

# INFORMATION BULLETIN

## Ph.D. Programme (2019-2022)



**ICAR- CENTRAL INSTITUTE OF FISHERIES EDUCATION**  
(Deemed-to-be University)  
Panch Marg, Off Yari Road, Versova,  
Andheri (West), Mumbai-400061  
Tel. No. 022-26361446/7/8, Fax No. 022-26361573  
Web Site : [www.cife.edu.in](http://www.cife.edu.in)  
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## **Important Information**

<b>Start date of Online Application</b>	<b>: 06.05.2019 (Monday)</b>
<b>Last date of submission of Online Application</b>	<b>: 05.06.2019 (Wednesday)</b>
<b>Last date of receipt of Hard Copy of filled in Application form along with two copies of SoP (By Speed Post)</b>	<b>: 18.06.2019 (Tuesday)</b>
<b>Last date of receipt of Hard Copy of filled in Application form along with two copies SoP for Candidates from J &amp; K Andaman &amp; Nicobar Island and North Eastern Region (By Speed Post)</b>	<b>: 30.06.2019 (Sunday)</b>
<b>Issue of Admit Card</b>	<b>: 15.07.2019 (Monday)</b>
<b>Written Examination</b>	<b>: 28.07.2019 (Sunday)</b>
<b>Interview</b>	<b>: 29.07.2019 (Monday)</b>
<b>Final Result on CIFE Website</b>	<b>: Last week of Aug., 2019</b>
<b>Commencement of First Semester</b>	<b>: 01.09.2019</b>
<b>Date of Registration/Admission</b>	<b>: Sept., 3-5, 2019</b>
<b>Date of Registration/Admission with late fees (Amount of late fees- Rs. 1,000/-)</b>	<b>: Sept., 6-7, 2019</b>
<b>Date of Registration/Admission for wait-list candidates</b>	<b>: Sept.,9-10, 2019</b>
<b>Last date of Ph.D. Admission (Deadline)</b>	<b>: 10.09.2019 (Tuesday)</b>

*All the candidate are advised to visit CIFE website ([www.cife.edu.in](http://www.cife.edu.in).)*

*For further enquiries: Contact - 022-26361446/7/8, Ext. 669*

*Mobile - 09819144313*

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### INFORMATION BULLETIN FOR Ph.D. (2019-2022) ENTRANCE TEST

#### 1. ABOUT THE INSTITUTE

The Central Institute of Fisheries Education (CIFE), Mumbai is a flagship university under Indian Council of Agricultural Research (ICAR), New Delhi contributing in upland research in fishery science. Two campuses of the university are centrally located at about a distance of 10 Km from the airport and 4 Km. from nearest railway station. Since its establishment in 1961, the institute is contributing in fisheries education and research by offering Masters and Doctoral Degree programmes besides conducting need based short-term training programs. The teaching and research programmes are undertaken by experience and learned faculty of the institute.

The teaching and research activities of the institute are pursued in Six Divisions:

1. **Aquaculture**
2. **Fisheries Resources, Harvest and Post-Harvest Management**
3. **Fisheries Economics, Extension and Statistics**
4. **Fish Nutrition, Biochemistry and Physiology**
5. **Fish Genetics and Biotechnology**
6. **Aquatic Environment and Health Management**

The Divisions/Laboratories of University are equipped with modern instrumentation facilities. Other facilities include a fully networked library with computers and Internet facilities, Photography and audio-visual services, Engineering and Electronics workshops, Aquarium, Museum etc.

The Institute also has research and training facilities at its **Regional Centers** located in four regions of the country. They are:

- CIFE Centre, Kakinada, Near Old Burma Shell, Beach Road, Kakinada, - 533007 (Andhra Pradesh)
- CIFE Centre, Rohtak, Lahli, Via Anwal, Rohtak – 124411 (Haryana)
- CIFE Centre, Kolkata, 32 G.N.Block, Sector – V, Salt Lake City, Kolkata-700009 (West Bengal)
- CIFE Centre, Powarkheda, Distt. Hoshangabad – 461110 (Madhya Pradesh)
- CIFE Centre, Motipur, Bihar

The Institute has a library which houses more than 36,771 books, 135 e-books, 3665 e-journals, 29 foreign and 52 national journals along with online access to reputed journals (both national and international) through CeRA (Consortium of e-Resources in Agriculture). Apart from these, hostels with modern infrastructural facilities, Gymnasium, Indoor and outdoor sports facilities, regular transport service between two campuses are available. A new international hostel is also established.

Oceanographic research and training programs of the Institute are carried out onboard its training-cum-research vessels M.F.V. Saraswati and M.F.V. Narmada.

## **2. Academic & Research**

The Institute offers Ph.D. programmes under following disciplines:

- 1) Fisheries Resource Management
- 2) Aquaculture
- 3) Post-Harvest Technology
- 4) Fish Genetics
- 5) Fish Biotechnology
- 6) Fish Nutrition & Feed Technology
- 7) Fish Physiology and Biochemistry
- 8) Fisheries Economics
- 9) Fisheries Extension
- 10) Aquatic Animal Health Management
- 11) Aquatic Environmental Management

The Institute follows the credit system pattern of evaluation for course and research work. The course work is of one year duration (two semesters of six months) and it is a mandatory part of the Ph.D. programme.

Though a major part of the course and dissertation research work in the above courses is carried out in C.I.F.E. but facilities for field oriented research can be availed at its sister institutions;

- i. ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata-700120, West Bengal
- ii. ICAR-Central Marine Fisheries Research Institute, Tatapuram, Kochi - 682 014, Kerala
- iii. ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar-751 002, Orissa.
- iii. ICAR-Central Institute of Brackishwater Aquaculture, Santhome High Road, Chennai - 600 028, Tamil Nadu
- iv. ICAR-Central Institute of Fisheries Technology, Willington Island, Matsyapuri, Kochi - 682 029, Kerala
- vi. ICAR-National Bureau of Fish Genetic Resources, Lucknow- 211 006, Uttar-Pradesh
- vii. ICAR-Directorate of Coldwater Fisheries, Post Box. No.28, Roop Nagar, Near Shivala Nursery, Bhimtal - 263 136, Dist. Nainital, Uttar-Pradesh

The Institute has Memorandum of Understanding with National Institute of Oceanography, Goa; Central Drug Research Institute (C.D.R.I.), Lucknow, Industrial Toxicological Research Centre (I.T.R.C.), Lucknow and Central Salt and Marine Chemicals Research Institute (C.S.M.C.R.I), Bhavnagar, Ramakrishna Mission and Adikavi Nannaya University and Chhattisgarh Kamdhenu Viswavidyalaya DURG and various Central and State Universities where students can avail required research facilities.

### 3. AVAILABILITY OF SEATS

Admission to the **Doctoral degree programme (2019-2022) Batch** in different disciplines of fisheries, offered at **ICAR-Central Institute of Fisheries Education, Mumbai**, will be finalized as per **the marks obtained** by the candidate in the **All India Competitive Examination** and **Personal Interview**.

Numbers of seats available for **Ph.D. (2019-2022) Batch** are as follows:

S. No.	Name of Discipline	No. of seats	Reservation (2019-22)
1	Fisheries Resource Management	6	1-(SC/ST), 2-(OBC)
2	Aquaculture	9	1-(SC/ST), 2-(OBC)
3	Post-Harvest Technology	4	1-(SC/ST), 1-(OBC)
4	Fish Genetics	3	1-(OBC)
5	Fish Biotechnology	3	1-(ST/SC), 1-(OBC)
6	Fish Nutrition & Feed Technology	3	1-(SC/ST), 1-(OBC)
7	Fish Physiology and Biochemistry	3	1-(SC/ST), 1-(OBC)
8	Fisheries Economics	3	1-(ST/SC), 1-(OBC)
9	Fisheries Extension	3	1-(SC/ST)
10	Aquatic Animal Health Management	4	2-(OBC)
11	Aquatic Environment Management	3	1-(ST/SC), 1-(SC/ST),
<b>Total</b>		<b>44</b>	<b>22-(Gen), 10-(7SC, 3ST), 12-(OBC)</b>

**Seats for Divyang will be allotted horizontally against the category (Gen/SC/ST/OBC) to which they belong as per Govt. of India rules.**

**N.B.: The candidate should opt for any one of the discipline and he/she is required to appear for the entrance test in the same discipline. Option once exercised cannot be changed under any condition.**

Numbers of seats are tentative and likely to be changed without prior notice.

\* Separate entrance tests will be conducted for different disciplines. A candidate can appear in any one discipline of his / her choice.

\*\* Seats are reserved for first category. In case suitable candidate is not found from that category then seat will be filled through the other reserved category and in case a candidate of reserved category is not found suitable, the seat will be treated as vacant. Reservation for OBC category would be provided as per the Government of India / ICAR Institute issued from time to time. There is no provision for inter changing of OBC Seats with SC/ST Category. There is a provision for admitting **In-Service candidates from ICAR Institutes/SAUs/ CAUs/ State Fisheries Department. In-service candidates will be required to qualify in the written entrance test.** Candidates with **CSIR/UGC/DBT/ICMR/ICAR-SRF with fellowship and the candidates** cleared through **other national level fellowship** will be **admitted over and above to the allotted seats.** Hence, they are requested to mention the category and enclose a certificate.

#### **4. ELIGIBILITY**

**B.F.Sc. & M.F.Sc. (4 +2 yrs) or B.Sc & M.Sc. (3 yrs) from CIFE (till 1995), with M.F.Sc./M.Sc. OGPA 7.0 out of 10 and 3.5 out of 5 FOR General / OBC candidates (OGPA for SC/ST candidates is 6.5 out of 10 and 3.25 out of 5).**

**(OR)**

D.F.Sc. from CIFE provided the candidate holds a Bachelor's degree in biological science and has two years of experience in fisheries development work after obtaining D.F.Sc.

In case of sponsored candidates, those holding M.Sc. in Fish and Fisheries and related disciplines with at least two years experience in fisheries development work are also eligible to apply.

#### **AGE LIMIT**

The **minimum age** for admission shall be **22 years as on 31<sup>st</sup> August 2019.** No relaxation in age limit is permitted.

#### **5. COURSE LOCATION**

Candidates have to complete their course work at CIFE Hqrs, Mumbai. However, for research work they may be asked to work anywhere in India.

#### **6. DURATION OF THE PROGRAMME**

***The minimum residential requirement for Ph.D. programme is three years.***

#### **7. ACADEMIC CALENDAR**

An academic year will be of two semesters of 21 weeks duration.

**I Semester - September – February**  
**II Semester - March – August**

## 8. PROCEDURE FOR APPLICATION

8.1 (i) **Candidates can apply online. Application fees is Rs.1,000/- (for General/OBC category) and Rs.500/- (for SC/ST/Divyang category). Application and prospectus will be available on CIFE website. The candidate has to visit [www.cife.edu.in](http://www.cife.edu.in) and click the option of filling online application Ph.D. The candidate can download prospectus and then fill his/her form online. He/She need not purchase separate prospectus. During filling of prescribed online form, candidates have option for making fee payment through Bank challan of State Bank of India or credit / Debit card using e- Payment of SBI.**

(ii) **Making payment through Credit / Debit card using e- Payment / fee collection of State Bank of India**

**During online filling of the form, candidate have to pay the fees through Credit card / Debit card using facility of State Bank of India. In this case the candidate will make payment directly through his computer and will not be required to visit the Bank. Receipt of such payments / application is confirmed immediately.**

(iii) **Making payment through Bank Challan**

**After filling the Online Application, candidate has to take a print out of his/her filled up application and bank challan (in 3 copies) through which he / she has to deposit cash (fees) in the nearest State Bank of Indian Bank branch. Bank will return two copies of challan duly stamped. Candidate will retain one copy of the challan. He/she will enclose the second copy (duly stamped by the bank) with his / her filled in computer generated confirmation copy printout and send it to AAO (PG), CIFE, Mumbai by post at the given address.**

8.2 The Application form bears a **serial number at the top right corner on page no. 1**. This number, as well as the main discipline to which the admission is sought must be quoted in further correspondence.

8.3 **The Entrance-Test will be held at ICAR-CIFE, Mumbai.**

8.4 Online application should be downloaded and a **hard copy** of the same along with **proof of payment of fees** and following **self-attested certificates** should be send by Speed post/ Registered post/Courier to the **Asstt. Admn. Officer (PG) Section, ICAR-CIFE, Mumbai on or before 18.06.2019.**



- (a) Proof of the Date of Birth.
- (b) Certificate of Examinations passed starting from Matriculation / Higher Secondary / PUC / Pre degree to Master's Degree.
- (c) Mark sheets in detail indicating percentage of marks, division / class obtained etc. for all the above examinations.
- (d) Course completion certificate from the Registrar of the University / Controller of Examination / Dean / Principal in case of candidates from the University / College following the course-credit system. Candidates who have completed their degrees in Grade Point System should mention the OGPA / CGPA only.
- (e) Character Certificate either from the Principal / Dean / Registrar or Head of the Institute / University last attended.
- (f) A candidate who is appearing in the qualifying examination prior to the Entrance Test, or whose result is not declared can also apply and appear in the said test but he/she shall have to submit their final PG result/ mark sheet latest by **21<sup>st</sup> August, 2019** otherwise his/her candidature for admission will be cancelled.
- (g) Scheduled Caste / Scheduled Tribe / OBC candidates are required to submit certificate in the Performa given in Annexure from the prescribed Authorities, **Applications without such certificate will be considered against unreserved seats only.**
- (h) Provision for **photograph and signature** uploading.
- (i) Two copies of SoP to be submitted.
- (j) Copy of the Receipt generated for Proof of Payment of Fees

**Note :** (a) **Applications received after the due date will be rejected.** Postal delay will not be accepted as a legitimate reason to entertain applications received after the last date.

(b) The Original Certificates and Mark Sheets are to be produced at the time of admission. Candidates who does not possess the Original certificates and mark sheets will not be admitted.

(c) Admitted students coming from other Universities/Institutes will be required to submit the **Migration Certificate in original within 2 months of joining the course.**

8.5 For candidates coming from a University following the course credit system or otherwise, the application will be considered for undertaking the Entrance Examination even though the final viva-voce examination has not been completed, provided the full transcript is enclosed showing the overall grade point average / marks obtained along with a certificate from the Registrar of the University / Controller of Examinations/ Principal of the College / Dean of Faculty to the effect that the candidate has completed successfully all the prescribed course work. (Certificate from officials other than mentioned above will not be entertained).However, a Course Completion Certificate has to be produced at the

time of the Entrance Test from the Competent Authority as mentioned above, failing which the candidate will not be allowed to appear in the Test.

8.6 **Admit cards for the Entrance Examination to be held on the 28<sup>th</sup> July, 2019 (Sunday) will be issued from CIFE 15<sup>th</sup> July, 2019 onwards.**

8.7 **Candidates shall have to arrive at the place of Examination and Interview at their own expenses and make their own arrangement for stay. In case there is any change in the venue / date of Entrance Test due to some unforeseen reason, the changed venue / date will be intimated on CIFE, Website.**

8.8 If a candidate is found to furnish wrong information or suppress any relevant information, the application is liable to be rejected and admission made to a course on the basis of such information will stand terminated without refund of fees etc., if already deposited.

## 9. GENERAL INFORMATION FOR ENTRANCE TEST

An All India Competitive Written Examination for admission to Ph.D. in Fisheries shall be held on the Sunday 28<sup>th</sup> July 2019 at Mumbai. The candidates who fulfill the minimum eligibility criteria will be permitted for the **Entrance-Test**. To test the knowledge of the candidate in the discipline to which he/she sought the admission, a written test covering the subject matter shall be conducted before the interview. The details are given as under:

	Written Test	Interview	Total
Contents	General Topics & Subject matter	-	-
Duration	2 hrs.	-	-
Max. marks	150	-	-
<b>Qualifying marks for</b>			
General / OBC	<b>50%</b>	-	-
SC/ST/ PH	<b>45%</b>	-	-
In-service General/OBC	<b>45%</b>	-	-
In-service SC/ST/ PH	<b>40%</b>	-	-
<b>Weightage</b>	<b>80%</b>	<b>20%</b>	<b>100%</b>

It will be in the interest of the applicants that they should verify their eligibility as mentioned in the above sections before they submit their applications along with the Application Fee and appear in the Entrance-Test. Applicants not satisfying the eligibility requirements shall not be permitted to appear in the Entrance-Test.

**The examination will be of 2 hrs. duration. The Question Paper will have two parts: one of 50 questions compulsory for all disciplines and second of 100 questions for respective discipline. There will be no negative marks.**

Interview for the **qualified candidates** will be conducted after the Entrance-Test, i.e. on **29<sup>th</sup> July, 2019**.

**A minimum of 50% marks in Entrance Test as well as in Interview** should be obtained by the candidates **to be considered for admission**.

## **10. SELECTION OF CANDIDATES**

Permission to sit for the Entrance Test and to appear for the Interview is by itself no guarantee of admission to the Ph.D.

**List of eligible candidates for Ph.D. Entrance Examination** will be displayed on the **website by the end of Second week of July, 2019**. No intimation will be sent to those who are not selected.

**Also, Final Result of Ph.D. (2019-22) Batch** students' admission will be displayed on the **website by the Last week of Aug, 2019**.

The selection procedure through Entrance Test is not applicable for holders of ICAR / CSIR / UGC and other national level Fellowships. Such fellowship holders will directly qualify for admission to the relevant discipline through interview.

The selected candidates are required to appear for medical checkup by the Institute Medical Officer, before they are enrolled / admitted to this Institute. They will be allowed to join the Institute for pursuing further studies only after they have been declared physically fit by the Institute Medical Officer. The fees for physical fitness certificate shall be paid by the candidates.

## **11. LAST DATE FOR ENROLMENT / ADMISSION**

***All selected candidates have to execute a Surety bond of Rs.50,000/- compulsorily at the time of registration at the University. If the student leaves the studies without completion of Ph.D. of three years or his/her being rusticated/ removed from the University, the amount of Rs.50,000/- and interest will have to be paid.***

All selected candidates are required to enroll as per the schedule given on the page reflecting important information by completing the formalities and paying the requisite fees. If the selected candidates do not report on or before above date, their selection will stand cancelled and seats will be offered to the candidates in the wait list. Wait listed candidates should secure admission positively before the date prescribed by the competent authority.

## 12. FEES STRUCTURE

The following are the prescribed fees for Ph.D. programme of the Institute.

S.No.	Description of fee and other charges	Charges
1)	Caution money	Rs. 2,000.00 (Refundable)
2)	Registration fee	Rs. 100.00
3)	Tuition fee (Annual)	Rs. 10,000.00
4)	Hostel charges (Annual)	Rs. 2,000.00
5)	Students Union fee	Rs. 300.00
6)	Magazine	Rs. 100.00
7)	Welfare Fund	Rs. 200.00
8)	Sports Fund	Rs. 200.00
9)	Cultural and literary activities fee	Rs. 200.00
10)	Examination fee	Rs. 1,000.00
11)	Thesis evaluation for Ph.D.	Rs. 2,000.00
12)	Identity card fee	Rs. 100.00

### Other charges

i)	Provisional Degree Certificate	Rs. 200.00
ii)	Original Degree Certificate	Rs. 1,000.00
iii)	Transcript	Rs. 200.00
iv)	Duplicate Degree	Rs. 800.00
v)	Award of Degree in absentia	Rs. 1,000.00
vi)	Late registration	Rs. 500.00
viii)	Make-up examination	Rs. 800.00
viii)	Alumni Association	Rs. 500.00
ix)	Migration Certificate	Rs. 100.00
x)	Medical Insurance	Rs. 2,000.00

Students belonging to the SC/ST are exempted to pay the Tuition Fees under the Fees Structure. However, they are liable to pay the rest of the fees. Each student is required to register at the beginning of each semester on a notified date with a grace period as provided in the Academic Regulations till the completion of the degree requirements, failing which he/she will not be registered for the semester. Registration for newly admitted students is a part of the admission procedure and shall be governed by the admission rules.

## 13. ORIENTATION

An orientation programme for new batch of students will be arranged to acquaint them with the rules, regulations and norms pertaining to academics, examination, hostel etc. They will be also apprised about the facilities available in the Institute and other student's welfare activities.

#### **14. RESIDENCE**

The Institute has separate hostels for male and female students at its headquarters in Mumbai. Students seeking admission to the hostel must apply separately at the beginning of each academic year in the prescribed form available at Warden's Office of the respective hostel.

Students admitted to the hostel shall abide by the decision of the Director / Warden with respect to the Hostel Rules. A copy of the hostel rules will be provided at the time of admission. Those violating the hostel rules will be liable for expulsion from the hostel.

#### **15. GENERAL CONDITIONS**

There is no provision for scrutiny or revaluation of answer books of the Entrance Examination and the result regarding admission as declared by the Institute shall be final.

The selected candidates should join the course by the date indicated in the admission letter. No interim enquiries will be entertained.

The right to admission or the right to cancel the admission of a candidate at any stage is vested with the Institute if it is found that the information furnished by the candidate is not true or is incomplete.

Admission to the Institute implies acceptance by the student and his/her parents / guardians of all provisions given in the Bulletin or any change in the Institute Rules, Regulations, Fees etc. modified from time to time.

All requirements of Ph.D. degree must, however, be completed within **5 years** of admission for regular students and **6 years** for In-Service candidates, failing which the name of the student will be removed from the rolls of the Institute.

The information given in the Bulletin is only for general guidance and could be modified /changed from time to time by the Institute.

The Information Bulletin shall not be treated as a legal document.

#### **16. FELLOWSHIP**

There is a provision for awarding Institutional fellowship to selected candidates including In-service candidates as per ICAR rules. However, the candidates who passed the National Entrance Test/SRF conducted by ICAR/ASRB or CSIR/UGC/DBT/ICMR/NFHE/MANF are eligible for the Fellowship of the above bodies as per rules.

## 17. REFUND OF CAUTION MONEY AND OTHER DEPOSITS

Refund of caution money payable to students should be claimed by them within three years of the completion of the course. Claims thereafter will not be entertained. (Those desirous can relinquish the claim and give an application to be a life member of the Alumni Association of the Institute).

**Fee (other than the refundable deposits) once paid will not be refunded under any circumstances.**

## 18. FOREIGN STUDENTS

The application of foreign students for admission shall have to be forwarded through their respective Embassies at New Delhi or through the respective Indian Missions abroad to the **Secretary, DARE, Govt. of India, ICAR, Krishi Bhavan, New Delhi-110 001** and their candidature shall be considered only if they are sponsored by their Government or Government of India.

The eligibility for admission of sponsored foreign students will be decided by the Equivalence Committee of CIFE. They should possess the requisite Master's degree in the concerned discipline or its cognate branches. A good knowledge of English is essential. A certificate of the candidate's proficiency in English, issued by the respective Indian Mission abroad, should accompany their application for admission. Further the foreign students are required to be in possession of student's visa.

**The Institutional Economic Fee of US \$ 4000 per annum is to be paid besides other fees as per the requirements of CIFE.**

The last date for receipt of applications, results and mark sheets from the applicants who are foreign nationals but are resident in India will be the same as prescribed for the Indian applicants for admission through open competition.

The Admission of Foreign students shall be finalized without any interview. Foreign students who are already residents in India, will, however, have to appear for Entrance Examination and Interview. Candidates sponsored by International organization like the Agricultural Development Council, the Food and Agricultural Organization (FAO) of the United Nations, United Nations Educational Scientific and Cultural Organization (UNESCO) etc. shall be considered for admission at the Central Institute of Fisheries Education provided such a request is received through the ICAR / DARE fulfilling the conditions as prescribed from time to time by the Competent Authority. Their cases shall be considered along with the other candidates without giving them any concession in minimum marks but they shall be exempted from appearing in the Entrance Examination and Interview.

As per the directive from the Govt. of India, Ministry of Family Welfare, New Delhi, health check-up for foreign students including that for AIDS, has been introduced. It has been laid down that foreign students will be provisionally admitted. Their admission will be confirmed on production of fitness certificate from the competent medical authority.

## 19. FINAL DECISION OF ADMISSION

The decision of the **Director/Vice-Chancellor, ICAR-Central Institute of Fisheries Education, Mumbai** shall be final regarding admissions and other matters.

The Director may summarily cancel the registration of any student or group / batch / class of students who violate(s) the rules and regulations of the Institute or whose continuance in the Institute would not be in the interest of the Institute.

## 20. SYLLABUS FOR ENTRANCE EXAMINATION

For admission to **Ph.D. programme in** Fisheries Resources Management / Aquaculture/ Post-Harvest Technology/ Fish Genetics/ Fish Biotechnology/ Fish Nutrition & Feed Technology/ Fish Physiology & Biochemistry/ Fish Economics/ Fisheries Extension/ Aquatic Animal Health Management/ Aquatic Environment Management, **written entrance examination** will be of **objective type only**.

### (a) **General Topics in Fisheries and Aquaculture (compulsory for all fisheries disciplines)**

Fisheries resources of world and India; Important commercial fishery resources of India and their impact on economy; Aquaculture of commercially important freshwater, brackish water and marine finfish and shellfish; Fisheries and aquaculture related developmental Programmes in India; Domestic and export marketing of fish and fishery products, trends, channels, trade and non-trade barriers; IPR issues; Contribution of fisheries and aquaculture to the food, income, GDP and livelihood securities; Common property resource management in fisheries and aquaculture; Aquatic biodiversity; Principles of fish genetics - Mendelian genetics, laws of inheritance, linkage; mutation; Fish biotechnology - structure of DNA and its replication, genetic code, transgenics and their implications and regulations; Common fish diseases; Feeding behavior of fish; Fish food organisms - phytoplankton and zooplankton; Feed and feeding management in aquaculture; Institutional finance in Fisheries; Fisheries extension methods and approaches.

(b) **Compulsory Syllabus discipline wise**

**Fisheries Resource Management**

**World Fisheries** - Present status of world fisheries utilization and demand.

**Fishery Hydrography** - Hydrology of the continental shelf around India, Fisheries oceanography, physico-chemical and biological parameters related to fisheries, primary production, thermocline, carbon cycle, nitrogen cycle, phosphorus cycle, food chain and web, micronutrients in the water and soil. Pollution aspects.

**Marine Fisheries of India** -Pelagic demersal fishery resources, their exploitation area, season, important species, Production, potential resources, efforts, determination of age, mortality, yield per recruit, maximum sustainable yield and stock-recruitment relationship.

**Inland Fisheries of India** - Inland fisheries resources of India, riverine fisheries Of India, Management and development of reservoir and lakes fisheries resource Of India. Their conservation and management.

**Fishing Craft & Gear** - Mechanized and country craft, efficiency and mode of operation.

**Fish Processing & Marketing** - Chemical composition of fish causes of fish spoilage, evaluation of fish freshness, preservation, processing and marketing.

**Extension, Economics and Statistics** -Extension techniques for marine fisheries, and economics of capture fisheries and statistical method in management of capture fisheries.



## **Aquaculture**

**World Fisheries** - Present status of world fisheries, utilization and demand of fish and fish products.

**World Aquaculture** - Status of world aquaculture, production trend, important Cultivable species of finfish and shellfish, aquatic plants and their culture practices.

**Fish/Shellfish** - Selection of species, biology of commercially Aquaculture important species, culture of finfishes, crustaceans, mollusks, sea weeds, availability of seed, hatchery practices and management, monoculture, polyculture, integrated farming system and economics of aquaculture.

**Aquatic Environment** - Physico-chemical parameters of water, soil and their Interaction in aquaculture ecosystems, management of water and soil qualities for sustainable aquaculture production, nutrient cycles, principles of aeration, Chlorination, Ozonation and U.V. radiation. Aquatic pollution, types of pollution, pollution indicators, mitigation measures and environment impact assessment study.

**Nursery and Grow out** - Farm construction, pond preparations, fertilization, feeding, soil- water management, stocking and management, culture in ponds, pens and cages, sea ranching and production economics.

**Seed Production and Hatchery Technology** - Natural seed resources and its management, collection techniques, hatchery seed production and management, hypothesis of spawning and induced breeding, larval rearing, seed transportation and economics.

**Fish Nutrition** - Feed composition, feed formulation, supplementary feeds and feeding methods for finfish and shellfish, feed dispenser, protein, fat, amino acid and micro-nutrients requirement of culturable finfish and shellfish, methods of feeding. Anti-nutritional factor in aquatic feeds. Live feeds and artificial feeds for larviculture.

**Fish Pathology** - Common fish diseases and their control, bacteria, virus, protozoan and metazoan-parasites, symptoms of diseases and prophylactics.

**Genetics and Biotechnology** - Biochemical genetics; polymorphisms, gene action and allele expression, manipulations of chromosome sets; gynogenesis/ androgenesis, polyploidy. Control of sexuality, gametic manipulations and cryopreservation. Gene cloning technology and its applications in mariculture. Genetic improvement of aquaculture candidates through selective breeding/ hybridization / transgenesis.

**Aquaculture Economics, Extension and Statistics** - Extension techniques for aquaculture, economics of aquaculture. Projects feasibility analysis, marketing aspects of aquaculture, products and transfer of technology programs in fisheries and statistical techniques in aquaculture

## **Post-Harvest Technology**

Amino acids – structure and quality of protein, digestibility, primary, secondary, tertiary, quaternary structure of protein and denaturation of protein.

Fish oil, body oil, liver oil, fatty acid composition of fish oils, PUFA and HUFA in fish oil, rancidity, antioxidants and vitamins.

Staining of bacteria, nutrition of bacteria, effect of environment on bacteria, growth phase of bacteria and microbial changes during icing, freezing and curing.

Factors affecting quality of fresh fish, handling of fish and board fishing vessels, chill storage of fish, shelf life, storage method, insulated boxes, heat load calculation and ice as a cooling medium.

Freezing – freezing curve for fish, different types of freezers, quality changes during frozen storage and unit steps in freezing.

Rate of drying, unit steps in drying of fish, defects in dried products, mechanical driers and solar driers.

Canning preservation of fish, sterilization and commercial sterilization, defects in canned products and unit steps in canning.

Quality assurance in fishery products, HACCP – principles of HACCP and its implementation.

Fishmeal and different fisheries products, chitin, chitosan, fish sauce, fish silage and fish hydrolyzate.

Hurdle technology, modified atmosphere packaging, transportation of fish and value added products.

## **Fish Genetics**

### **Principal of Genetics and Breeding**

Historical development of genetics, Physical basis of heredity. Significance of mitosis and meiosis; Mendelian principles-importance, interpretation, scope and limitation. Modification of Mendelian ratio. Sex determination and development; Modification of inheritance, Multiple alleles. Linkage and crossing over, recombination, interference. Modern concept of gene. DNA as genetic material - structure, chemistry of nucleic acids. Genetic code and protein synthesis. Transfer and regulation of genetic information. Pleiotropy, modification, penetrance. Mutation-natural and induced, mutagenic agents and fate of mutant allele in the population.

### **Quantitative Genetics**

Hardy Weinberg principles-deduction and test of equilibrium, application of the equilibrium law. Equilibrium populations-properties. Equilibrium points in case of multiple alleles more than one loci and linked loci. Attainment of equilibrium by non-equilibrium population; when gene frequencies are different in two sexes for autosomal and sex linked genes. Change in gene frequency and forces affecting equilibrium points under migration, mutation and selection. Effect of small population on gene frequency on populations in approximate equilibrium. Theory of path coefficients and analysis. Basis of relationships-independent and correlated causes; path relation between parent and offspring, collateral relatives, etc. Inbreeding - increase of homozygosity, random fluctuation of gene frequency, genetic drift, effective population size. Pedigreed populations and close inbreeding. Quantitative and qualitative traits-mode of inheritance and continuous variation. Components of phenotypic value-population mean, genotypic value, average effect of gene and gene substitution. Breeding value, dominance deviations interaction deviations. Components of variation-additive non additive environment genotype and environmental interaction. Biometrical relationship among relatives-genetic, environment and phenotypic covariances. Genetic parameters and their usage in fish breeding. Selection and its effect on population structure Intensity of selection, measurement of response to selection, methods of selection and their relative efficiencies, genetic gain, correlated response. Utilisation of non-additive genetic variance; specification of heterosis-theories, estimation of heterosis under additive dominance model and usage in fish production. Maternal effect Diallel mating: scale effects and their estimation; interpretation of genetic components. Bidirectional selection and its implications in performance improvement. Aids to selection; methods of selection. QTL and MAS (Quantitative Trait loci and Marker Assisted Selection). Construction of selection indices; sire and dam evaluation. Selection experiments and genetic advance in various fish species. Development of new strains/ synthetic population. National breeding plans. Trends in fish breeding research. Threshold characters and their importance. Selection procedure for threshold characters.

## **Cytogenetics and molecular Genetics**

Range of chromosomes in finfish and shell fish. Chromosomal aberrations-inherited and induced, structural and numerical, karyotyping of chromosomes. Chromosome banding G- C-, NORs Restriction Enzyme banding; Fluorescent In Situ Hybridization. Sister chromatid exchanges. Cytogenetics and evolution, genetic and evolutionary implication of chromosomal aberrations and their implications on economic traits. Cytogenetic Engineering Triploidy and tetraploidy Induction, androgenesis, gynogenesis, their importance in fish breeding and aquaculture production. Role of molecular genetic tools (Alozyme and DNA markers) in stock structure analysis and aquaculture.

## **Fish and Shell Fish Breeding**

Population and production statistics of cultivable finfish, shellfish and ornamental fish breeding. Current status of aquaculture in world and India. Quarantine procedures, Tagging and maintaining breeding records. Performance; Growth, productive and reproductive traits and their inheritance. Study of growth curves and their components. Influence of non genetic factors on growth. Endocrine control of reproduction; Synchronisation of spawning. Estimation of heritability and repeatability. Phenotypic, genetic and environmental correlations among various economic characters and their role in formulation of breeding strategies. Brood stock management. Inbreeding depression and heterosis in various economic characters. Ornamental fishes as models in genetic research. Introduction to bioinformatics and various software packages. Data base relevant to fish genetics and breeding. Packages for genetic data analysis.

## **Fish Genetic Resources Conservation**

Survey and geographic distribution of Marine, Brackish-water Freshwater and Cold water fish gentic resources. Threatened aquatic species of India and world and their status. Technical problems associated with conservation and preservation of aquatic species. Breeding strategies for threatened species. National and international programs and strategies for conservation of fish genetic resources. Cryopreservation of sperms, eggs and embryos. Factors threatening indigenous species. IPR issues and patenting of genetic resources. Regulation regarding introduction of exotic germplasm.

## **Fish Biotechnology**

Genome organization in prokaryotes and eukaryotes, structure and replication of DNA, proteins and enzymes in DNA replication, telomerase and chromosome replication, recombination, mutation, DNA repair, gene and operon models, promoters and regulatory elements, transfer of genetic material, transformation, conjugation and transduction, transcription in prokaryotes and eukaryotes; translation in eukaryotes and prokaryotes, genetic code, wobble hypothesis, genetic code in mitochondria, codon bias, post translational modifications. Restriction and DNA/RNA modifying enzymes and their application; Vectors – plasmids; cosmids; Yeast artificial chromosomes; Adapters and linkers; Molecular cloning; strategies to construction genomic and cDNA libraries; Screening of libraries. Nucleic acid and protein sequencing; Nucleic acid probes and their application; Recombinant expression systems and application. Genome analysis and manipulations in fish and shell fish. Chromosomal and gene manipulations transgenic fish. Recombinant biologicals and their importance in fisheries.

Immune system of shell fish and finfish, characterization of antigen, production and purification of antibodies (polyclonal & monoclonal), complement system, Immunodiagnosics, Immunoglobulins and their functions, CMI & Humoral Immunity, Vaccine and Immunization in fish, Electrophoresis and Western blotting, Cell and tissue culture techniques, PCR.

Production of single cell protein as feed for Fish/Prawn, Nutrition and gene interaction, Bio-conversion of agriculture and animal wastes into fish feed, sex reversal of larvae by dietary manipulation, Enhancement of quality of meat by dietary manipulation. Use of digestive enzymes for enhancing digestibility of feed and probiotics in feed.

## **Fish Nutrition and Feed Technology**

Protein nutrition of fish and shellfish: Introduction, function, digestion and metabolism of protein, amino acids and their classification, specific function, protein deficiency symptoms, evaluation criteria of dietary protein ( PER, NPU, BV etc.).

Lipid nutrition: Introduction, function, metabolism, Fatty acids and their classification, specific functions of essential fatty acids, deficiency symptoms, evaluation of lipid quality. Phospholipids, Steroids.

Carbohydrate nutrition: Introduction, function, metabolism, improvement of carbohydrate utilization by fish.

Vitamin and mineral nutrition: Introduction, classification, source, functions, deficiency symptoms.

Energy nutrition: Definition, energetics, expression of energy value of feed (gross energy, digestible energy, metabolizable energy, net energy), partitioning of energy, protein energy ratio.

Larval nutrition: Importance of live feed and formulated feed, Different types of feed available for larvae, constraints and scope; Larval gut morphology and mode of nutrition. Micro bound, micro encapsulated diets, micro coated. Application of nanotechnology in diet delivery.

Feed formulation: General principles, different steps of feed formulation, classification of feed ingredients; Energy and protein sources; Evaluation of ingredient quality.

Types of feed: Dry (pellets, flakes, powdered, micro-encapsulated, micro-bound and micro-coated diets) and non-dry. Compact pellet feed, floating and slow sinking pellet feeds

Feed processing technology: Common processes in feed manufacture; Equipments used in feed manufacture; Pulverizer, grinder, mixer, pelletizer, crumbler, drier, Extruder/ Expander, Vacuum coater, fat sprayer, extrusion cooking; Complimentary processes; Drying, crumbling, coating;

Feed storage: Hydro-stability of feed and their storage; Prevention of spoilage from rancidity, fungus and associated toxins; Fish disease vectors in feed and quality control; Feed value in relation to processing; Feed additives, Safety of farm fish products-harmful residues

(pesticides, antibiotics, pollutants).

Effects of processing on the nutritional value of feeds, effect of processing on the availability and nutritional value of vitamins; effect of processing on the availability and nutritional value of trace mineral elements

Quality control in fish feed manufacturing; Quality control procedures, raw materials, finished products; Geometrical, and physical feature; mechanical characteristics in air, Behavioural characteristics in water. Feed economics and evaluation criteria: FCR, AFCR, SGR, PRE, ERE, PER, NPU, EAAI, chemical score, biological value.

Feed influence on body composition and quality; Effect of rations on fecundity and egg quality.

Feed dispensing devices, ration size/feeding rate, feeding frequency, check trays, restricted feeding and compensatory feeding; Nutritional studies and the problem of applying research findings to farming systems.

Designing of nutritional experiments: Analysis of experimental data employing complete Random Block Design (CRD), Random Block Design (RBD), t- test and analysis of variance

## **Fish Physiology and Biochemistry**

Reproductive physiology: Oogenesis, Spermatogenesis; Mechanism of oocyte maturation and ovulation. Regulation of seasonal reproduction; Sex differentiation and sex determination, Reproductive biotechnology; Pheromones and reproductive behavior; Neuro-endocrine system in fish and crustacean its role in the regulation of reproduction.

Digestive physiology: Food & feeding biology; Digestive system and its Physiology in fish  
Excretion and osmoregulation: Physiology of excretion; Mechanism of osmotic and ionic regulation; Stenohaline and Euryhaline animals and their tolerance capacity.

Ecophysiology: Thermal stress in fish; Response of fish during hypoxia; C-reactive proteins, heat shock, antifreeze and metallothioneines proteins; Natural and anthropogenic radioactivity in the aquatic environment; Use of radioisotopes in tracer techniques for metabolic studies.  
Endocrine physiology: Classification and functional properties of different hormones; Hormone receptors and their regulation, Mechanism of hormone action at cellular level. Endocrine disruption in fish.

Carbohydrates: Definition, classification and biological significance; stereoisomerisms and mutarotation, structure and properties of monosaccharides, disaccharides, polysaccharides and mucopolysaccharides, carbohydrate metabolism; Oxidative phosphorylation; Electron Transport Chain and ATP synthesis

Proteins: Definition, classification, biological significance; Structure: primary, secondary, tertiary and quaternary; Amino acids: Structure, classification, Oxidative and non-oxidative degradation of amino acids; transamination and deamination, Urea cycle.

Lipids: Definition, classification, biological significance. Fatty acids: structure, properties and chemical reactions; saponification and iodine number, peroxide value of fats. Phospholipids: Structure, properties and functions; steroids; prostaglandins, PUFA (polyunsaturated fatty acids).

Nucleic acids: Structure, functions and properties. Structure of purines, pyrimidine; DNA and RNA; Purine and pyrimidine metabolism. Recombinant DNA technology, DNA fingerprinting, transgenic fish.

Enzymes: Nomenclature, classification and structure of enzymes, Active site; Concepts of activation energy, Transition state and enzyme-substrate complex, Units of enzyme activity, Factors affecting enzyme activity, Enzyme kinetics; Michaelis Menten Equation,  $K_m$  and  $V_{max}$

values; Lineweaver and Burke Plots, Competitive and noncompetitive inhibition, Biochemistry of Vitamins and minerals.

Spectrophotometry: principle and application; Beer-Lambert's law; UV-visual, fluorescent; Chromatography: Theory and applications of paper, affinity, column, thin layer, ion-exchange, size exclusion, gas chromatography and HPLC, Gel electrophoresis of proteins and nucleic acids. Radioimmunoassay (RIA) and Enzyme-linked immunosorbent assay (ELISA), Beta and gamma scintillation counters.

## **Fisheries Economics**

Marine & Inland fishery resources of India, status and prospects. Production concepts applied to aquaculture – cost concepts and cost functions – Returns concepts – least-cost combination of inputs – optimization of aquaculture production. Planning and budgeting; linear programming, economies of scale – production function analysis, management of risk and uncertainty in aquaculture, socio economic issues in aquaculture development.

Theory of demand and its determinants; demand elasticity's; Price, income and cross elasticity's of demand. Supply – Supply concepts, Law, determinants of supply. Theory of product pricing. National Income Accounting – definition and concepts of NI, different components of national Income, and methods of national income accounting, Classical theory of income and Employment, Inflation- Nature, Effects and control. Business Cycle theory, Credit and Commercial Banking, Balance of Payment - Foreign Exchange.

Marketing management-Market intermediaries and their role, Marketable & Marketed surplus estimation., Market Structure, Conduct, Performance analysis and price spread and efficiency; market integration; price stabilization measures and policies; Issues and problems of fisheries inputs marketing. Indian marketing environment; rural marketing; Fishery & aquaculture marketing system; marketing mix; marketing strategy; market segmentation; marketing organization Marketing Co-operatives, Direct marketing, Contract farming and Retailing - Marketing functions; processing, transportation, storage and warehousing; forward trading, futures market, channels in marketing,; government interventions.

Multicollinearity, heteroscedasticity and autocorrelation.

Financial management tools- income statement, balance sheet, financial ratios. Enterprise budgeting – cash flows –fisheries credit appraisal – 3 R's of credit –Fisheries Cooperatives. Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal techniques .introduction to linear programming, uses of LP indifferent fields, graphic solution to problems. Concepts of terms of trade, free trade vs protection, exchange rate, devaluation and depreciation, Balance of payments.

Principles of environmental economics, Concepts of market and non-market valuation the natural resources/environment. MPEDA and its development programmes, WTO Agreement on Agriculture and fisheries - Contradictions of free trade - proponents and opponents policies in vulnerable sectors like fisheries – Lessons for developing countries WTO in dispute settlement. Formulation of research objectives; Hypothesis - meaning, types, development of hypothesis and its testing; Methods of observation and data collection for biological and social sciences research.



## **Fisheries Extension**

**Perspectives and Practices of Fisheries Extension:** Overview of Fisheries Extension; Development and extension approaches as practiced by public agencies, NGOs and by the private sector; Market led extension approaches; ITC's aqua-choupal, MANAGE's Agri Business Clinics, Contract farming; AMUL model; UN agencies, non-governmental and private extension service organizations; Concept of gender mainstreaming.

**Participatory Approaches in Fisheries Extension:** Participatory Rural Appraisal; Participatory Technology Development; Participatory Learning Approach (PLA) including role-plays, case studies, brainstorming, and ranking of priority issues, discovery-based experiential learning, participatory education methods like FGD; Farmer Field Schools for Aquaculture. Trickle Down System of Aquaculture Extension; Fisheries Co-management.

**Extension Communication and Methods:** Communication - meaning, process, theories and models; Traditional communication; Individual, group and mass communication; documenting and presenting success stories; public speaking and presentation skills; organising meetings, guided discussions; organizing field demonstrations and field-days; preparation of information, education and communication materials on various aspects of fisheries through flip charts and flash cards; instructional video and ICT; case study of a community radio, tele-centres and farmer discussion groups; designing a website on fisheries and aquaculture; developing a script and shooting a video film as an extension aid.

**Multimedia Creations and Applications:** Image editing and 2D Animation; Vector graphics using Corel Draw; Digital Audio - Basic features and digitization, audio recording and editing and composing of music, special effects; Script development and Story board preparation; Digital Video - video recording, capturing and conversion into different video file formats; Organization of content, logical sequencing, text entry; Multimedia Authoring - concepts, navigation planning and hyper linking; User friendly tools; Preparation of multimedia presentation; CD/DVD writing, labelling and presentation.

**Training for Development:** Training cycle –training need assessment, developing training objectives and outcome, developing training modules and lesson plan, logistic management and evaluation of training programme, follow-up and action plan; Different types of Training tools like T-Group, Fish bowl exercise, ice-breakers, team-building exercises and games; workshop and writeshop; Preparation of Training Manuals.

**Planning and Management of Fisheries Development Programs:** Planning for Sustainable Development, Economic Planning- types of planning; Top down and bottom up approaches; Project formulation and Project Appraisal in terms of social benefit analysis, shadow prices; Project Management Techniques- PERT and CPM; Logical Framework Approach (LFA), Stakeholder analysis; Participatory Monitoring and Evaluation (PROME).

**Diffusion and Adoption of Innovations in Fisheries:** Elements of diffusion; Opinion leadership – meaning, characteristics, types and their measurement; diffusion networks; social learning theory; Change agent – meaning, roles, factors of success, change agent contact; centralised and decentralised diffusion systems; innovation in organisations; consequences of innovations – model and classification, equality in the consequences; recent studies in innovation decision process.

**Research Methodology:** Important research types; survey research, action research, participatory research, case study method, content analysis; Steps involved in research process; Constructs; Nature and type of variables; Types and levels of measurement; Types of reliability and validity and their measurement; Methods of observation and data collection for social sciences research; Selection of appropriate tools for analysis social sciences research data; Formats of research report - writing thesis/dissertation, research articles.

## **Aquatic Animal Health Management**

Inflammation and cellular components participating in the inflammatory process, types of inflammation and sequelae, reparative process, Oedema, Necrosis, Degenerative process, Disturbances in growth of tissue and cellular components.

Neoplasm, the etiology and classification, gross and histological features.

Immune system in fishes and their function, Antigen and antigenicity, phagocytic system and lymphoid system, Histocompatibility, Hypersensitivity reactions, Antigen processing, Antigen - antibody reactions.

Vaccines and methods of vaccination in fish, immunostimulants and probiotics, Immuno diagnostics.

Bacterial and viral diseases of fish and shellfish, the clinical, gross and microscopic changes in various organ tissues. Diagnosis of specific diseases and differential diagnosis, treatment methods for bacterial diseases.

Drugs, chemicals and antibiotics used in aquaculture and their modes of action and application.

Pathogenesis, pathology, treatment and control of common bacterial, parasitic, protozoan and fungal diseases of fish and shellfish.

Common parasites of freshwater and marine fishes, their morphology, life cycle, diseases they produce and their treatment and control.

Microorganisms associated with aquatic environment, pollution and its effect on aquatic organisms, fish production and public health. Role of microorganisms in degradation of pollutants and bioremediation.

Pathogenesis, pathology and diagnosis of heavy metal toxicity in fish.

## **Aquatic Environmental Management**

Environmental management approaches; Environmental economics; Environmental audit; EIA; TQM strategies; Ecological standards; Eco-labeling systems; Environmental regulations; Groundwater resources; Greenhouse gases; Chemicals and drugs in aquaculture; Water management; Aquatic weeds; Basic chemistry principles; Chemistry of soil-nutrient interactions and water permeability; Organic substances; Humus and biogeochemical substances; Transport of substances; Soil-water interactions; Availability of nutrients and productivity; Microbial dependency; Microbial interaction; Xenobiotic and inorganic pollutants; Microbial degradation; Water-borne pathogens of public health importance; Microbial criteria for water quality assessment; Standards for different water uses; Indicator organisms; Principles and applications of bioprocesses; Microbial biomass production; Bioprospecting; Management of water and soil qualities for sustainable aquaculture; Bio-fertilization; Waste recycling in aquaculture; Wastes from fish processing units and their treatment; Solid waste management; Aquatic pollution; Impact of global warming on aquatic environment; Toxicity; Common transport processes of pollutants; Waste disposal systems; Biological pollution; Algal blooms and their effects; Pollution mitigation strategies; Biocontrol; Microbial nucleic acids; Cell fusion; Gene cloning and recombinant DNA technology; Genetically-improved strains; Oil recovery; Consortia of microbes for environmental protection; Bioreactors; Biosensors as a tool for biomonitoring; Biopesticides, biofuels, fermented products and biogas; IPR issues related to environmental biotechnology;

Microbial interaction with chemical pollutants in aquatic environment; Microorganisms as potential bioremediators; Bioengineering involved in bioremediation in the coastal zone; Phytoremediation and use of artificial islands for reclamation of wastewater habitats; Microbial toxins; Toxins from fish/aquatic organisms and fish poisoning; Factors influencing toxicity; Ecological effects of toxicants; Metabolism of toxic substances; Comparative toxicology; Plants as source of bioactive compounds; Bioaccumulation and biomagnification; Analytical techniques in environmental science; Sampling techniques and procedures; Colorimetry and spectrophotometry; Chromatography; Electrophoresis; Ultracentrifugation; Scintillation counters and radio isotopes; Classifications of plankton; Primary and secondary production; Community interrelationships; Life history parameters; Predator-prey relationship; Impact of grazing in the aquatic ecosystem; Vertical migration of zooplankton; Larval ecology of benthic invertebrates; Nanoplankton and their significance; Plankton nets and recorders; Plankton fixatives and preservatives; Importance of biodiversity; Factors influencing biodiversity; Biodiversity indices; Habitat degradation; Overexploitation of resources; Protected areas; Functions of wetlands; Zonation and succession in wetlands; Factors affecting wetland ecosystems; Mangroves and freshwater wetlands; Waterways and freshwater swamps; International conventions; Effects of physicochemical oceanographic factors on fish behaviour; Space and time scales in oceanographic analysis; Speed and magnitude of short-term changes in the ocean; Synoptic oceanographic analysis; Fisheries forecasts; Coastal fishery and hydrography; Environmental factors influencing seasonal variations in fish catches; Application of echo-sounders and SONAR; Categorization of different freshwater fisheries resources; Physical and chemical properties of lentic and lotic waters; Trophic succession; Measures to control lake degradation caused by eutrophication.

**ANNEXURE**

**FORM OF CASTE CERTIFICATE FOR SC / ST**

1. Form of certificate to be produced by candidate belonging to SC or ST in support of his/her claim.

This is to certify Shri/Smt./Kumari\* \_\_\_\_\_  
Son/daughter\* \_\_\_\_\_ of village/Town\* \_\_\_\_\_  
In District/Division\* \_\_\_\_\_ of the State/Union Territory\* \_\_\_\_\_  
Belongs to the \_\_\_\_\_ Caste/Tribe\* which is recognized as  
SC/ST\* under

The Constitution (Schedule Castes) Order, 1950.

The Constitution (Schedule Tribes) Order, 1950.

The Constitution (Schedule Castes) Union Territories Order, 1951.

The Constitution (Schedule Tribes) Union Territories Order, 1951 as amended by SCs and STs Lists (modification ) Order 1956, the Bombay Reorganisation Act, 1960, the Punjab Reorganisation Act, 1966, the State of HP Act, 1970, the North Eastern Areas (Reorganisation ) Act, 1971 and the SCs and STs Order (Amendment) Act, 1976.

The Constitution (Jammu & Kashmir) SCs Order, 1956.

The Constitution (Andaman & Nicobar Island) SCs Order, 1959. as amended by SCs and STs Order (Amendment) Act, 1976.

The Constitution (Dadra & Nagarhaveli) SCs Order, 1962.

The Constitution (Dadra & Nagarhaveli) STs Order, 1962.

The Constitution (Pondicherry) SCs Order, 1964.

The Constitution (Uttar Pradesh) STs Order, 1967.

The Constitution (Goa, Daman & Diu) SCs Order, 1968.

The Constitution (Goa, Daman & Diu) STs Order, 1968.

The Constitution (Nagaland) STs Order, 1970.

The Constitution (Sikkim) SCs Order, 1968.

2. **Applicable in the case of SC/ST persons who have migrated from one State/Union Territory/Administration.**

The Certificate is issued on the basis of the SC/ST certificate to Shri/Smt./Kumari\* \_\_\_\_\_ father/mother\* of Shri/Smt

\* \_\_\_\_\_ in district /Division\* \_\_\_\_\_  
of the State Union Territory\* \_\_\_\_\_ Who belongs to the \_\_\_\_\_  
caste/tribe\* which is recognized as Schedule Caste/Schedule Tribe\* in the  
State/Union Territory \_\_\_\_\_ issued by the (Name of the prescribed  
authority) Vide their No. \_\_\_ Date \_\_\_ Shri/Smt./Kum.\* \_\_\_\_\_  
and/or\*family ordinarily reside(s) in village/town\*of District \_\_\_\_\_  
\_\_\_\_\_ of State/Union Territory\* .

Place \_\_\_\_\_ Signature \_\_\_\_\_

State/Union Territory\* \_\_\_\_\_ \*Designation \_\_\_\_\_

(With seal of Office)

**\*Please delete the words which are not applicable**

Please quote specific Presidential Order.

Delete the paragraph which is not applicable.

**NOTE:** The term "Ordinarily reside(s)" used here will have the same meaning as in Section 20 of the Representation of the Peoples Act, 1950.

**\*\* List of authorities empowered to issue SC/ST Certificates:**

1. District Magistrate / Additional District Magistrate / Collector / Deputy Commissioner / Additional District Magistrate / Collector /Deputy Commissioner/Additional Deputy Commissioner/Deputy Collector/1<sup>st</sup> class Stipendiary Magistrate / City Magistrate / Sub-divisional Magistrate / Taluka Magistrate/ Magistrate / Executive Magistrate / Extra Asstt. Commissioner not below the rank of 1<sup>st</sup> Class Stipendiary Magistrate.
2. Chief Presidency Magistrate/Additional Chief Presidency Magistrate/ Presidency Magistrate.
3. Revenue Officers not below the rank of Tahsildar.
4. Sub-division Officer of the area where the candidate and/or his family normally resides.
5. Administrator/Secretary to Administrator/Development Officer. (Lakshadweep Islands).

**FORM OF CERTIFICATE TO BE PRODUCED BY OTHER BACKWARD  
CLASSES APPLYING FOR APPOINTMENT TO POSTS UNDER THE  
GOVERNMENT OF INDIA**

(Gol., Dept of Per. & Trg., O.M. No. 36033/28/94-Estt. (Res), dated 2-7-1997)

This is to certify that.....,son of....., of village..... District / Division.....in the ..... State.....belongs to the.....Community which is recognized as a Backward Class under-

- ❖ (i) Government of India, Ministry of Welfare, Resolution No. 12011/68/93-BCC (C), dated the 10th September, 1993, published in the Gazette of India, Extraordinary, Part-I, Section I, No. 186, dated the 13th September, 1993.
- ❖ (ii) Government of India, Ministry of Welfare, Resolution No.12011/9/94- BCC, dated the 19th October, 1994, published in the Gazette of India, Extraordinary, Part-I, Section I, No. 163, dated the 20th October, 1994.
- ❖ (iii) Government of India, Ministry of Welfare, Resolution No.12011/7/95-BCC, dated the 24th May, 1995, published in the Gazette of India, Extraordinary, Part-I, Section I, No. 88, dated the 25th May, 1995.
- ❖ (iv) Government of India, Ministry of Welfare, Resolution No.12011/44/96-BCC, dated the 6th December, 1996, published in the Gazette of India, Extraordinary, Part-I, Section I No. 210, dated the 11th December, 1996.

Shri.....and/or his family ordinarily reside(s) in the .....District/Division of the .....State. This is also to certify that he/she does not belong to the persons/sections (Creamy Layer) mentioned in Column 3 of the Schedule to the Government of India, Department of Personnel and Training, O.M. No. 36012/22/93-Estt. (SCT), dated 8-9-1993.

District Magistrate,  
Deputy Commissioner, etc.

Dated:

SEAL

**Declaration/undertaking - for OBC candidates only**

I, .....son/daughter of Shri.....  
resident of Village/Town/City.....District.....

State hereby declare that I belong to the.....Community which is recognized as a Backward Class by the Government of India for the purpose of reservation in services as per orders contained in Department of Personnel and Training Office Memorandum No.36012/22/93- Estt.(SCT), dated 8/9/1993. It is also declared that I do not belong to persons/Sections (Creamy Layer)mentioned in Column 3 of The Schedule to the above referred Office Memorandum, Dated 8/9/1993, which is Modified vide Department of Personnel and Training Office Memorandum no.36033/3/2004 Estt.(Res.) Dated 9/3/2004.

Signature of the Candidate

Place: .....

Date: .....

- **Declaration/undertaking not signed by candidate will be rejected.**
- **False declaration will render the applicant liable for termination of registration at any time.**

**Creamy Layer Definition**

OBC Creamy layer is defined comprehensively at  
<http://ncbc.nic.in/html/creamyayer.html>

All candidates for the OBC reserved seats should make sure that they do not satisfy any of the creamy layer criteria as listed in the website. Some general exclusion for quick reference (no way comprehensive) are as follows.

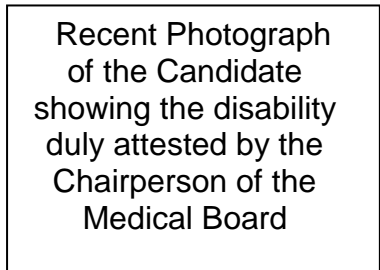
1. Any of the parents holds a constitutional position in govt. of India
2. Any one of the parents is a class i officer.
3. Both the parents are class ii officers.
4. Any one of the parents is employed in an equivalent rank to class I officer or both parents equivalent to class II officer in a public sector, insurance companies, banks, universities or in other organizations
5. Land holdings on irrigated land are 85% or more of the statutory ceiling area.
6. Parents income is more than Rs. 4.5 lakhs per year or Government of India directives applicable at the time of counseling.



**DISABILITY CERTIFICATE**

**(a) ANNEXURE-1 to O.M., dated 29-12-2005**

NAME AND ADDRESS OF THE INSTITUTE / HOSPITAL  
Certificate No.....



This is certified that Shri /Smt/ Kum.....son/wife/daughter of  
Shri.....age.....Sex.....  
identification mark(s).....is suffering from permanent disability of  
following category:-

A. Locomoter or Cerebral palsy:

- (i) BL-Both legs affected but not arms.
- (ii) BA-Both arms affected
  - (a) Impaired reach
  - (b) Weakness of grip
- (iii) BLA-Both legs and both arms affected
- (iv) OL-One leg affected (right or left)
  - (a) Impaired reach
  - (b) Weakness of grip
  - (c) Ataxic
- (v) OA-One arm affected
  - (a) Impaired reach
  - (b) Weakness of grip
  - (c) Ataxic
- (vi) BH-Stiff back and hips (Cannot sit or stoop)
- (vii) MW-Muscular weakness and limited physical endurance.

B. Blindness or Low Vision

- (i) B-Blind
- (ii) PB- Partially Blind

C. Hearing impairment:

- (i) D-Deaf
- (ii) PD-Partially Deaf

(Delete the category, whichever is not applicable)

1. This condition is progressive / non-progressive / likely to improve / not likely to improve. Re-assessment of this case is not recommended / is recommended after a period of .....years.....months.\*

2. Percentage of disability in his / her case is .....per cent.

3. Sh. / Smt / Kum.....meets the following physical requirements for discharge of his / her duties:-

- |  |          |
|--|----------|
| (i) F-can perform work by manipulating with fingers. | Yes / No |
| (ii) PP-can perform work by pulling and pushing.     | Yes / No |
| (iii) L-can perform work by lifting.                 | Yes / No |
| (iv) KC-can perform work by kneeling and crouching.  | Yes / No |
| (v) B-can perform work by bending.                   | Yes / No |
| (vi) S-can perform work by sitting.                  | Yes / No |
| (vii) ST-can perform work by standing.               | Yes / No |
| (Viii) W-can perform work by walking.                | Yes /No  |
| (ix) SE-can perform work by seeing.                  | Yes / No |
| (x) H-can perform work by hearing / speaking.        | Yes / No |
| (xi) RW-can perform work by reading and writing.     | Yes / No |

(Dr. ....)  
Member  
Medical Board

(Dr. ....)  
Member  
Medical Board

(Dr. ....)  
Chairperson  
Medical Board

Countersigned by the  
Medical Superintendent / CMO  
/Head of Hospital (with seal)

\* Strike out which is not applicable.