Credit-2; Marks- 25)

Basic concepts of fish nutrition, study the Bioenergetics in fish. Different biomolecules in fish nutrition and their importance. Fish feed ingredients. Scenario of feed ingredients and feed industry in world and India. Importance of additives formulation of nutritionally balanced diet (amino acid, micronutrients). Process of feed formulation, Packaging and labeling, Factors affecting feed manufacture and stability of nutrients, Effects of processing on the nutritional value of feeds, Processing methods for non-compacting feed; Storage of feed and quality deterioration, CGMPs and HACCP feed regulation, farm made feed. Feed for early larval development. Nutraceuticals in fish feed and their importance. Principles of nutrigenomics: Methodologies, Genomics, Transcriptomics, Proteomics, Metabolomics and Nutrigenomics, Gene structure and Regulation, Nutritionally Important genes, Environmental aspects of fish nutrition study. Eco-friendly feed, Improving nutrient utilization through exogenous phytase and acidifiers, Methods of enhancing feed digestibility, Biofloc and probiotics influences on nutrient utilization. Judicious use of feed.

DSC 2P: Practical: (Credit-2; Marks- 25)

1. Proximate analysis of fish feed ingredients and prepared feed.
2. Fish feed preparation using different ingredients.
3. Water stability study of fish feed.
4. Study the growth, FCR, PER, NPU and digestibility of feed
5. Study the requirements of fish feed in different aquaculture system.
6. Feed application process and feeding devices.
7. Visit to feed manufacturing industry / Feed Company/ Fish farm to study the feeding process.

Course Outcomes: Describe the importance of different dietary components, effective feed formulation, balanced diets, use of ingredients for aquafeeds and the production of aquafeeds. Apply the knowledge of nutritional concepts to optimize growth efficiency and product quality for the major groups of farmed aquatic animals: fish, crustaceans and molluscs. Design aquaculture nutrition experiments and analyse and evaluate data. Discuss the importance of nutrition research for sustainable aquaculture and the responsible use of global resources

Suggested reading:

1. Lehninger, A. L. 1990. Biochemistry, CBS publishers and Distributors Pvt. Ltd., Shahdara, Delhi.
2. Lovell Tom. 2nd Edition. Nutrition and Feeding of Fish. Springer, India, Private Ltd.

3. Meera Vashis hit. 1998. Food nutrition and processing –Anmol publication pvt. Ltd.
4. Ronald W. Hardy, Sadasivam J. Kaushik. 2021. 4th edition. Fish Nutrition. Academic Press.
5. S.S. de Silva. T.A. Anderson. 1994. Fish Nutrition in Aquaculture. Springer Science & Business Media.
6. Swaminathan, M. 1985. Hand book of Food and Nutrition – The Bangalore Printing and Publishing Company, Ltd. Mysore road.
7. Wilson, K. and Walker, J. 2000. Practical Biochemistry: Principles and Techniques. University of Cambridge, UK.

DSC 3T: Research Methodology and Ethics (Credit-4; Marks- 50)

Definition of Research Methodology, Logical framework, Different kinds of Research Style of Referencing and Bibliography, Reviewing Articles and Books, and writing a good Research Proposal. Ethics with respect to science and research, scientific misconduct: Falsification, Fabrication, and Plagiarism (FFP), duplicate and overlapping publications. Publication ethics: definition, introduction, and importance. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals. 1. Indexing databases Citation databases: Web of Science, Scopus, etc. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score, Metrics: h-index, g index.

Course outcomes: Discuss research methodology and the technique of defining a research problem. Explain the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and writing a review. Explain various research designs and their characteristics. Explain the art of interpretation and the art of writing research reports. Develop the research mind of the student and they learn about different ethics related to research.

Suggested reading:

1. Essentials of Biostatistics & Research Methodology, by Indranil Shah (Author), Boddy Paul (Author), third edition, Academic Publishers (2020).
2. Biostatistics and Research Methodology, by G. Nageswara Rao (Author), Pharma Med Press / BSP Books; 1st edition (2018).
3. Comprehensive textbook of biostatistics and research methodology, by Dr. S. Kartikeyan, Dr. R. M. Chaturvedi, Mr. R. M. Bhosale, 1 first edition, 2016, Bhalani Publishing House, Parel, Mumbai 400 012, Maharashtra, India.
4. Biostatistics & Research Methodology, by Dr. Richa Agarwal, Dr. Sukhbir Singh, Dr.

5. Neelam Sharma & amp; Dr. Tania Bose, first edition 2021 R. Narain Publishers & Distributors.
6. Research Methods and Statistics: An Integrated Approach, By: Janie H. Wilson and Joye, first edition 2017, AGE Publications, Inc.

DSE 1aT: Statistics and Bioinformatics (Credit-2; Marks- 25)

Statistics: Frequency distribution; Variance; Histogram; Pie diagram; Bar diagrams and Frequency curves. Concept of sample and population. Mean; Median; Mode; Standard Deviation (SD), and Standard Error of Mean (SEM). Normal and binomial distribution. Scope and objectives of fisheries statistics. Sample; Survey; Probability calculation; Chi-squire (X2) test; Test of significance; ANOVA; Linear regression and correlation. Analysis of Variance. Fitting curves and index numbers. Statistical analysis of biological data. Identification of problem and formulation of objectives and hypotheses. Types of hypotheses. Testing of the hypothesis. Variables, data types: qualitative, quantitative; Experimental design. Application of statistical methods in Research. Use of tables, graphs, diagram, etc. in reports using computers.

Bioinformatics: Introduction and scope of Bioinformatics. Concepts, brief history and its role and importance in fisheries and aquaculture. Field of application and common biological database. Major Bioinformatics resources; Knowledge of various database. Important bioinformatics tools used in fisheries and aquaculture. Computational analyses of genomes and proteomes. Basic concepts in computational phylogenetic analysis. Role of ICT in Aquaculture sector. AI in aquafarming.

Course outcome: Apply statistical methods to analyse and interpret the biological data. Represent the data of experimental and field studies through graphs and diagrams. Understand statistical concepts and learn to use a variety of statistical tests. Know how to use bioinformatics for DNA and protein sequence analysis through bioinformatics tools and databases. Understand microarray technique for gene expression analysis. Application of ICT and AI in the aquaculture field.

Suggested reading:

1. Bhatt B. R., Srivenkatramana T. and Rao Madhva K. S. (1996): Statistics: A Beginner's Text, Vol 1, and New Age International (P) Ltd.
2. Goon A. M., Gupta M. K. Das Gupta B. (1991): Fundamentals of Statistics. Vol 1, World Press, Calcutta. Additional References.
3. Anderson T. W. and Sclove S. L. (1978): An Introduction to Statistical Analysis of Data, Houghton Mffin\Co.
4. Snedecor G.W. and Cochran W.G. (1967): Statistical Methods. Iowa State University Press.
5. Spiegel M. R. (1967): Theory and Problems of Statistics, Schaum's Publishing Series.

6. Das. N. G (1996), *Statistical* Methods, M. *Das* & Co. (Ca1cutta).
7. Das D. and Das A. (2005). Statistics in Biology and Psychology. Academic Publishers, Kolkata.
8. Bioinformatics: Sequence and Genome Analysis by Mount D., Cold Spring Harbor Laboratory Press, New York. 2004.
9. Bioinformatics- a Practical Guide to the Analysis of Genes and Proteins by Baxevanis, A.D. and Francis Ouellellette, B.F., Wiley India Pvt Ltd. 2009.
10. Introduction to bioinformatics by Teresa K. Attwood, David J. Parry-Smith. Pearson Education. 1999.

DSE 1bT: Remote Sensing & GIS (Credit-2; Marks- 25)

Definition and principles of Remote Sensing and GIS. Sensing mechanism. Analysis of images and data. Fisheries forecasting system. Global Positioning System (GPS). Application of Remote Sensing & GIS in conservation, management of fish faunal diversity and exploitation of capture fisheries. Application of Remote Sensing and GIS in coastal resource management and aquaculture. Basic concepts of disaster vulnerability in India. Different ways of detecting and predicting disasters. Natural and manmade hazards' impact on the fisheries and aquaculture sector in India. Pre-disaster prevention and post-disaster management in the aquaculture sector. Measures to enhance sea safety.

Course outcome: Students will acquire an in-depth understanding of the principles and operational mechanisms of Remote Sensing, GIS, and GPS, and their relevance to fisheries and aquaculture systems. They will develop the competence to interpret and analyze spatial and satellite data for fisheries forecasting, conservation, and sustainable management of aquatic resources. The course will enable students to apply geospatial tools in coastal resource assessment, aquaculture planning, and environmental monitoring. Furthermore, learners will gain insights into disaster vulnerability, evaluate the impacts of natural and anthropogenic hazards, and design geospatially informed strategies for disaster mitigation and enhancement of sea safety.

DSE 2T: Ornamental Fish and Aquarium Management (Credit-2; Marks- 25)

Importance and scope of ornamental fish. Diversity of freshwater and marine ornamental fish species. Popular indigenous and exotic species. Breeding and larval rearing methods. Formulated, live feed and nutrition. Types and designs of aquaria. Aquarium construction, equipment and accessories. Aquarium plants, accessories, decorative materials. Aquarium management. Entrepreneurship opportunities in ornamental fish culture and aquarium management. Ornamental fish marketing.

DSE 2P: Practical: (Credit-2; Marks- 25)

1. Identification of common freshwater and marine ornamental fishes
2. Identification of aquarium plants and decorative materials.
3. Designing and construction of aquarium.
4. Water quality parameters and management
5. Aquarium maintenance: cleaning, water exchange, stocking density.
6. Breeding of freshwater ornamental fishes
7. Preparation and feeding of live feed
8. Observation of ornamental fish diseases and treatment methods.
9. Field visit

Course outcome: Students will gain comprehensive knowledge of the importance and scope of the ornamental fish industry, along with an understanding of the diversity of freshwater and marine ornamental fish species, including popular indigenous and exotic varieties. They will develop skills in breeding, larval rearing techniques, and nutritional management using formulated and live feeds. The course will enable students to design, construct, and manage aquaria, incorporating suitable plants, equipment, and decorative materials. Furthermore, students will be able to apply scientific and entrepreneurial principles in ornamental fish culture, aquarium maintenance, and marketing for sustainable enterprise development.

Suggested readings:

1. Chakraborty, B. K. & Bhattacharjee, S. (2010). *Ornamental Fish: Breeding, Culture and Marketing.* Narendra Publishing House, New Delhi.
2. James, P. S. B. R. (Ed.) (2003). *Handbook on Aquafarming: Ornamental Fishes.* Marine Products Export Development Authority (MPEDA), Cochin.
3. MPEDA (Marine Products Export Development Authority) (2011). *Ornamental Fish Breeding and Culture: A Practical Manual.* MPEDA, Cochin.
4. Qureshi, T. A. & Qureshi, N. A. (2016). *Ornamental Fish Culture and Aquarium Management.* Biotech Books, New Delhi.**Saxena, A. (2014).** *Aquarium Fishes and Ornamental Fish Culture.* Daya Publishing House, New Delhi.
5. Swain, S. K. & Das, R. C. (2010**).** *Ornamental Fish Breeding, Culture and Trade.* Narendra Publishing House, New Delhi.
6. Vivekanandan, E. & Jayasankar, P. (2008). *Marine Ornamental Fishes of India.* Central Marine Fisheries Research Institute (CMFRI), Cochin.

FSC-IKS-T: Indian Knowledge System (IKS): (Credit-2; Marks- 25)

Introduction to Indian Knowledge System (IKS), Indigenous Technical Traditional practice in Fisheries and Aquaculture. Traditional Fish Processing and Preservation. Use of indigenous therapeutics. Documentation, Validation, Conservation, and Dissemination of ITK in fisheries in India in general and West Bengal in particular. Different fishing festival in India. ITK in Fishery technology (craft and gears). Institutions and NGOs in ITK Promotion. Integration of IKS and

Modern Technologies. Indian Biological Diversity Acts, National Biodiversity Authority; People's Biodiversity Register (PBR) and preparation process, Access and Benefit Sharing (ABS), Prior Informed Consent (PIC), TRIPS vs. CBD, and IPR-related issues.

Course outcome: Students will develop a comprehensive understanding of the Indian Knowledge System (IKS) and Indigenous Technical Knowledge (ITK) relevant to the fisheries and aquaculture sectors. They will be able to identify, document, and validate traditional fisheries practices, aquaculture systems, and fish processing techniques prevalent in different regions, including West Bengal. The course will enable students to appreciate the role of institutions and NGOs in ITK promotion and to integrate traditional knowledge with modern technological advancements. Learners will also gain insight into biodiversity conservation laws, People's Biodiversity Registers, Access and Benefit Sharing, and intellectual property rights related to indigenous knowledge.

Suggested reading:

1. Nirmal Kumar, J. I., & Kumar, R. N. (2012). *Indigenous Knowledge in Sustainable Utilization of Natural Resources.* Discovery Publishing House, New Delhi.
2. Sastry, K. V. S. (2022). *Introduction to Indian Knowledge System – Concepts and Applications.* Indian Institute of Technology (IIT) Kharagpur & Bharatiya Vidya Bhavan, New Delhi.
3. ICAR–Central Institute of Fisheries Technology (CIFT) (2014). *Indigenous Technical Knowledge (ITK) in Fisheries: Documentation and Dissemination.* CIFT, Kochi, India.
4. ICAR–Central Institute of Freshwater Aquaculture (CIFA) (2016). *Traditional Aquaculture Practices in India.* CIFA Extension Series, Bhubaneswar.
5. CMFRI (Central Marine Fisheries Research Institute) (2010). *Indigenous Knowledge in Marine Fisheries Sector of India.* CMFRI Special Publication, Kochi.
6. Chattopadhyay, D. N., & Mishra, B. K. (2018). *Indigenous Knowledge and Fisheries Development in India.* Narendra Publishing House, New Delhi.
7. National Biodiversity Authority (NBA) (2013). *People's Biodiversity Register: Guidelines and Format.* NBA, Ministry of Environment, Forest and Climate Change, Government of India, Chennai.
8. National Innovation Foundation – India (NIF) (2015). *Documenting and Promoting Grassroots Innovations and Traditional Knowledge.* NIF, Department of Science and Technology, Government of India, Ahmedabad.
9. Government of India (2002). *The Biological Diversity Act, 2002 and Rules, 2004.* Ministry of Environment, Forest and Climate Change (MoEFCC), New Delhi.
10. Chaudhuri, S. K., & Ghosh, S. K. (2016). *Traditional Fisheries and Indigenous Aquaculture Systems of West Bengal.* Department of Fisheries, Government of West Bengal.

FSC-VLP-T: Vidyasagar: Life and Philosophy

Section-A

A) Early Life and Education: (3 Classes)

1. Birth and Lineage
2. A Journey from Iswar Chandra Bondopadhaya to Iswar Chandra Vidyasagar

B) Vidyasagar and Indian Education: (5 Classes)

1. The then Indian education system
2. Vidyasagarian plan for reformation of Indian education- Vidyasagar as teacher,Vidyasagar as writer, planner and reformer of Indian education.

C) Vidyasagar and Women Emancipation: (4 Classers)

1. Introduction of widow remarriage.
2. Struggle to stop child marriage.

Section-B

D) Philanthropist Vidyasagar (2 Classes)

1. Vidyasagar's philanthropy as narrated by others.

E) Vidyasagar : Traditions and modernity (6 Classes)

1. Tradition.
2. Modernity.
3. Vidyasagara as Traditional modernizer.

F) Relevance of Vidyasagarian thoughts and values (4 Classes)

1. Vidyasagar and the then Society of Bengal.
2. Lesson for future generations.

Course Outcome: Students will be able to understand the life, education and historical context of Ishwar Chandra Vidyasagar. They will be able to analyze Vidyasagar's philosophical principles of rationalism, humanitariasm and social justice to contemporary societal and educational issues.

Suggested reading:

1. Amalesh Tripathi: Vidyasagar: the Traditional Modernizer, Cambridge University Press, 2011.
2. Asok Sen: Iswar Chandra Vidyasagar and His Elusive Milestone, Riddhi-Indian, 28 Beniatola Lane, Cal-9.
3. Vidyasagar o Bangali Samaj, Binoy Ghosh, Orient Blacksoan, 2011.
4. Revisiting Modern Indian Thought: Themes and Perspective, (Ed. S. K. Malik and A. Tomar), Routledge, New York and London, 2022 (First South Asian Edition).
5. Brian A. Hatcher (Trans): Vidyasagar: The Life and After Life of Eminent Indian, Routledge, New Delhi, 2014.
6. Binoy Ghosh: Vidyasagar O Bangali Samaj, Orient Blacksoan, 2011.