



ADIKAVINANNAYAUNIVERSITYR  
AJAHMAHENDRAVARAM

**National Skill Qualification Framework [NSQF]  
A UGC Sponsored Scheme  
*for*  
Certificate Course  
on  
Aquaculture Feed preparation, Analysis and Management**

**Departments of Zoology and Aquaculture**  
Adikavi Nannaya University  
Rajahmahendravaram  
Rajahmahendravaram-533296,A.P.,



ADIKAVIRANNAYAUUNIVERSITY::RAJAHMAHENDRAVARAM  
Syllabus(2020-21)

S.No		Name of the member
1	Chairman	Vice-Chancellor
2	Principal/Director/Nodal officer of the programme / Centre,	Nodal Officer
3	One representative of the partner industry(s),	Mr. Ashok Reddy General Manager, CPT Aquaculture India Pvt. Ltd. Mr. B. Jayant Kumar Vaisakhi Bio Marine, VSP.
4	one nominee of the Controller of Examination	Dean, examination
5	one external expert.	Dr. P. V. Koushna, Associate Professor Dept. of Aquaculture, Acharya Nagarjuna University
6	additional experts on the Skill Assessment Board, if required.	Dean Academic Affairs Coordinator BOS Chairman / Convener One additional expert



**Minutes of Board of Studies**

Board of studies meeting for National skill qualification framework [NSQF] certificate course on Aquaculture feed preparation, analysis and management.

Minutes of the meeting of board of studies held on 24/12/2020 at 12 noon on online

**Agenda**

1. To approve the syllabus for National skill qualification framework [NSQF] certificate course on Aquaculture feed preparation, analysis and management
2. To approve the Marks and credits for the course
3. To approve the number of teaching hours for the course
4. To approve the University component and Industry component for the course
5. If Any other

**RESOLUTIONS:**

The board members have discussed the agenda through Online meeting (<https://meet.google.com/heo-nzxx-vgo>) and resolved the following.

1. It has been resolved that Bachelors and Masters graduate with "Aquaculture/Fisheries" as one of the subjects are preferred to apply for admission into National skill qualification framework [NSQF] certificate course on Aquaculture feed preparation, analysis and management.
2. The members formulated the syllabus for National skill qualification framework certificate course on Aquaculture feed preparation, analysis and management with a duration of 6 months beginning from the academic year 2020-21. (On campus for 4 months and 2 months industry training)
3. There shall be 3 days class work per week. For those candidates holding a job Industrial training is to be done during vacation period.
4. Marks and credits are allotted to theory and practical papers including project work.



Board of studies meeting for National skill qualification framework [NSQF] certificate course on Aquaculture feed preparation, analysis and management.

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### **RESOLUTIONS:**

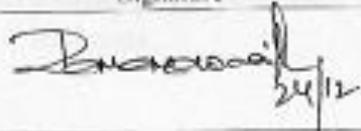
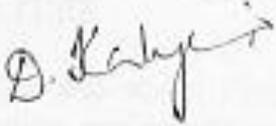
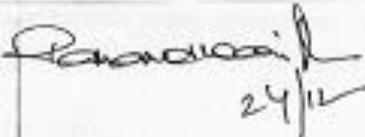
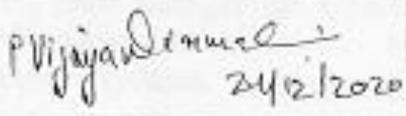
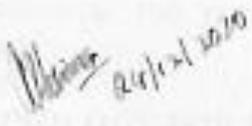
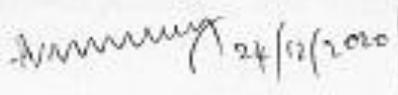
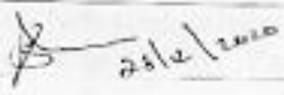
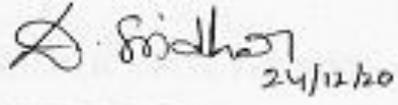
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ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM  
Syllabus(2020-21)

**Board of Studies-UGC NSQF  
Certificate Course On  
Aquaculture Feed preparation, Analysis and Management**

S.No.	Name of the Member	Signature
1	Chairman Principal, University College of Science and Technology, Adikavi Nannaya University, Rajamahendravaram	 24/12
2	Convener Dr. D.Kalyani, Assisnt. Professor, Department of Zoology, Adikavi Nannaya University, Rajamahendravaram	
3	Coordinator Dr. K. Ramaneswari, Dept of Zoology Adikavi Nannaya University Rajamahendravaram.	 24/12
4	Head Head, Department of Aquaculture, Adikavi Nannaya University Rajamahendravaram	 24/12/2020
5	Experts 1. Dr. P.V. Krishna Associate Professor Department of Aquaculture, Acharya Nagarjuna University, Guntur	 24/12/2020
	2. B.Jayant Kumar Director, Vaisakhi Bio marine Visakhapatnam	 24/12/2020
	3. Dr. A. Matta Reddy Associate Professor Department of Zoology UCST, Adikavi Nannaya University Rajamahendravaram	 24/12/2020
	4. Mr. Ashok Reddy, General Manager, CP Aquaculture INDIA., Pvt. Ltd	—
	5. Mr. Selvin Jaya Kumar, HR, CP Aquaculture INDIA., Pvt. Ltd	 24/12/2020
	6. Dr. D. Sridhar, Asst. Prof. Ad hoc Department of Aqua culture UCST, Adikavi Nannaya University Rajamahendravaram	 24/12/20



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UGC in recent years had made initiatives to reorient and restructure the policies of higher education.

For creating a boost to the economic growth and social development It has recognized the need and importance of the skills in the students by bringing down the demand – supply mismatch with ready manpower as skills and knowledge. In addition to conventional disciplines, there is a need to introduce some career oriented courses where qualified students may learn certain skills and knowledge which will provide them more openings in service, industry and self employment sectors.

Findings for the past and future trends, drivers and challenges, regional aquafeed demand break up of finfish and shellfish is show that there is a need on the major ingredients used in commercial finfish feed, to understand and evaluate the kind of ingredients that will be in demand with the increase in aquaculture production. There are also central and state governments initiatives for promoting aquaculture production and industry restraints of the commercial aquafeed market as well as technological advancements in aquaculture industry. In view of the facts the department of Aquaculture would like to establish skill development courses in Adikavi Nannaya University Campus. M.Sc Aquaculture course was started in 2016-17 academic year. This sector provides good employment and research opportunities for students, because aquaculture is one of the growth engine of Andhra Pradesh,

Students with requisite qualification, age no bar, are eligible to take this course for starting their careers.

### **Objectives:**

- Provide knowledge for sustainable aquaculture
- Provide the students an on field exposure to help them in understanding the Aquaculture practices
- Provide the learners an experience in research for Aquaculture production
- Enhancing skills of rural youth commercial fish farming and increasing their entrepreneurship opportunities
- Effective utilization of aquatic and land resource
- Providing means of livelihood through commercial and industrial aquaculture.

### **Course Outcome:**

On successful completion of the course, students will be able to:

- ✓ Get Employment in specific area
- ✓ Get the knowledge of different types of Aquaculture practices
- ✓ Build up capability in self-employment and income generation
- ✓ Apply for various Government, Non Government Schemes for establishing an independent aquaculture farm.
- ✓ Expand research ability



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**Members of Board of Studies**

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3.	Coordinator	Dr. K. Ramaneswari, Dept of Zoology Adikavi Nannaya University
4.	Head	Head, Department of Aquaculture, ANUR
5	Experts	1. Dr. P.V. Krishna Associate Professor Department of Aquaculture, Acharya Nagarguna University, Guntur
		2. B.Jayant Kumar, Director, Vaisakhi Bio- marine, Visakhapatnam
		3. Dr.A.Muralidhar, Scientist- Incharge, CIFE, Kakinada
		4. Dr.A.Matta Reddy, Associate Professor, Department of Zoology, UCST, ANUR.
		5. Mr. Ashok Reddy, General Manager, CP Aquaculture INDIA Pvt. Ltd.
		6. Mr. Selvin Jaya Kumar CP Aquaculture INDIA Pvt. Ltd
		7. Dr.D.Sridhar, Asst. Prof. Ad hoc, Department of Aquaculture, UCST, ANUR.



**National Skill Qualification Framework [NSQF]**  
**Aquaculture Feed preparation, Analysis and Management**  
**Departments of Zoology and Aquaculture**  
Adikavi Nannaya University  
Rajahmahendravaram

Course	Title of the Paper	Teaching Hours/week	Duration of Exam	Maximum Marks	credits
<b>Theory</b>					
<b>Paper I</b>	Principles of aquaculture	4	3	100	4
<b>Paper II</b>	Fish nutrition and feed technology	4	3	100	4
<b>Paper III</b>	Feed management and economics	4	3	100	4
<b>Total</b>		<b>12</b>		<b>300</b>	<b>12</b>
<b>Practicals</b>					
<b>Paper IV</b>	Principles of aquaculture	4	3	100	4
<b>Paper V</b>	Fish nutrition and feed technology	4	3	100	4
<b>Paper VI</b>	Feed management and economics	4	3	100	4
<b>Project work</b>		2 months	--	150	6
<b>Total</b>		<b>12</b>		<b>450</b>	<b>18</b>
<b>Grand Total Marks and Credits for the Course</b>				<b>750</b>	<b>30</b>
<b>Scheme of Examination</b>		<b>At the end of the course</b>			
<b>Theory Pass</b>		<b>Minimum 35% (35 Marks in each Paper)</b>			
<b>Practical Pass</b>		<b>Minimum 50% (50 Marks in each Paper)</b>			



**UGC National Skill Qualification Framework [NSQF]  
Aquaculture Feed preparation, Analysis and Management  
Syllabus**

**THEORY**

**Paper I : PRINCIPLES OF AQUACULTURE**

**4 Credits**

**Unit I:** Basics of aquaculture-definition and scope. Present global and national scenario. Culture systems of aquaculture - pond culture, pen culture, cage culture, running water culture, zero water exchange system, etc. Extensive, semi-intensive, intensive and super intensive aquaculture in different types of water bodies viz., freshwater, brackishwater and inland saline ground water.

**UNIT II:** Pre-stocking and post stocking pond management. Criteria for selection of species for aquaculture.

**Unit III:** Major cultivable species for aquaculture: freshwater, brackish-water and marine. Monoculture, polyculture and integrated culture systems.

**Unit IV:**Water and soil quality in relation to fish production. Physical,chemical and biological factors affecting productivity of ponds

**Paper II : NUTRITION AND FEED TECHNOLOGY FOR FIN FISH AND SHELL FISH  
4 Credits**

**Unit I:** Nutritional requirements of cultivable fish and shellfish. Forms of feeds: wet feeds, moist feeds, dry feeds, mashes, pelleted feeds, floating and sinking pellets.

**Unit II:**Feed additives: binders, antioxidants, enzymes, pigments, growth promoters, feed stimulants. Feed storage, use of preservatives and antioxidants.

**Unit III:** Feed evaluation - feed conversion ratio, feed efficiency ratio, protein efficiency ratio, net protein utilization and biological value.

**Unit IV :** Feeding devices and methods. Non-conventional feed ingredients and anti-nutritional factors. Digestive enzymes, feed digestibility. Factors affecting digestibility. Nutritional deficiency diseases.



**Paper III: FEED MANAGEMENT&ECONOMICS FOR FIN FISH AND SHELL FISH  
4 Credits**

**Unit I:** Feed Manufacture: Feed formulation and processing, On-farm feed manufacture, Commercial feed manufacture, Feed storage

**Unit II:** Feeding Practices: Supplementary feed–theory and practice, Complete diet - theory and practice, Feeding methods and scheduling, ration size, feed performance and economics. culture and use of different live feed in shellfish hatcheries, Aquarium fish feeds

**Unit III:** Introduction to fisheries economics , Farm production economics – production functions in capture and culture fisheries; Costs and returns – breakeven analysis of fish production system.

**Unit IV:** Factors of fish production, marginal cost and return, law of diminishing marginal return, economies of scale and scope, Revenue, profit maximization, measurement of technological change, farm planning and budgeting.

**PRACTICALS**

**Paper IV:**

**4 Credits**

1. Cultivable importance of fish & Shell fish Species
2. Practices on pre-stocking and post stocking management.
3. Analysis of water and soil samples.
4. Design and layout of fresh water and brackish water farms, fish and shrimp hatcheries
5. Visit to farms and hatchery.
6. Estimation and calculations of production costs of fish/shrimp farm.
7. Different types of filters.
8. Determination of Temperature, pH, Turbidity.
9. Total Alkalinity and total Hardness.
10. Dissolved Oxygen
11. Estimation of soil organic carbon
12. Estimation of nitrogen in soil.

**Paper V:**

**4 Credits**

1. Proximate composition analysis of feed ingredients and feeds.
2. Preparation of artificial feeds using locally available feed ingredients.
3. Estimation of FCR from feeding trials and preparation of feeding table.
4. Estimation of growth parameters from feeding trials
5. Collection, identification and isolation of live food organisms using various techniques
6. Supplementary feeds Identification.



**Paper VI**

**4 Credits**

1. Formulation and preparation of a balanced fish feed;
2. Feeding trials
3. Determination of gross energy content of feed and feed ingredients;
4. Gut content analysis to study artificial and natural food intake. Visit to feed manufacturing units.
5. Check tray assessment and feed ration calculation;
6. Demand and supply functions of fish market – determination of equilibrium price for fish and fisheries products,
7. Production function – production with one or two variable inputs.
8. Economic analysis on cost, return and break even of any two production units like fish farm / shrimp farm / seed production unit / fish processing plant / export unit.
9. Preparation of enterprise budget for integrated fish farming.
10. Contribution of fisheries to Indian Agriculture and total GDP – a trend analysis.

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**Model Paper for THEORY**  
**Paper I, II, III**  
(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

**Section A**

**Answer all questions**

**(4X15=60)**

1. a.  
or  
b.
2. a.  
or  
b.
3. a.  
or  
b.
4. a  
or  
b

**Section B**

**Answer any 5 questions**

**(5X8=40)**

- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.



**Model Paper for PRACTICAL**  
**Paper IV, V, VI**  
(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

- |                     |      |
|---------------------|------|
| 1.                  | [15] |
| 2.                  | [20] |
| 3.                  | [15] |
| 4.                  | [15] |
| 5.                  | [15] |
| 6. Viva-voce        | [10] |
| 7. Practical record | [10] |



ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM  
Syllabus(2020-21)

ADIKAVI NANNAYA UNIVERSITY, RAJAHMUNDRY  
UGC National Skill Qualification Framework [NSQF]

**Aquaculture Feed preparation, Analysis and Management**

Model Question Paper: **Paper I : PRINCIPLES OF AQUACULTURE**

Time: 3hours

Max. Marks: 100

Section-A

**(4X15=60)**

Answer ALL questions.

1. a) What is scope and basis of Aquaculture and analyze the Present global and national scenario.  
(or)  
b) Describe different culture Systems of aquaculture
2. a) Explain the details in Criteria for selection of species for aquaculture.  
(or)  
b) Discuss about Pre-stocking and post stocking pond management. Add a note on Major cultivable species for aquaculture.
3. a) Explain the Monoculture and polyculture systems.  
(or)  
b) Discuss about Integrated culture systems
4. a) Explain the Water and soil quality in relation to fish production  
(or)  
b) Discuss about Physical, chemical and biological factors affecting productivity of ponds.

Section-B

Answer any 5 questions

**(5X8=40)**

- 5) Cage culture
- 6) Super intensive aquaculture
- 7) Zero water exchange system
- 8) Polyculture
- 9) Extensive culture
- 10) Semi-intensive culture
- 11) Integrated culture systems
- 12) Aquaculture-definition and scope
- 13) Different types of water bodies



ADIKAVI NANNAYA UNIVERSITY, RAJAHMUNDRY  
UGC National Skill Qualification Framework [NSQF]  
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Model Question Paper: **Paper II : NUTRITION AND FEED TECHNOLOGY FOR FIN  
FISH AND SHELL FISH**

Time: 3hours

Max.Marks: 100

Section-A

Answer ALL questions.

(4X15=60)

1. a) Write in detail the Nutritional requirements of cultivable fish and shellfish .  
(or)  
b) Write an essay on Forms of feeds.
2. a) Write in detail the Feed additives  
(or)  
b) Write in detail about different Feed storage methods
3. a) Write in detail the Feed evaluation. Add a note on feed efficiency ratio  
(or)  
b) Explain the net protein utilization and biological value. Add a note on feed conversion ratio
4. a) Write the Feeding devices and methods  
(or)  
b) Write the Non-conventional feed ingredients and anti-nutritional factors. Add a note on Digestive enzymes

Section-B

Answer any 5 questions

(5X8=40)

- 5) Wet feeds
- 6) Pelleted feeds
- 7) Binders, antioxidants
- 8) Feed storage
- 9) Feed efficiency ratio
- 10) Protein efficiency ratio
- 11) Feed digestibility
- 12) Factors affecting digestibility
- 13) Nutritional deficiency diseases



ADIKAVI NANNAYA UNIVERSITY, RAJAHMUNDRY  
UGC National Skill Qualification Framework [NSQF]  
Aquaculture Feed preparation, Analysis and Management

Model Question Paper: **Paper III : FEED MANAGEMENT&ECONOMICS FOR FIN FISH  
AND SHELL FISH**

Time: 3hours

Max. Marks: 100

Section-A

Answer ALL questions.

(4X15=60)

1. a) What is Feed formulation and processing  
(or)  
b) Describe the On-farm feed manufacture & Commercial feed manufacture
2. a) Explain the details in Supplementary feed–theory and practice & Complete diet –  
theory and practice,  
(or)  
b) Discuss about culture and use of different live feed in shellfish hatcheries. Add a  
note on Aquarium fish feeds.
3. a) Discuss the economics of fisheries  
(or)  
b) Write an essay on Break-even Analysis and Profitability of Aquaculture
4. a) Discuss the law of diminishing marginal return in Aquaculture  
(or)  
b) Discuss about the farm planning and budgeting

Section-B

Answer any 5 questions

(5X8=40)

- 5) Feed formulation
- 6) Feed storage
- 7) Feeding methods
- 8) Breakeven analysis of fish production system
- 9) Feed scheduling
- 10) Factors of production
- 11) Marginal cost and return
- 12) Law of diminishing marginal return
- 13) Returns to scale