।। सा विद्या या विमुक्तये ।।
स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)
Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade
ACADEMIC (1-BOARD OF STUDIES) SECTION
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विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०–२१ पासून मान्यता दिलेल्या व्होकेशनल कोर्सेसचे (बी.व्होक पदवी, ॲडव्हॉस डिप्लोमा, डिप्लोमा व सर्टिफिकेट) अभ्यासक्रम शैक्षणिक वर्ष २०२०–२१ पासून लागू करणे बाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०–२१ पासून मान्यता दिलेल्या व्होकेशनल कोर्सेसच्या (बी. व्होक पदवी, ॲडव्हान्स डिप्लोमा, डिप्लोमा व सर्टिफिकेटस) अभ्यासक्रमांना मा विज्ञान व तंत्रज्ञान विद्याशाखेने **दिनांक ३१ मे २०२१ रोजीच्या बैठकीतील केलेल्या शिफारशीप्रमाणे व मा. विद्यापरिषदेच्या दिनांक १२ जून २०२१ रोजीच्या बैठकीतील विषय क्रमांक २६/५१–२०२१ च्या** ठरावानुसार खालील अभ्यासक्रमांस मान्यता देण्यात आली आहे.

1. B. Voc. IT/Hardware and Networking.
2. B. Voc Software Development.
3. B. Voc. Medical Laboratory Technology.
4. B. Voc. Horticulture and Post-Harvest Technology.
5. B. Voc. Herbal Medicine.
6. B. Voc. Commercial Aquaculture.
7. B. Voc. Food Processing Technology.
8. B. Voc. Skill Based Zoology.
9. B. Voc. Vocational Biotechnology.
10. B. Voc. Plant Tissue Culture Secretary.
11. Advance Diploma Radiological Physics.
12. Diploma – Computer Hardware.
13. Diploma – Computer Network Assistant.
14. Diploma – PGDMLT.
15. Diploma – Embedded System Design.
16. Diploma- Biofertilizer.
17. Diploma- Fisheries and Farm Management.
18. Diploma - Bee Keeping.

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी. ही विनंती.

जा.क्र.:शैक्षणिक–१/परिपत्रक/व्होकेशनल अभ्यासक्रम/N-२०२०–२१/६८

दिनांक : ०५.०७.२०२१

स्वाक्षरित
सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड.

UGC Sanctioned Vocational Course

Syllabus for,

Certificate, Diploma, Advanced Diploma and B.Voc Degree

in

Commercial Aquaculture

(CBCS Pattern)

Semester I & II

Faculty: Science and Technology

(w.e.f. 2020-21)

Table: Indicating Eligibility, Duration, Total Credits.

Exit Points /Awards	Eligibility	Normal Duration	Skill Component Credits	General Education Credits	Total Credits for Award	NSQF Level	Medium of instruction
Certificate	12th pass or Diploma in relevant field after 10th	One semester	18	12	30	4	English
Diploma		Two semester	36	24	60	5	
Advanced Diploma		Four semester	72	48	120	6	
B. Voc Degree		Six semester	108	72	180	7	

About the Course:

Government of India, taking note of the requirement for skill development among students launched National Vocational Education Qualification Framework (NVEQF) which was later on assimilated into National Skills Qualifications Framework (NSQF). Various Sector Skill Councils (SSCs) are developing Qualification Packs (QPs), National Occupational Standards (NOSs) and assessment mechanisms in their respective domains, in alignment with the needs of the industry.

In view of this, the UGC implemented the scheme of Community Colleges from 2013-14 in pilot mode on the initiative of the MHRD. Thereafter, realizing the importance and the necessity for developing skills among students, and creating work ready manpower on large scale, the Commission decided to implement the scheme of Community Colleges as one of its independent schemes from the year 2014-15. The Commission also launched another scheme of B.Voc. Degree programme to expand the scope of vocational education and also to provide vertical mobility to the students admitted into Community Colleges for Diploma programmes to a degree programme in the Universities and Colleges. While these two schemes were being implemented, it was also realized that there is a need to give further push to vocational education on a even larger scale. Accordingly, 'Deen Dayal Upadhyay Centres for Knowledge Acquisition and Upgradation of Skilled Human Abilities and Livelihood (KAUSHAL)' was also incorporated. Since all these three provisions serve a common purpose, all these schemes are merged into a single scheme for providing skill based education under National Qualification Framework.

Type of Courses and Awards:

There will be full time credit-based modular programmes, wherein banking of credits for skill and general education components shall be permitted so as to enable multiple exit and entry. The multiple entry and exit enables the learner to seek employment after any level of Award and join back as and when feasible to upgrade qualifications / skill competencies either to move higher in the job profile or in the higher educational system. This will also provide the learner an opportunity for vertical mobility to second year of B.Voc degree programme after one year diploma and to third year of B.Voc degree programme after a two year advanced diploma. The students may further move to Masters and Research degree programmes mapped at NSQF Level 8 – 10.

Aims and Objectives:

The aims and objectives of the Vocational programme under NSQF are;

(i) To provide judicious mix of skills relating to a profession and appropriate content of general education.

(ii) To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.

(iii) To provide flexibility to students by means of pre-defined entry and multiple exit points.

(iv) To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements.

(v) Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

(vi) To provide vertical mobility to students coming out of 10+2 with vocational subjects and Community Colleges.

The Objectives of the B.Voc. in Commercial Aquaculture:

(i) To provide an updated education to the students in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.

(ii) To develop a scientific attitude to make students open minded, critical and curious.

(iii) To develop an ability to work on their own and to make them fit for the society.

(iv) To develop skill in field work, experiments, equipment and laboratory use along with collection and interpretation of materials and data.

(v) To make aware of natural resources and environment and the importance of conserving the same.

(vi) To develop ability for the application of the acquired knowledge in the relevant fields so as to make our country self-reliant and self-sufficient.

Outcome of the course:

(i) This Program in commercial aquaculture will produce manpower with good expertize, knowledge and skills in the field of aquaculture and allied activities.

(ii) The program will impart education and skills with respect to aquaculture at different levels diploma, advance diploma, degree.

(iii) The certificate level of B. Voc. in commercial aquaculture will impart expertise and knowledge with respect to general fisheries information, identification of different fish species, principle activities of aquaculture and aquatic ecology and its conservation.

(iv) The diploma level of B. Voc. in commercial aquaculture will impart expertise and knowledge of fish biology, freshwater aquaculture and aquaculture engineering in addition to the certification level.

(v) The advance diploma level of B. Voc. in commercial aquaculture will impart expertise and knowledge with respect to fish seed production, anatomy & physiology of fishes, soil & water quality management, fish nutrition & feed technology and fish preservation in addition to diploma level.

(vi) The degree level of B. Voc. in commercial aquaculture will impart expertise and knowledge with respect to fish disease management, ornamental fisheries, value added fish products and fish genetics & biotechnology in addition to advance diploma level.

(vii) This program allows the students for different techniques, recent trends, innovation in aquaculture and hands on laboratory as well as on farm skills in order to serve as human resource for fisheries and allied sectors at different entry and exit level.

(viii) This skill oriented programs will provide career opportunities and self-employment through entrepreneurship development of their own enterprises in aquaculture and its allied sectors.

Syllabus structure for,
Certificate, Diploma, Advanced Diploma and B.Voc Degree in
Commercial Aquaculture (Agriculture and Allied Faculties)

	Paper No.	Course Number	Course Title	Hr/ Week	Type of Course	Credits	Marks		Total
							ESA	CIA	
Sem. I		**General Education Component**							
	Paper-I	BAAGE -111	Communication Skills	4	GE	4	75	25	100
	Paper-II	BAAGE -112	Basics of Computer	4	GE	4	75	25	100
	Paper-III	BAAGE -113	*Activity based on Paper-I & II	1	GE	1	-	25	25
		Skill Courses							
	Paper-IV	COMAQ-111	Taxonomy and General Topics in Fisheries	4	CC	4	75	25	100
	Paper-V	COMAQ-112	Principles of Aquaculture	4	CC	4	75	25	100
	Paper-VI	COMAQ-113	Aquatic Ecology	4	CC	4	75	25	100
		Practical Skill Courses							
	Paper-VII	Practical Based on COMAQ-111		3	PR	3	50	25	75
	Paper-VIII	Practical Based on COMAQ-112		3	PR	3	50	25	75
	Paper-IX	Practical Based on COMAQ-113		3	PR	3	50	25	75
	Paper No.	**Course Number**	**Course Title**	**Hr/ Week**	**Type of Course**	**Credits**	**Marks**		**Total**
							ESA	**CIA**	
Sem. II		**General Education Component**							
	Paper-X	BAAGE -124	Personality Development	4	GE	4	75	25	100
	Paper-XI	BAAGE -125	Environmental Study	4	GE	4	75	25	100
	Paper-XII	BAAGE -126	*Activity based on Paper-X & XI	1	GE	1	-	25	25
		Skill Courses							
	Paper-XIII	COMAQ-124	Biology of Fishes	4	CC	4	75	25	100
	Paper-XIV	COMAQ-125	Fresh Water Aquaculture	4	CC	4	75	25	100
	Paper-XV	COMAQ-126	Aquaculture Engineering	4	CC	4	75	25	100
		Practical Skill Courses							
	Paper-XVI	Practical Based on COMAQ-121		3	PR	3	50	25	75
	Paper-XVII	Practical Based on COMAQ-122		3	PR	3	50	25	75
	Paper-VIII	Practical Based on COMAQ-123		3	PR	3	50	25	75

Note:

1. The ESA part of practical and Industrial Project should be completely assessed and evaluated by external examiner.

2. The external examiner should be appointed for practical and industrial training ESA part.

3. * Sign denotes that internal assessment should be based on seminar/Interview skill/expected component of the course.

4. Student should submit the Report based on summer industrial training.

5. For VI semester students can opt Elective-I or Elective-II pattern.

6. Student should submit the certificate of three months industrial training from respective industries.

ESA: End Semester Assessment,

CIA: Continues Internal Assessment,

GE: General Education Component,

CC: Core Skill Courses,

PR: Practical Skill Courses,

CIA of 25 Marks (Theory): 15 Marks for college level internal test & 10 Marks for Assignment,

CIA of 25 Marks (Practical): 15 Marks for college level internal practical test & 10 Marks for Record Book and Field Note Book submission.

Swami Ramanand Teerth Marathwada University, Nanded

Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied Faculties)

First Year (**Semester I**) Semester Pattern

Paper-I: Communication Skills (BAAGE-111)

Maximum Marks: 100 **Credits: 4** **Periods: 45**

Unit I: Basic Grammar: (13 Periods)

Introduction, Grammar Word Classes (Open & Closed), Sentence – Kinds – Transformation, Phrase, Clause and its kinds, Simple, Complex & Compound sentences, (Only definitions & Structure), Tenses - Use of verbs in the Sentences

Unit II: Vocabulary: (10 Periods)

Morphology, Synonyms & Antonyms, One Word Substitution, Homophones & Homonyms

Unit III: Communication Skills: (10 Periods)

Definition & Types, Communication Cycle & Barriers, Principles for Effective Communication, Varieties in English (Indian, British & American).

Unit IV: Writing Skills: (12 Periods)

Letters (Formal & Informal), Report Writing (Scientific and Formal), Memorandum, Curriculum Vitae, Personal Employment Interview, Group Discussion. Phonetics: 44 sounds, consonants, vowels & Diphthongs, Transcription of words, Accent, Syllable cluster and Intonation.

Reference Books:

1. Developing of Communication Skills -Krishna Mohan & Meera Banerji

2. A Practical English Grammar A.J. Thomson –Oxford

3. Mastering English Grammar – S.H.Burton

4. Technical Communication- Raman Sharma- Oxford

5. Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.

6. A Course in Phonetics & Spoken English -J.Sethi & P.V.Dhamija

7. Radiance-Tense

Swami Ramanand Teerth Marathwada University, Nanded

Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied Faculties)

First Year (**Semester I**) Semester Pattern

Paper-II Basics of Computer (BAAGE-112)

Maximum Marks: 100 **Credits: 4** **Periods-45**

Unit I: Basics of Computer: (10 Periods)

Introduction to computer, Definition and Types. Basic Applications of Computer; Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software; Connecting keyboard, mouse, monitor and printer to CPU and checking power supply.

Unit II: Computer Operation: (13 Periods)

Operating Computer using GUI Based Operating System: What is an Operating System; Basics of Popular Operating Systems; The User Interface, Using Mouse; Using right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows;

Unit III: MS-Office: (10 Periods)

Introduction to MS-Word: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document. MS- Excel, Power Point. Internet concept & definition, WWW, URL, http, Browsers, Search engines etc.

Unit IV: Computer Networking: (12 Periods)

Basic of Computer networks; LAN, MAN, WAN; Concept of Internet; Applications of Internet. Communications and collaboration: Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.

Reference Books:

1. Introduction of Computer Science- Pcushman & R. Mata Toledo, McGraw Hill
2. Computer fundamentals – P.K. Sinha – BPB New Delhi.
3. Microsoft Office – 2000Complete – BPB Practicals

Swami Ramanand Teerth Marathwada University, Nanded

Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied Faculties)

First Year (**Semester I**)

Paper-IV: Taxonomy and General Topics in Fisheries (COMAQ-111)

Maximum Marks: 100 **Credits: 4** **Periods: 45**

UNIT-I: (Periods: 10)

1. Definition, Scope and importance of fishery science.
2. Fishery Recourses of India
3. Capture Fishery of India
4. Culture Fishery of India

UNIT-II: (Periods: 11)

1. Principles of taxonomy.
2. Nomenclature and types
3. Study of external morphology, morphometric and meristic characteristics of fishes
4. Study of external morphology and meristic characteristics of crustacean.

UNIT-III: (Periods: 12)

1. Difference between Cartilage and bony fishes
2. Study of external morphology and meristic characteristics of Mollusca
3. Classification of inland and marine fishes up to family level with examples of commercially important species.

UNIT-IV: (Periods: 12)

1. Classification of Crustacea up to family level with examples of commercially important species.
2. Classification of Mollusca up to family level with examples of commercially important species.

Reference Books:

1. Bal, D. V. and K. V. Rao, 1990. Marine fisheries of India. Tata McGraw-Hill Publishing Company Ltd, New delhi, Pp. 472.
2. Biswas, S. P. Fundamental of Ichthyology, Narendra Publishing House, Delhi, 392 p.
3. Day, F. 1981. Fishes of India Vol. I and II; William Sason and sons Ltd., London.
4. FAO volumes for fish identification.

5. J.R. Norman, A history of Fishes, Hill and Wang Publishers
6. Jayaram, K. C., 2002. Fundamentals of fish taxonomy. Narendra Publishing House, Delhi, 172 p.
7. Jhingran, V.C. 1991. Fish and Fisheries in India. Hindustan Publishing Company, New Delhi, India.
8. Khanna, S.S. and H.R. Singh, 2003.Fish Biology and fisheries, Narenrdra Publishing House, New Delhi, India.
9. Khanna, S.S. and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing house
10. Santanam, R. 1980. Fisheries Science, Daya Publishing House, New Delhi, India.
11. Srivastava C.B.L., 2008, Fish Biology, Narendra Publishing House, Delhi
12. Talwar, P. K. and A. G. Jingaran. 1991. Inland fishes of India and adjuscent countries. Volume I, IBH Publishing, New Delhi.
13. Yadav, B.N. 1997. Fish and fisheries, Daya Publishing House, New Delhi, India.

Swami Ramanand Teerth Marathwada University, Nanded

Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied Faculties)

First Year (Semester I)

Paper-V: Principles of Aquaculture (COMAQ-112)

Maximum Marks: 100 **Credits: 4** **Periods: 45**

UNIT-I: (Periods: 10)

1. Basis of Aquaculture: Definition and Scope
2. History of Aquaculture
3. Present global and national scenario of aquaculture
4. Aquaculture verses Agriculture
5. Objectives of fish culture
6. Types of cultivable fishes

UNIT-II: (Periods: 12)

1. Systems of Aquaculture - Pond culture, pen culture, cage culture, running water culture, zero water exchange system, Mono and poly culture, Cold and warm water culture etc.
2. Extensive, semi-intensive, intensive and supra intensive aquaculture

UNIT-III: (Periods: 12)

1. Criteria for site selection for aquaculture.
2. Criteria for selection of candidate species for aquaculture
3. Pond management: Pre-stocking, Stocking and post -stocking management.
4. Major freshwater candidate species for aquaculture
5. Major brackish water and marine candidate species for aquaculture

UNIT-IV: (Periods: 11)

1. Integrated culture system: Principle, Types of integration, suitable species for integration etc.
2. Introduction to organic aquaculture
3. Water and soil quality in relation to fish production.
4. Physical, chemical and biological factors affecting fish culture

Reference Books:

1. Balugut, E.A.1989. Aquaculture system and practices. A selected review publishing House, New Delhi.
2. Bardach J.E. and J.H. Rhyther, 2013. Aquaculture: The Farming and Husbandary of Freshwater and Marine organisms, John Wiley & Sons.
3. D. Allen Davis, 2015. Feed and Feeding Practices in Aquaculture, Woodhead Publishing
4. Jhingran, V.C. 1991. Fish and Fisheries in India. Hindustan Publishing Company, New Delhi, India.
5. Khanna, S.S. and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing house
6. Pillai, TVR. and M. N. Kutty., 2005. Aquaculture: Principles and Practices, Wiley-Blackwell.
7. Pillay, T.V.R. 1993. Aquaculture: Principles and Practices, Fishing New Books, Blackwell Scientific Publications
8. Rath, P. K., 2000. Freshwater Aquaculture, Scientific Publishers, Jodhpur
9. Robert R. Stickney., 2009. Aquaculture: An Introductory Text, CAB International Publishers.
10. Santanam, R. 1980. Fisheries Science, Daya Publishing House, New Delhi, India.
11. Srivastava C.B.L., 2008, Fish Biology, Narendra Publishing House, Delhi
12. Yadav, B.N. 1997. Fish and fisheries, Daya Publishing House, New Delhi, India.

Swami Ramanand Teerth Marathwada University, Nanded

Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied Faculties)

First Year (**Semester I**)

Paper-VI: Aquatic Ecology (COMAQ-113)

Maximum Marks: **100** **Credits: 4** **Periods: 45**

UNIT-I: Ecology (Periods: 10)

1. General concepts of ecology
2. Definition, objectives and scope of ecology
3. Branches and types of ecology.
4. Productivity, carrying capacity
5. Food Web & food chain

UNIT-II: Fresh water Ecology (Periods: 12)

1. River ecology : a) Physico-chemical characters of river waters, b) Biotic factors- Producers, consumers and decomposers, c) Zonation of river-Rhithron and potamon zone, d) Flora and fauna of river
2. Ecology of Reservoir: a) Introduction to reservoirs, b) Classification of reservoirs, c) Eutrophication of reservoirs, d) Physico-chemical characters of reservoirs waters, e) Biotic Community: -Flora and fauna of reservoirs.
3. Pond ecology

UNIT-III: Marine and Estuarine Ecology (Periods: 12)

1. **Marine Ecology**
   a) Physico-chemical characters of Sea water.
   b) Horizontal & Vertical Zonation of Sea water.
   c) Flora & Fauna.
2. **Ecology of Estuaries**
   a) Types of estuaries:-
      i. Salt wedge estuaries
      ii. Partially mixed estuaries
      iii. Fjords estuaries
      iv. Bar-built estuaries
   b) Physico-chemical characteristic of estuaries.

c) Biota of estuaries: - Oligohaline organism, true estuarine organism, Stenohaline organism, marine organism and migrants.

UNIT-IV: Water pollution & their control (Periods: 11)

1. Introduction and definition.
2. Different types of pollutants.
3. Sewage and domestic refuge.
4. Pollution and treatment of sewage.
5. Pollution control and legislation

Reference Books:

1. Agarwal, K.C.2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
3. Cunningham, W. P. Cooper, T. H. Gorhani, E & Hepworth, M.T.2001. Environmental Encyclopedia, Jaico Publ. House. Mumbai, 1196p
4. Dc A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Hawkins R.E, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
6. Jadhav & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
7. Mckinncv, M.L. & Schoch. R.M. 1996. Environmental Science systems & Solutions
8. Odum, E. P., 1972. Fundamentals of Ecology by Eugene, W. B. Saunders Company, London.
9. Pillay, T.V.R. and M. N. Kutty, 2005. Aquaculture Principles and Practices, Blackwaell Scientific Publishers, UK.
10. Smith, R.L., 1986. Elements of Ecology. Harpet and Row Publishers, New York.
11. Trivedi, P.R. and K. Gurdeepraj, 1992. Environmental Biology, Akashdeep Publishing House, New Delhi.

Swami Ramanand Teerth Marathwada University, Nanded

Certificate, Diploma, Advanced Diploma and B.Voc Degree (Agriculture and Allied Faculties)

First Year (Semester I)

Paper-VII: Practical based on COMAQ-111 (Taxonomy and General Topics in Fisheries)

Maximum Marks: 75 **Credits: 3** **Periods: 30**

List of practical's	**Number of Hours**
1. Study of external morphology of finfishes 2. Identification, Classification and external features of commercially important inland fishes (Indigenous) 3. Identification, Classification and external features of commercially important inland fishes (Exotic)	9
4. Identification, Classification and external features of commercially important marine fishes (Indigenous) 5. Identification, Classification and external features of commercially important marine fishes (Exotic) 6. Study of external morphology shell fishes.	9
7. Identification, Classification and external features of commercially important prawns, shrimps, crabs and lobsters, bivalves, gastropods, cephalopods 8. Identification, Classification and external features of commercially important bivalves, gastropods, cephalopods	6
9. Fish identification techniques (any locally available fish) a) Study of any five morphometric characters b) Study of any five meristic characters 10. Field visits to fish landing centers to study the commercially important fishes and shellfishes	6

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First Year (Semester I)

Paper-VIII: Practical based on COMAQ-112 (Principles of Aquaculture)

Maximum Marks: 75 **Credits: 3** **Periods: 30**

List of practical's	**Number of Hours**
1. Aquaculture production statistics- World & India 2. Aquaculture resources of India 3. Components of Aquaculture farms 4. Estimation of carrying capacity	6
1. Study of practices of pre-stocking pond management: Drying, ploughing, Liming, Fertilization, etc. 2. Study of practices of pre-stocking pond management: Eradication of aquatic insects 3. Study of practices of pre-stocking pond management: Eradication of aquatic weed and Insects.	6
4. Study of practices of pre-stocking pond management: Eradication of predatory fishes 5. Study of practices of stocking pond management: Transportation methods and Acclimatization methods 6. Study of practices of post-stocking pond management: Feed management (Types feed, Ration, feeding methods, Timing etc.)	9
7. Study of practices of post-stocking pond management: Health management (Sampling, External observation for health) 8. Growth studies in aquaculture system 9. Study of organic and inorganic fertilizer 10. Preparation of layout plan of fish farm and their submission	9

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First Year (Semester I)

Paper-IX: Practical based on COMAQ-113 (Aquatic Ecology)

Maximum Marks: 75 **Credits: 3** **Periods: 30**

List of practical's	**Number of Hours**
1. Collection, identification of planktons a. Fresh water phytoplankton & Zooplankton. b. Marine Phytoplankton & Zooplankton 2. Preparation of permanent slides	6
3. Measurement of primary production. 4. Study of benthic organisms. 5. Study of natural pond habitat and organisms	6
6. Study of estuarine habitat and organisms 7. Study of river habitat and organisms 8. Study of endangered species and protection	9
9. Study of sandy shore habitat and organisms 10. Study of muddy shore habitat and organisms 11. Study of rocky shore habitat and organisms 12. Study of endangered species and protection	9

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First Year (**Semester II**)

Paper-X: Personality Development (BAAGE-124)

Maximum Marks: 100 **Credits: 4** **Periods: 45**

UNIT-I: Personality Development: (Periods: 11)

Introduction to personality development: The concept personality- Dimensions of theories of Freud & Erickson- personality – significant of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success, What is failure - Causes of failure. SWOT analyses.

UNIT-II: Attitude & motivation: (Periods: 11)

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude - Advantages –Negative attitude - Disadvantages - Ways to develop positive attitude - Difference between personalities having positive and negative attitude. Concept of motivation - Significance - Internal and external motives - Importance of self-motivation- Factors leading to de-motivation

UNIT-III: Interpersonal Relationship: (Periods: 11)

Term self-esteem - Symptoms - Advantages - Do's and Don’ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self-esteem - Positive and negative self-esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviors - Lateral thinking.

UNIT-IV: Overall personality development: (Periods: 12)

Other aspects of personality development: Body language, Problem-solving, Conflict and Stress Management, Decision making skills, Leadership and qualities of a successful leader. Character building, Team-work, Time management, Work ethics, Good manners and etiquette. Employability quotient: Resume building, The art of participating in Group Discussion. Facing the Personal (HR & Technical) Interview.

Refrence Books:

1. “Personality Development and Soft Skills” by Barun Mitra
2. The Only Skill That Matters by Jonathan A. Levi

3. “Personality Development” by Swami Vivekananda
4. “Personality Development for Students” by Dr Vijay Agrawal
5. Soft Skills Personality Development for Life Success- 2nd Edition by Prashant Sharma

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First Year (**Semester II**)

Paper-XI: Environmental Study (BAAGE-125)

Maximum Marks: 100 **Credits: 4** **Periods: 45**

Unit-I: Ecosystems: (Periods: 11)

Introduction, Concept of an ecosystem. Structure and function of an ecosystem. Energy flow in the ecosystem. Food chains, food webs. Ecological pyramids: Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Aquatic ecosystems (ponds)

Unit-II: Biodiversity: (Periods: 11)

Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega diversity nation. Biodiversity Hot-spots of India. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-III: Environmental Biology: (Periods: 12)

Environmental Pollution; Introduction, Definition, Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Noise pollution f. Thermal pollution g. nuclear hazards. Disaster Management; Natural disaster- Earthquake, Tsunami, Cyclone, Tornedo, Chemical Disaster- Bhopal Gas Tragedy, Nuclear Disaster- Chernobil.

Unit-IV: Natural Resources: (Periods: 11)

Renewable and Nonrenewable Resources; Solar Energy, Wind Energy. Forest Resources, Metal Mines, Crude Oil Mines. Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. Environmental ethics. Population growth, Population explosion.

REFERENCES:

1. Agarwal, K.C.2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad —

380 013, India, Email: mapin@icenet.net (R)

3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill lnc.480p
4. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W. P. Cooper, T. H. Gorhani, E & Hepworth, M.T.2001. Environmental Encyclopedia, Jaico Publ. House. Mumbai, 1196p
6. Dc A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment(R)
8. Gleick, 11.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press. 473p
9. Hawkins R.E, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, VII & Watson, R.I. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p. .
11. Jadhav & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
12. Mckinncv, M.L. & Schoch. R.M. 1996. Environmental Science systems & Solutions. Web enhanced edition. 630pp.

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First Year (**Semester II**)

Paper-XIII: Biology of Fishes (COMAQ-124)

Maximum Marks: **100** **Credits: 4** **Periods: 45**

UNIT-I: (Periods: 11)

1. General Morphology
2. Life cycles (Commercially Important species)
3. Food and feeding habits of fishes
4. Calorific and Medicinal value

UNIT-II: (Periods: 12)

1. Oviparity, viviparity & ovo – viviparity
2. Types of eggs
3. Stages in development: Breeding and release of gametes, Fertilization of egg, Cleavage, Morula, Blastula, Fate map of Blastula, Gastrulation, Hatching and post embryonic development.

UNIT-III: (Periods: 12)

1. Definition, Introduction, Modes of reproduction
2. Sexual dimorphism.
3. Parental care
4. Maturity stages
5. Gametogenesis: Oogenesis and spermatogenesis.
6. Assessment of fecundity: i) Volumetric method ii) Gravimetric method iii) Von Bayrs methods
7. Study of Gonado Somatic Index (GSI).

UNIT-IV: (Periods: 10)

1. Factors affecting growth
2. Ponderal index
3. Length- weight relationship
4. Methods for age and growth determination: Direct method, Tagging method, marking method, using hard body parts, radio carbon uptake method, RNA– DNA ratio method.

Reference Books:

1. Biswas, S. P. Fundamental of Ichthyology, Narendra Publishing House, Delhi, 392 p.
2. J.R. Norman, A history of Fishes, Hill and Wang Publishers
3. Jayaram, K. C., 2002. Fundamentals of fish taxonomy. Narendra Publishing House, Delhi, 172 p.
4. Jhingran, V.C. 1991. Fish and Fisheries in India. Hindustan Publishing Company, New Delhi, India.
5. Khanna, S.S. and H.R. Singh, 2003.Fish Biology and fisheries, Narenrdra Publishing House, New Delhi, India.
6. Khanna, S.S. and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing house.
7. Kumar, A. 2005.Fish Biology, APH Publishing Corporation.
8. Prasad T. L. and K. Ramaswamy, 2014. Applied Fisheries, Publisher: Crescent Publishing House. 279pp
9. Santanam, R. 1980. Fisheries Science, Daya Publishing House, New Delhi, India.
10. Srivastava C.B.L., 2008, Fish Biology, Narendra Publishing House, Delhi
11. Talwar, P. K. and A. G. Jingaran. 1991. Inland fishes of India and adjuscent countries. Volume I, IBH Publishing, New Delhi.
12. Yadav, B.N. 1997. Fish and fisheries, Daya Publishing House, New Delhi, India.

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Certificate, Diploma, Advanced Diploma and B. Voc. Degree (Agriculture and Allied Faculties)

First Year (**Semester II**)

Paper-XIV: Fresh Water Aquaculture (COMAQ-125)

Maximum Marks: **100** **Credits: 4** **Periods: 45**

UNIT-I: (Periods: 11)

1. Production trends and prospects of Freshwater Aquaculture in different parts of the world.
2. Fresh water aquaculture resources - ponds, tanks, lakes, reservoirs, etc.
3. Major species cultured and Traits of important cultivable fresh water species

UNIT-II: (Periods: 12)

1. Culture of carps (Indian major carps, Medium & minor carps and exotic carps)
2. Culture of cat fishes
3. Culture of cold water fishes

UNIT-III: (Periods: 12)

1. Culture of freshwater prawns
2. Culture of mussels (Freshwater pearl culture)
3. Culture methods of other freshwater exotic species
4. Exotic fish species introduced to India and its impact on indigenous fish fauna

UNIT-IV: (Periods: 10)

1. Sewage-fed fish culture
2. Species of fish suitable for integrated aquaculture.
3. Integration of aquaculture with agriculture, horticulture and livestock

Reference Books:

1. Ahilan, B. Textbook of freshwater Aquaculture, Daya Publishing House, New Delhi.
2. Bardach J.E. and J.H. Rhyther, 2013. Aquaculture: The Farming and Husbandry of Freshwater and Marine Organisms, Wiley India Pvt Ltd

3. Daniel Merrifield and Einar Ringø, 2014. Aquaculture Nutrition: Gut Health, Probiotics and Prebiotics, John Wiley & Sons, Ltd
4. Jayaram K. C., The Freshwater Fishes of India, Pakistan, Angladesh, Burma and Sri Lanka- A Handbook, Zoological Survey of India, Culkatta.
5. Jhingran, V.C. 1991. Fish and Fisheries in India. Hindustan Publishing Company, New Delhi, India.
6. John S. Lucas, Paul C. Southgate and Craig S. Tucker. 2019. Aquaculture: Farming Aquatic Animals and Plants, 3rd Edition, Willy publication.
7. Khanna, S.S. and Sing, H.R. 2003.Fish Biology and fisheries, Narenrdra Publishing House, New Delhi, India.
8. Michael Bernard New, Wagner Cotroni Valenti, James H. Tidwell, Louis R. D'Abramo and Methil Narayanan Kutty, 2010. Freshwater Prawns Biology and Farming, Willy Blackwell Publishing Ltd.
9. N. Romoanowski, 2006. Sustainable Freshwater Aquacultures: The complete guide from backyard to investor, University of New Southwales Press.
10. Pillai, TVR. and M. N. Kutty., 2005. Aquaculture: Principles and Practices, Wiley-Blackwell.
11. Rath, R. K., 2000. Freshwater Aquaculture, Scientific Publishers, Jodhpur.
12. Santanam, R. 1980. Fisheries Science, Daya Publishing House, New Delhi, India.
13. Singh S.H. and A.K. Ahmad, 2011. Freshwater Aquaculture, Daya Publishing House, New Delhi.
14. Sinha, V.R. P. and Srinivastava, H. C. (1991). Aquaculture Producativity. Oxford and IBH Publications CO., Ltd., New Delhi.
15. Sugumaran, V. V., 1997. Reservoir fisheries of India. Daya Publishers, New Delhi.
16. Yadav, B.N. 1997. Fish and fisheries, Daya Publishing House, New Delhi, India.
17. Zade S. B., C. G. Khune, S. R. Sitare and R. V. Tijare, Principles of aquaculture, Himalaya Publishing House.

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Certificate, Diploma, Advanced Diploma and B. Voc. Degree (Agriculture and Allied Faculties)

First Year (**Semester II**)

Paper-XV: Aquaculture Engineering (COMAQ-126)

Maximum Marks: **100** **Credits: 4** **Periods: 45**

UNIT-I: (Period 10)

1. Aquaculture Farm- Definition, objectives;
2. Farm types – Freshwater, brackish water and marine farms.
3. Selection of site for aqua farm-
4. Layout and design of aquaculture farm

UNIT-II: (Periods: 12)

1. Ponds - Types and classification of ponds
2. Planning and Design of ponds
3. Construction ponds
4. Dykes: types of dykes, design of dykes, construction of dykes.
5. Water distribution system- Canal, Pipeline system,
6. Water control structures- types of inlet and out let and their construction.
7. Pond drainage system; seepage and the methods used for seepage control,

UNIT-III: (Periods: 12)

1. Hatcheries- Site selection, Layout plan and design
2. Raceway culture system- site selection, layout plan

UNIT-IV: (Periods: 11)

1. Aerators- principles, classification of aerators and placement of aerators.
2. Pumps- purpose of pumping, types, selection of pump, total head and horse power calculation.
3. Filters- types and constructions.

Reference Books:

1. Bardach J.E. and J.H. Rhyther, 2013. Aquaculture: The Farming and Husbandry of Freshwater and Marine Organisms, Wiley India Pvt Ltd.
2. Christoph Meske. Fish Aquaculture: Technology and Experiments (2nd Edition), Pergamon Press,
3. Jhingran, V.C. 1991. Fish and Fisheries in India. Hindustan Publishing Company, New Delhi, India.
4. John S. Lucas, Paul C. Southgate and Craig S. Tucker. 2019. Aquaculture: Farming Aquatic Animals and Plants, 3rd Edition, Willy publication.
5. Lucas, J.S. 2012. Aquaculture: Farming Aquatic animals and plants, Wiley – Blackwell.
6. N. Romoanowski, 2006. Sustainable Freshwater Aquacultures: The complete guide from backyard to investor, University of New Southwales Press.
7. Odd-Ivar Lekang, 2020. Aquaculture Engineering, 3rd Edition, Wiley-Blackwell. 544pp.
8. Pillai, TVR. and M. N. Kutty., 2005. Aquaculture: Principles and Practices, Wiley-Blackwell.
9. Rabinarayan Mishra and K. Dora, 2015. Text Book on Aquaculture Engineering, Narendra Publishing House, New Delhi, 330 pages
10. Rath, R. K., 2000. Freshwater Aquaculture, Scientific Publishers, Jodhpur.
11. S.H. Singh and A.K. Ahmad, 2011. Freshwater Aquaculture, Daya Publishing House, New Delhi.
12. Sugumaran, V. V., 1997. Reservoir fisheries of India. Daya Publishers, New Delhi.
13. Upadhyay, A. S. 1995. A Hand Book on Design, Construction and Equipments in Coastal Aquaculture (Shrimp Farming). Daya Publishing House, New Delhi.
14. Wheaton W., 2017. Aquacultural Engineering, Publisher: Medtech Publishers
15. Yadav, B.N. 1997. Fish and fisheries, Daya Publishing House, New Delhi, India. Zade S. B., C. G. Khune, S. R. Sitare

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First Year (Semester I)

Paper-XVI: Practical based on COMAQ-124 (Biology of Fishes)

Maximum Marks: 75 **Credits: 3** **Periods: 30**

List of practical's	**Number of Hours**
1. Study of embryonic developmental stages 2. Identification of spawn fry and fingerlings 3. Analysis of gut contents	9
4. Study of sexual dimorphism 5. Study of parental care 6. Study of development stages of ovaries	9
7. Study of development stages of testis 8. Estimation of fish fecundity 9. Study of length weight relationship	6
10. Tagging and marking. 11. Estimation of age and growth	6

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First Year (Semester I)

Paper-XVII: Practical based on COMAQ-126 (Fresh Water Aquaculture)

Maximum Marks: 75 **Credits: 3** **Periods: 30**

List of practical's	Number of Hours
1. Identification and study of key characteristics of commercially important cultivable finfishes 2. Identification and study of key characteristics of commercially important cultivable crustacean	6
3. Identification and study of key characteristics of commercially important cultivable mollusk 4. Preparation and management of nursery, rearing and grow out pond	6
5. Identification and study of aquatic weeds & insects 6. Identification and study of predatory and weed fishes 7. Algal blooms and their control	9
8. Estimation of plankton and benthic biomass. 9. Study of natural and supplementary feeding in freshwater aquaculture 10. Workout of economics of aquaculture practice	9

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First Year (Semester I)

Paper-XVIII: Practical based on COMAQ-126 (Aquaculture Engineering)

Maximum Marks: 75 **Credits: 3** **Periods: 30**

List of practical's	**Number of Hours**
1. Evaluation of potential site for aquaculture 2. Design and layout plan of fresh water farms. 3. Design and layout plan of brackish water farms	6
4. Estimation of earth work 5. Estimation of Water requirement.	6
6. Design of farm structure: a) Ponds 7. Design of farm structure: b) Dykes 8. Design of farm structure: c) Channels	9
9. Study of aerators 10. Study of Pumps 11. Study of filters 12. Visit to different types of farms	9

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based Credit System (CBCS) (Semester Pattern)

Theory Examination

Question Paper Pattern (B.Voc.)

Maximum Marks: **75** **Time: 3.00 Hrs**

Q1. Long Answer Type Question ……. (15 Marks).

OR

a) Short Answer Type Question ……. (8 Marks).

b) Short Answer Type Question ……. (7 Marks).

Q2. Long Answer Type Question ……. (15 Marks).

OR

a) Short Answer Type Question ……. (8 Marks).

b) Short Answer Type Question ……. (7 Marks).

Q3. Long Answer Type Question ……. (15 Marks).

OR

a) Short Answer Type Question ……. (8 Marks).

b) Short Answer Type Question ……. (7 Marks).

Q4. Long Answer Type Question ……. (15 Marks).

OR

a) Short Answer Type Question ……. (8 Marks).

b) Short Answer Type Question ……. (7 Marks).

Q5. Write a short note on (**Any three** of following) ……. (15 Marks).

a) ……..(5 Marks)

b) ……..(5 Marks)

c) ……(5 Marks)

d) ……..(5 Marks)

e) ……..(5 Marks)

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Choice Based Credit System (CBCS) (Semester Pattern)

Practical Examination

Question Paper Pattern (B.Voc.)

Maximum Marks: 50 **Time: 4.00 Hrs**

Q1. Perform the Major Experiment ……. (20 Marks).

Q2. **a)** Perform the Minor Experiment …… (10 Marks).

b) Describe procedure and working of the Minor Experiment …… (10 Marks).

Q3. **a)** Viva -voce ..…… (5 Marks).

b) Submission of Field Collection and Samplings during Field Visits and Excursions ..…… (5 Marks).

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