Proceedings of the Second Resident Instructions Committee (RIC) online meeting held on 05.08.2020 at 16.15 hrs. under the Chairmanship of DRI-cum-Dean PGS, BASU, Patna via Zoom (Meeting ID 3340458995).

Following Members were present in the online meeting: -

1.	**Dr. Veer Singh**, DRI-cum-Dean PGS, BASU, Patna	:	Chairman
2.	**Dr. Raman Trivedi**, DSW, BASU, Patna	:	Member
3.	**Dr. J.K. Prasad**, Dean, BVC, BASU, Patna	:	Member
4.	**Dr. V.P. Saini**, Dean, COF, Kishanganj	:	Member
5.	**Dr. K.G. Mandal**, COE, BASU, Patna	:	Member
6.	**Dr. Jehangir Badshah**, O/C Academic, SGIDT, Patna	:	Invited Member
7.	**Dr. A.K. Jha**, Assoc. to COE, BASU, Patna	:	Invited Member
8.	**Dr. P Kaushik**, Asstt. Registrar (Acad.), BASU, Patna	:	Member
9.	**Dr. Nirbhay Kumar**, Asstt. Registrar (Exam.), BASU, Patna		Member Secretary

At the outset, Dr. Veer Singh, DRI-cum-Dean PGS, BASU, Patna and Chairman of the Committee welcomed all members to the Second RIC meeting. He highlighted the importance of RIC meeting for streamlining the Residential Instructions regarding Under Graduate and Post Graduate Programmes in the University. Further, he emphasized the need to have this meeting in the online mode looking into the present COVID-19 situation.

MINUTES AND DECISIONS TAKEN: -

AGENDA ITEM NO.- 2.1:

Conduct of Online External Examination of B.V.Sc.& A.H., B.Tech.(DT) and B.F.Sc. Programmes for the Academic Year 2019-20 in light of COVID-19 situation.

DETAILS:

The unprecedented condition of lock down due to COIVD -19 in the state has led to closure of all on-campus teaching, learning and examinations through off line mode. Looking into this situation Bihar Animal Sciences University, Patna has been quite instrumental in adopting online teaching tools for conduct of virtual online classes during the lock down period. The University under the leadership of Hon'ble Vice Chancellor, Dr. Rameshwar Singh has succeeded in the effort of completion of all course syllabi through online virtual classes. Since, the semesters/ academic years as per the academic calendar of the University has to be completed, it is proposed that the students may be given the opportunity to appear for the online external examinations too so that their semesters/ academic years may be completed on time and the impact of lock down may not affect the teaching ambience of the University.

As per the academic calendar of the University, final external examinations of different academic programmes *viz.* B.V.Sc.&A.H., B.Tech. (D.T.) and B.F.Sc. under different Colleges have to be conducted.

The details of different Examinations which were due as per the Academic Calendar are presented as follows:-

S.N.	*External Examinations to be conducted*		*Dates as per the Academic Calendar*
1.	**B.V.Sc.&A.H.** (Annual System - 1st, 2nd & 3rd Years	:	2nd July to 8th August 2020
2.	**B.V.Sc.&A.H.** (Semester System)	:	15th June to 9th July 2020
3.	**B.Tech. (D.T.)** 1st Semester	:	30th April to 15th May 2020
4.	**B.Tech. (D.T.)** 2nd, 4th, 6th, 8th Semesters	:	10th July to 22nd July 2020
5.	**B.F.Sc.** 1st & 4th Semesters	:	10th July to 22nd July 2020

Looking into the lock down situation in the state and unavailability of students in the campus, it is proposed that the University may conduct online external examinations, the modus operandi is detailed in the following proposal for deliberation and discussion in the Instruction Committee of the University for implementation.

Proposal for Online External Examination

Looking into the experience of online conduct of internal examinations in the University, it is proposed that all external examinations, which are due as per the academic calendar may be conducted online. A brief outline for conduct of online external examinations is presented as follow:-

External Examination & Evaluation Cell of BASU, Patna

(To provide Questions set by External Examiners as per the regulations of VCI, 4th/ 5th Deans Committee)

↓

Deans of respective Colleges

(To conduct the Online Examination with the help of their TEAMS)

↓

Centre Superintendent of respective College

[Dean or as nominated by Dean]

↓

TEAM of respective College

↓

Semester/ Year wise TEAM

1. Nodal Officer-I
2. Nodal Officer-II
3. Computer Operator
4. Supporting Staff

Duties to be performed by each Team

- Creation of dedicated Email account for each Semester/ Year Exam.
- Providing Instructions to the students atleast 30 minutes before start of the Examination.
- Scanning & Uploading of Question Papers over the WhatsApp group of the concerned Semester/ batch atleast two minutes before start of Examination.
- After end of Examination time, 10 minutes additional time be given to students for scanning and sending the pdf of their answer books by email.
- Making Attendance sheet of Students based on their submitted answer books.
- Downloading and Printing of answer books of students submitted by email.
- Submission of sealed packet of answer booklets containing downloaded & printed answer booklets duly authenticated (signed by the Nodal Officers) to the Centre Superintendent/ Dean of concerned College for onward transmission to the External Examination & Evaluation Cell of BASU, Patna.

(34)

FORMAT FOR SUBMISSION OF ANSWER BOOKLETS (Objective)

Bihar Animal Sciences University, Patna
Online External Examination

NAME OF STUDENT : _____
(IN BLOCK LETTERS)

Admission No. : _____

Registration No. : _____

Programme : _____
(BVSc&AH/ B.Tech.(DT)/ BFSc)

Semester/ Year : _____

Course No. : _____

Course Title : _____

Date of Examination : _____

Note: Students should not write any personal information like Name etc. on any page except this page. However, since the Examination Answer Sheet has to be submitted online, the student will write ***only Roll No. just beside with page no. on each & every page*** so that there should not be any confusion while printing the answer sheets.

Bihar Animal Sciences University, Patna
Online External Examination

PART – I (OBJECTIVE)

Q. No. 1 (Fill in the blanks)	Q. No. 2 (MCQs)	Q. No. 3 (True/ False)	Q. No. 4 (Cross Match)
(i)	(i)	(i)	(i) .....
(ii)	(ii)	(ii)	(ii) .....
(iii)	(iii)	(iii)	(iii) .....
(iv)	(iv)	(iv)	(iv) .....
(v)	(v)	(v)	(v) .....
(vi)	(vi)	(vi)	(vi) .....
(vii)	(vii)	(vii)	
(viii)	(viii)	(viii)	
(ix)	(ix)	(ix)	
(x)	(x)	(x)	

FORMAT FOR SUBMISSION OF ANSWER BOOKLETS (Subjective)

Bihar Animal Sciences University, Patna
Online External Examination

NAME OF STUDENT : _____
(IN BLOCK LETTERS)

Admission No. : _____

Registration No. : _____

Programme : _____
(BVSc&AH/ B.Tech.(DT)/ BFSc)

Semester/ Year : _____

Course No. : _____

Course Title : _____

Date of Examination : _____

Note: Students should not write any personal information like Name etc. on any page except this page. However, since the Examination Answer Sheet has to be submitted online, the student will write ***only Roll No. just beside with page no. on each & every page*** so that there should not be any confusion while printing the answer sheets.

Bihar Animal Sciences University, Patna
Online External Examination

SUBJECTIVE

Ans. to Q.No. 5:

(i) .....
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(ii) .....
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(iii) .....
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(iv) .....
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(v) .....
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Bihar Animal Sciences University, Patna
Online External Examination

SUBJECTIVE

Ans. to Q. No. 6:

(i) .....
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(ii) .....
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(iii) .....
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(iv) .....
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(v) .....
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Bihar Animal Sciences University, Patna
Online External Examination

SUBJECTIVE

Ans. to Q. No. 7:

(i) .....
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(ii) .....
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(iii) .....
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(iv) .....
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(v) .....
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Proposal for Offline Evaluation by Internal Course Instructors

Looking into the current situation of COVID-19 pandemic and timely conduct of examination, publication of results and resumption of next Academic Semester/ Year, it is proposed that the External Examination need to be redefined.

External Examination may be redefined as the Examination whose Question Papers are set by the External Examiners and the evaluation of which are made by the Internal Faculty members.

A brief outline for offline evaluation is presented as follow: -

External Examination & Evaluation Cell of BASU, Patna

(To provide the coded Answer Booklets and Answer Keys)

TEAM of respective College to be engaged for evaluation work
(*Team to be notified by concerned Dean)

* *Concerned Dean to notify the Course Wise Team for Evaluation of Answer Booklets and submission of Grades*

Compilation and Publication of Results by the External Examination & Evaluation Cell, BASU

The External Examination & Evaluation Cell, BASU will compile and publish the results after going through the standard scrutiny by the Retotalling Committee as well as Tabulation Committee as constituted and notified earlier.

DECISIONS:

The Committee members unanimously agreed for conduct of online examination as well as offline evaluation as per the proposal of Controller of Examinations, BASU, Patna with following modifications: -

1. **In place of two (2) minutes, five (5) minutes before the scheduled time of examination, scanned Question Papers should be uploaded over the Whatsapp group of the concerned Semester/ batch before start of Examination.**

2. **For conduct of practical examinations in Semester System of B.V.Sc. & A.H. (Old VCI as per MSVE 2008), Dean BVC suggested to conduct Viva-Voce by the External Examiners through online Video Conferencing looking into the situation that there are only three Year Back students each in 3rd & 4th Professional Year of B.V.Sc. & A.H. This will fulfil the requirements of MSVE 2008 regulations for external practical examination. However, for conduct of rest part of the practical examination, HODs of concerned departments will take the examination by means of assignments.**

3. **General Instructions (for both objective and subjective) should be floated over the WhatsApp group of students of concerned semester/ year at least 1-2 days before start of the examination so that students should be well acquainted about the examination process.**

4. **For smooth conduct of online examinations, it was also decided that the Nodal Officer of each team will provide his WhatsApp Number for submission of answer sheets, if the student finds difficulty in attaching the pdf of answer sheets by Email. However, Email should be the first preference for submission of answer sheets.**

5. **If any student who fails to appear in online mode of examination due to any valid reason like internet connectivity etc. should be given one additional chance for appearing in offline mode of examination after opening of the campus.**

6. **It was unanimously decided that the Academic Calendar as approved by the Academic Council of the University needs to be shifted for conduct of online examinations. In this regard, the Committee recommends the following date schedule for the examination and start of next Academic semester/year: -**

S.N.	Particular details of events		Proposed & Recommended Dates
1.	Online annual/end term final external examination (theory & practical) of B.V.Sc.& A.H. (annual & semester systems), B.Tech. (D.T.) & B.F.Sc.	:	20th August to 15th September, 2020
2.	Admission and Registration in next Academic semester/year	:	21st September, 2020

(Action: Controller of Examinations, BASU, Patna)

AGENDA ITEM NO.- 2.2:

Conduct of Online Post-Graduate Semester End Term Examination for the Academic Year 2019-20 in light of COVID-19 situation.

DETAILS:

DRI-cum-Dean PGS, BASU moved this agenda and informed the Committee that online examination in all post graduate courses will be taken as per the semester calendar. Since the end term final examination in PG Programme is internal, all HODs will conduct the examination in online mode as per the following details: -

- All Head of the Departments to conduct the Final End Term Semester / Annual Examination between 10th to 25th August, 2020 and Practical Examination, etc. before the 31st August, 2020 of PG Programme of the concerned Departments at Department level in the online mode and be conveyed to the office of DRI-cum-DEAN, PGS office, immediately.

- **Weightage to Various types of examinations will be as follows for information:**

Sl. No.	Type of Examinations	Courses involving Practical (%)	Courses involving no Practical (%)	Courses involving Practical only
I.	Quiz	10	10	10
II.	Mid-term Examination	25	30	10
III.	Final Examination	40	50	-
IV.	Practical Examination	25	-	50
V.	Assignment	-	-	20
VI.	Viva-Voce	-	10	10
	Total	**100**	**100**	**100**

- **Instructions:**
  1. Ratio of question paper shall be having 40% objective and 60% subjective questions.
  2. The examination shall be 2 hours duration.
  3. Objective type questions will be conducted in Goggle Forms or any other suitable online platform.
  4. Subjective type questions will be answered on a white sheet paper, and then scanned PDF copy of answer sheet must be submitted within 10 minutes sharp of the end of examination on HoDs WhatsApp No. or e-mail Id.
  5. If any 2 or more than 2 students having similar answers more than 5% in total, those answers not be awarded.
  6. Pattern of Objective Type Questions:
     a. Multiple Choice Questions
     b. True / False Type Questions
     c. Justification / define in one sentence / word type questions.
  7. Pattern of subjective type Questions:
     a. Long type / Justification type questions / short notes.
  8. Practical examination will be conducted as assignment based / seminar and Viva-voce will be conducted in online mode like Zoom, Google meet, etc.
  9. All questions paper should be uniformly distributed throughout course content.
- All the Marks of various type of examination must be submitted with a week after the completion of examination to the office of DRI-cum-DEAN, PGS.

DECISION:

The Committee members unanimously agreed to the proposal of DRI-cum-Dean PGS, BASU, Patna.

(Action: DRI-cum-Dean PGS, BASU, Patna)

AGENDA ITEM NO.- 2.3:

Shifting of In Plant Training of 7th Semester Students to 8th Semester and vice versa under COVID 19 situation for B.Tech. (DT), 2017 batch in special case.

DETAILS:

Looking into the emergency situation which has arisen due to COVID-19 pandemic, the students of Batch 2017 of B.Tech. (D.T.) Programme of SGIDT cannot be sent for In Plant training.

DECISION:

The Committee recommends to shift In Plant Training of 7th Semester Students to 8th Semester and vice versa under COVID 19 situation for B.Tech. (DT), 2017 batch in special case.

(Action: Dean, SGIDT, Patna)

AGENDA ITEM NO.- 2.4:

Proposal for Certificate and Diploma Course for Entrepreneurship development in Fisheries.

DETAILS:

Dean, COF, Kishanganj moved the Proposal for certificate & diploma course for entrepreneurship development in Fisheries. The detailed proposal as submitted by COF, Kishanganj is placed as Annexure-1.

DECISION:

The Committee recommends the proposal as it is and should be placed in the next Academic Council meeting for discussion.

(Action: Dean, COF, Kishanganj)

AGENDA ITEM NO.- 2.5 (ANY OTHER AGENDA):

Agenda: **Dean, Bihar Veterinary College, Patna raised the problems faced by students during online teaching. He informed the house that students are attending all their online classes over their cellphones whose screen size is of maximum 6 inches x 3 inches. This creates great stress to the students.**

Recommendation: **The Committee deliberated over this problem and suggested that the students may be given a good quality tablet or a laptop by the University. The budget for the same may be managed by the monthly stipend of the students, their contingency grants as well as additional financial support from the University side.**

(Action: DSW, BASU, Patna)

The meeting ended with vote of thanks to the Chair.

Sd/-
(Member Secretary)
Resident Instruction Committee,
BASU, Patna

ANNEXURE- 1

COLLEGE OF FISHERIES, KISHANGANJ
BIHAR ANIMAL SCIENCES UNIVERSITY, PATNA

File No.: RIC 1/COF/Kishanganj/2020-21/989 **Dated 31/.07/220**

To,

The DRI Cum PGS
Bihar Animal Sciences University

Sub: Agenda item for inclusion in the Resident Instruction Committee of BASU Patna-reg.

Sir,

With reference to the above, please find the following agenda item of College of Fisheries, Kishanganj, for inclusion in the **Resident Instruction Committee** of Bihar Animal Sciences University for consideration.

Agenda item:

1. **Proposal for certificate & diploma course for entrepreneurship development in Fisheries:** Fishery is one of the growing sectors of Indian economy. An ever increasing number of entrepreneurs, those are adopting fisheries business activities are significantly contributed to its continuous growth. Many a times, the new entrepreneurs are not able to achieve expected success. It is due to lack of adequate knowledge in the field. To help the existing and prospective entrepreneurs, following three certificates and one diploma courses are proposed.

   Certificate course (4 month duration each)

   - **Certificate course in Freshwater Aquaculture**
   - **Certificate Course in Fish Seed Production**
   - **Certificate course in Ornamental Fish Production**

   Diploma Course (One year)

   Diploma in freshwater aquaculture: A candidate cleared all the three certificate courses will be awarded Diploma. However, he has to appear in comprehensive exam for the same.

   Objectives of certificate course

   - To produce a certified cadre of fisheries entrepreneurs through imparting practical oriented certificate course in a substantially short period
   - To provide an authentic and reliable source of information to all the existing and prospective entrepreneurs in the field of fish farming which have very high business potentials and promote entrepreneurship development.

Minimum Qualification: 10th pass

Intake capacity: 30

Details of the proposed courses are enclosed as annexure I.

Dean,
COF, Kishanganj

Annexure I

Proposal
For

Certificate & Diploma Course for Entrepreneurship Development in Fisheries

Background

Fishery is one of the fast growing sectors of Indian economy. An ever increasing number of entrepreneurs, those are adopting fisheries business activities are significantly contributed to its continuous growth. Many a times, the new entrepreneurs are not able to achieve expected success. It is due to lack of adequate knowledge in the field. A large number of educated and unemployed youth are interested to take up a fishery business activity for livelihood earning. But, they fail to do so due to absence of knowledge and other circumstances that neither allowed them to take up a regular degree programme conducted by various educational institutes nor any informal experiential learning. To help the existing and prospective entrepreneurs, following three certificates and one Diploma courses are proposed:

Certificate Course (4 months duration each)

- Certificate Course in Freshwater Aquaculture
- Certificate Course in Fish Seed Production
- Certificate Course in Ornamental Fish Production

Diploma Course (One year)

Diploma in Freshwater Aquaculture: A candidate cleared all the three certificate courses will be awarded Diploma. However, he has to appear in comprehensive exam for the same.

Objectives of certificate course

- To produce a certified cadre of fisheries entrepreneurs through imparting practical oriented certificate course in a substantially short period.
- To provide an authentic and reliable source of information to all the existing and prospective entrepreneurs in the field of fish farming which have very high business potential and promote entrepreneurship development.

Minimum Qualification: 10th Pass.

Intake Capacity: Maximum 30

Study Mode

Both Certificate and Diploma course will be arranged in virtual & offline mode. The theory part will be covered in virtual mode while practical seasons will be arranged at College of Fisheries, Kishanganj.

Course Fee

- Certificate: Rs6000 (Payable in three equal instalments)
- Diploma: Rs15000 (Payable in three equal instalments)
- Diploma (Comprehensive Examination): Rs 2500 (after completing 3 certificate courses).

Medium of Instructions & Examination: The medium of instruction and examination will be bilingual (Hindi & English).

Design of Certificate Course/Diploma Module

Certificate/Diploma course module will be consisted of two parts viz; Part-A and Part-B. The Part-A will be a theoretical section which will be covered in 100 days. It will cover all important information related to that activity and required to set up a successful business. It will enable a candidate to know the business potential of that specific activity, the demand and supply gap, operations & management, economics of operations and finally the funding schemes of developmental agencies (if any). The Part-B will be of 17 days duration of practical knowledge. It will cover all practical aspect related to planning, implementation, management; *etc*. The Part C will cover experience and case study of 3days duration.

Syllabus for Certificate Courses

A: Certificate Course in Freshwater Aquaculture

PART-A: Theory (Knowledge)
Topics
Introduction Basics of fish farming-definition and scope. History of fish farming. Present scenario. Requirements for fish farming(Land,Water,Money & training)
Candidate Species for farming Criteria for selection of suitable fish species Important cultivable fish and shellfish (Indian major carps, exotic carps, air breathing fishes, cold water fishes, saline water fishes, brackish water fishes & freshwater prawns.). General biology(food & feeding habit, growth, reproduction, etc) of cultivable fishes
Construction of Fish Farm Farm-types and objectives Survey, site selection, topography Soil – types, properties, classification, sampling methods and texture analysis. Water quality and quantity Design and construction of different types of ponds (Nursery ponds, Rearing ponds, Production ponds, Stocking, ponds, Brood stock rearing ponds, marketing ponds). Structure of a fish ponds (Pond bottom, Pond depth,Freeboard,Berm,Inlet and Outlet,Spillway,Crown side slope, Dry side slope, Wet side slope Bund height, Bund formation, Bund or Embankment or Dyke,Slope of bund) Location, design and construction of hatcheries, race ways and farm complex.
Types of Fish culture Polyculture culture Monosex fish culture Composite fish culture Sewage fed fish culture Integrated fish culture Extensive ,Semi-extensive & Super intensive
Management of fish culture ponds **A. Pre-stocking management** Repairing & maintenance of pond Removal of aquatic weeds Removal of weed and predatory fishes Application of lime & fertilizers **B. Stocking management** Assessment of suitability of water quality Assessment of natural food availability Monitoring seed health and seed treatment Seed stocking (Size, ratio and numbers) **C. Post- stocking management** Daily management (Feeding) Weekly management (monitoring of water quality, minor repair of ponds). Monthly management (Monitoring fish growth & health Fish treatment, application of manures & fertilizers)

D. Harvesting Different methods of harvesting Size of harvesting Packing and marketing
Systems of Fish Farming Pond culture, pen culture, cage culture, running water culture, zero water exchange system Method and importance of different farming systems
Feed and Feeding Types of feed (natural and supplementary feeds) Criteria for selection of fish feed(Ready acceptability, Easy digestibility, High conversion values, Abundant availability, Low cost) Nutritional requirements of different stages of fish Feed ingredients and their nutritional value Farm made feeds (Method of preparation, advantages and disadvantages) Commercial fish feed (Floating and sinking types)
Fish Health Management Major fish diseases (Nutritional, environmental, bacterial, fungal, and parasitic diseases). Their Control measures and treatment
Integrated Fish Farming (IFF) Definition , Principles, importance and history of integrated fish farming Different types of integrated fish farming (fish culture with plants & fish culture with animals) Methods of integrated fish farming (i.e. Poultry-cum-fish farming, duck- cum-fish farming, pig-cum-fish farming, cattle- cum-fish farming, paddy-cum-fish farming, horticulture- cum-fish farming) Advantages & Disadvantages of different integrated farming systems
Economics of Different Fish Farming Capital Investment Operational Cost Gross income and Net Income
Organic Fish Culture Definition, scope and present status of organic fish culture Principles of organic fish culture Recycling of agro-industrial waste in aquaculture. Use of bio-fertilizers in fish culture
Fish Farmers Welfare Schemes of State & Central Govt. Input subsidy, Saving cum relief , Fishermen's insurance, Fishermen village, *etc.*

PART-B: Practical (Skill)

Topics
Why Fish Culture Fish Demand & Supply Estimation of fish production trends Per-capita fish consumption Nutritional value of fish Role/contribution of fish in Indian economy Employment opportunities is fish farming

Identification & Biological study of Fish

Different types of fishes
Different life stages of fish
Identification of important cultivable fish and shellfish
Study of fish morphology & anatomy
Food habit of different fishes

Fish Farm Construction

Evaluation of potential site for fish farm.
Land survey – chain, compass, level, plane table, and contouring
Water & Soil analysis for farm construction.
Site survey: preparation of site and contour maps.
Design and layout of freshwater and brackish water farms.
Design of farm structure: ponds, dykes, sluices and channels.
Earth work calculation.
Calculation on water requirement

Fish health Management

Identification of discussed fish
Identification of casual organisms
Control & treatment of diseased fish
Handling of diseased fish

Fish Feed

A. Natural Fish Feed

Identification of phyto and zooplanktons
Culture of phyto and zooplankton using organic and inorganic fertilizers
Artemia culture techniques
Culture of infusoria for fish larvae

Supplementary Feed

Identification of locally available feed ingredients
Nutritional value different feed ingredients
Formulation of farm made
Estimation of proximate composition of feeds

Fish Culture in Ponds

Pond Preparation.- Eradication of predator and weed fishes, eradication of aquatic weeds, pond sterilization, sun drying, ploughing, leveling and liming / gypsum treatment of pond bottom, water filling, fertilization.

Seed Stocking - Tests for selection of good quality seed, source & transport of seed, stocking time and density, size of stocking, acclimatization, estimation of survival rate (using survival nets)

Stock manipulation and management, production & maintenance of natural food, supplementary feeding-common feeds used, feeding schedule

Soil and water quality management- Estimation of various soil & water quality parameters for sustainable culture, trouble indicators

Health management, chemicals, antibiotics and probiotics used.

Use of acrators, sampling for estimation of feed requirement, growth and health condition

Harvesting and marketing - Days of culture, time of harvest, methods followed, precautions, considered to maintain quality of product

Methods of packing and transport, market outlets

Fish Production In Enclosures Design & fabrication of different types of fish Cage & Pen Selection of suitable cage & pen fabrication material Selection of suitable site and water body for cage & pen culture Installation of cages & pen Selection of suitable species for cage farming Stocking density Feed , feeding rate & method in cage farming Taking care of fish in a cage Maintenance of cage Harvesting method in cages Estimation of production , productivity and profitability of cage fish farming over open water culture system
Tools and Implements of fish farming Identification and maintenance of following fish farm tools & equipment **Tools** (,Hapa, Buckets, Baskets, Knife, Rake, Rope, Spades, Bamboo poles, Bottom rake or Weedier, Straw rope- Loose & ,Small boat, Balance, scale, etc) **Nets**(Dragnets, cast net) **Equipment** (Aerators, compressor, Air blower, etc.)
Preparation and Maintenance of Fish Farm Records Types of farm record Methods of record keeping Input records Output records Cash flow records Balance sheet
Planning and Project Development Planning and development of project proposal on different aspects of fish farming (Pond culture, hatchery farm, cage culture, *etc*) for financing
Part C: Experience & Case Study
Visit to Fish Production Units Study on the operational aspects of different fish units Preparation of visit report and presentation

B: Certificate Course in Fish Seed Production

PART-A: Theory(Knowledge)
Topics
Introduction Fish breeding-definition, importance and scope. Fish seed resources Present scenario. History of fish Breeding
Site Selection for Fish Hatchery Survey, site selection, topography Soil – types, properties, classification, sampling methods and texture analysis. Water quality and quantity for seed farm Layout design of different hatchery farms Construction of brood fish ,Nursery and Rearing ponds

Fish Hatchery Introduction Different types of hatcheries Operational aspects of different hatcheries
Rearing and Management of Brood Stock Introduction Importance of quality brood fish Methods of quality brood stock development Rearing techniques of brood fish
Carp Breeding Induced breeding, definition, importance and history Sexual maturity and breeding strategies of various cultivable species. Environmental factors affecting breeding Sympathetic breeding. Hypophysation of fishes. Fish pituitary gland – its structure, collection, preservation and preparation of extract for injection, dosages and methods of injection. Synthetic hormones used for induced breeding of carps. Carp breeding protocol
Seed Rearing **Management of nursery & rearing ponds** **Pre-stocking management** Repairing & maintenance of pond Removal of aquatic weeds Removal of weed and predatory fishes Application of lime & fertilizers **Stocking management** Assessment of suitability of water quality Assessment of natural food availability Monitoring seed health and seed treatment Seed stocking (Size, ratio and numbers) **Post- stocking management** Daily management (Feeding) Weekly management (monitoring of water quality, minor repair of ponds). Monthly management (Monitoring fish growth & health Fish treatment, application of manures & fertilizers) **Harvesting** Different methods of harvesting Size of harvesting
Feed and Feeding Types of feed (natural and supplementary feeds) Criteria for selection of fish feed(Ready acceptability, Easy digestibility, High conversion values, Abundant availability, Low cost) Nutritional requirements of different stages of fish Feed ingredients and their nutritional value Farm made feeds (Method of preparation, advantages and disadvantages) Commercial fish feed (Floating and sinking types)
Brood Fish & Fish Seed Health Management

Major diseases of fish brood stock Common diseases of fish seed Control measures and treatment of different diseases of brood fish and seed
Brood Fish and Seed Transportation Introduction Different methods of fish seed and brood fish transportation Chemicals used in live fish transportation Methods of handling ,conditioning , packing & transportation Factor affecting live fish transportation
Catfish Breeding Breeding techniques of catfishes such as magur, pangas & singhi Techniques of catfish seed rearing
Monosex Seed Production of Tilapia Tilapia breeding techniques Protocol for monosex seed production of tilapia
Economics of Different Fish Farming Capital Investment Operational Cost Gross income and Net Income

PART-B: Practical (Skill)

Topics
Identification & Biological study of Fish Identification of important cultivable fish Identification of spawn, fry and fingerling
Fish Farm Construction Water & Soil analysis for farm construction. Site survey: preparation of site and contour maps. Design and layout of freshwater seed farm. Design of brood fish, nursery and rearing ponds, dykes, sluices and channels.
Soil & Water Quality Management Water quality requirements of different fish species Analysis of important water quality parameters (temp., pH, dissolved oxygen, carbon di oxide, alkalinity, hardness, EC, TDS, nitrate, nitrite, ammonia, phosphate Soil quality analysis (water holding capacity, pH, EC, organic carbon, available nitrogen and phosphorus)
Aquatic Weed Management Identification of major pond weed Study on the control of aquatic weeds (manual, chemical & biological)
Aquatic Insects management Identification of aquatic insects Eradication of aquatic insects

C:	
	Weed & Predatory Fishes Harmful effect of weed & predatory fishes Identification of aquatic insects Removal weed & predatory fishes from pond
	Fish Feed **Natural Fish Feed** Identification of phyto and zooplanktons Culture of phyto and zooplankton using organic and inorganic fertilizers: Artemia culture techniques; Culture of infusoria for fish larvae **Supplementary Feed** Identification of locally available feed ingredients Nutritional value different feed ingredients Formulation of farm made Estimation of proximate composition of feeds
	Fish Breeding and Seed Production Preparation of fish seed production work plan Target seed production. Estimate brood stock and input requirements Study of maturity stages in fish. Collection and preservation of fish pituitary gland, preparation of extract for Hypophysation. Management of Brood stock Selection of brooders, acclimatization, induced breeding Recording of breeding indices (fecundity, fertilization, hatching, spawn, *etc.*) Study of fish eggs and embryonic developmental stage. Identification of eggs, spawn, fry and fingerlings of different species. Nursery and rearing pond management. Pre-stocking and post-stocking management, harvesting, packing, transport and supply Fish seed and brood stock transportation Use of anesthetics, disinfectants and antibiotics in fish breeding. Water quality monitoring in fish hatcheries and nurseries.
	Tools and Implements of fish farming Identification and maintenance of following fish farm tools & equipment **Tools** (,Hapa, Buckets, Baskets, Knife, Rake, Rope, Spades, Bamboo poles, Bottom rake or Weedier, Straw rope- Loose & ,Small boat, Balance, scale, etc) **Nets**(Dragnets, cast net) **Equipment** (Aerators, compressor, Air blower, etc.)
	Preparation and Maintenance of Fish Farm Records Types of farm record Methods of record keeping Input records Output records Cash flow records Balance sheet
	Planning and Project Development Planning and development of project proposal on different aspects of fish farming (Pond culture, hatchery farm, cage culture, *etc*) for financing
	Part C: Experience & Case Study
	Visit to Fish Hatchery Units Study on the operational aspects of fish breeding & seed rearing units Preparation of visit report and presentation

Certificate Course in Ornamental Fish Production

Topics

Introduction History of aquarium keeping-Growth of the sector - Current status Scope and prospect of ornamental fishery in India World trade of ornamental fish and export potential
Ornamental Fish Different varieties of exotic and indigenous fishes The habits and habitats of ornamental fishes Biology of ornamental fishes
Fish Aquarium Principles of a balanced aquarium Type of aquarium: Freshwater and marine aquarium Aquarium construction and management
Water Quality Management Important water quality parameters and their optimum range for ornamental fish breeding and rearing Water filtration system. Type of filters: Biological, mechanical and chemical filtration system Important chemicals used in aquarium water quality management. Their doses and method of application
Aquarium Plants Important aquarium plants Role of aquatic plant in aquaria Methods of aquarium plant propagation
Aquarium Accessories and Equipment Toys & decoratives Lighting, heating and aeration
Aquarium Fish Feed & Feed Management Types: Dry, wet and live feeds Common feeds ingredients Preparation of artificial diet: Pelleted feeds, floating and sinking pellets, Feed additives, and Feed storage Culture of live food organisms Use of preservatives and antioxidants
Breeding and Larval Rearing of Selected Species Brood stock management Methods of reproduction in ornamental fishes Identification of male and female brood fish Breeding techniques for selective live bearers (Guppy, molly, platy), egg layers(koi, goldfish, barbs, tetras, etc.) and nest making(fighter, gouramis, chiclets) fishes Simple genetic selection methods for the improvement in traits in ornamental fishes Nursery pond management of ornamental fish
Health Management Common diseases of ornamental fishes. Their control and treatment Bio security at production and rearing site Quarantine: importance and techniques

Establishment of Ornamental Fish Unit Site selection for ornamental fish unit Design and construction of different types of ponds. Different types of rearing systems (cemented tanks, FRP tank, Ferro-cement tanks, and earthen ponds): their shape and size.
Ornamental Fish Enterprise Scope of ornamental fish entrepreneurship Trade regulations and wild life act in relation to ornamental fishes Marketing- Export potential Green certification Project formulation Costing and implementation. Record keeping

PART-A: Practical

Topics
Ornamental Fishes Identification of ornamental fishes (exotic and indigenous fishes) General biological study of exotic and indigenous ornamental fishes Study of ornamental fish trade trends Status of ornamental fish industry in Employment opportunities is fish farming
Aquarium Plants Identification of aquarium plants Methods aquarium plant propagation Culture & management of aquarium plants Packing and transportation of aquarium plants
Aquarium Fabrication introduction Factor to be considered for aquarium constriction Size and shape of aquarium Glass thickness for different shape & size of aquarium Fabrication of all glass aquarium
Aquarium Accessories Identification of aquarium accessories Maintenance and repair of aquarium accessories Fabrication and installation of aquarium accessories
Setting and Maintenance of Aquarium Selection of suitable site for aquarium Select suitable stand for aquarium Take an exercise of setting up of an aquarium Regular monitoring of aquaria for maintaining healthy environment for fishes

Breeding & Rearing of Ornamental Fishes

Brood stock development & management
Study of maturity stages in ornamental fishes
Selection of brooders, acclimatization for breeding
Breeding of live bearers
Breeding of egg layers
Caring young ones : Rearing trials and Management of nursery and rearing systems
Water quality management in breeding and rearing units

Ornamental Fish Feed & Feeding

Artificial Diet

Identification of locally available feed ingredients
Nutritional value different feed ingredients
Formulation of dry & wet feed for ornamental fishes
Estimation of proximate composition of feeds
Storage and preservation fish feed

Live Food

Identification of natural/ live food organisms
Culture of different live food organisms

Feed Management

Feeding rate
Feeding frequency
Feeding timing

Water Quality Management

Analysis of important water quality parameters :Temperature, pH, DO, Co_2, Hardness, alkalinity, Ammonia, Chlorine
Management of water quality using different chemicals, filters, etc.

Ornamental Fish Health Management

Identification of ornamental fish disease: Bacterial, Parasitic, Protozoan, Fungal , Viral, Parasitic, and Nutritional disease of ornamental fish
Prophylactic measures
Preparation of diseases diagnostic chart (Symptom, possible cause, medication and product)

Conditioning, Packing and Transportation of Ornamental Fishes

Size grading of ornamental fishes
Conditioning and quarantine
Packing for long and short distance
Different types of packing material
Packing density of ornamental fishes
Use of anaesthetics in ornamental fish transportation

Garden Pool

Designee of garden pools
Suitable ornamental fishes for garden pools
Important aquatic plants for garden pool : Their identification and propagation techniques
Management of garden pool

Preparation and Maintenance of Ornamental Fish Unit Records

Types & methods of record keeping
Input records
Output records

Part C:	Cash flow records Balance sheet
	Planning and Project Development Planning and development of project proposal on different aspects of ornamental fish (Breeding unit, Rearing Unit, Ornamental fish shop, national & international trade, etc.) for financial assistance

Experience & Case Study

Topic
Visit to Ornamental Fish Production Units & Public Aquaria Study on the operational aspects of different ornamental fish units and public aquaria Preparation of visit report and presentation

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