INFORMATION BULLETIN

for

Admission to Ph.D. Courses
2010-11

POST GRADUATE SCHOOL
INDIAN AGRICULTURAL RESEARCH INSTITUTE
(Deemed University)
NEW DELHI-110 012
Post Graduate School
Indian Agricultural Research Institute
New Delhi

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The academic activity at the Institute is regulated by the Academic Council with Director, IARI as its Chairman and the Dean as its Vice-Chairman. The Academic Council is the competent authority to amend the rules and procedures governing all aspects of post-graduate programmes. All correspondence regarding admission should be addressed to the Registrar (Academic), P.G. School, Indian Agricultural Research Institute, New Delhi-110 012.

This Information Bulletin should not be treated as a legal document.

This Bulletin can be obtained from the following:

(a) **By Hand**: From special counter Syndicate Bank, Pusa Institute Campus, New Delhi 110 012 by paying Rs. 500/- for General/OBC category and Rs. 250/- for SC/ST/PH category plus Rs. 25/- as bank charges.

(b) **By Post**: From Registrar (Academic), Post Graduate School, IARI New Delhi - 110 012 by sending request with a demand draft for Rs. 575/- for General/OBC category (Rs. 325/- for SC/ST/PH category) drawn in favour of the Registrar (Academic), P.G. School, IARI, New Delhi-110012, payable at New Delhi.

(c) **Through Website**: Candidates may download the Information Bulletin, admit cards, application form & acknowledgement card from the Institute website: http://www.iari.res.in. In this case a demand draft of Rs. 500/- (for General/OBC category) and Rs. 250/- (for SC/ST/PH category) is required to be enclosed along with the application form.

**IMPORTANT DATES**

(i) Last date for receipt of application  
(ii) Last date for receipt of application from remote areas namely Assam, Meghalaya, Arunachal Pradesh, Mizoram, Manipur, Nagaland, Tripura, Sikkim, Ladakh Division of J & K State, Lahaul & Spiti District and Pangi Sub-Division of Chamba District of Himachal Pradesh, Andaman & Nicobar Islands and Lakshadweep  
(iii) Entrance Examination  
(iv) Interview for Final Selection  
(v) Announcement of Final Result of Selection  

: April 08, 2010
: April 22, 2010
: June 06, 2010
: July 07, 2010
: July 09, 2010
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Application form for admission
1. INTRODUCTION

The Indian Agricultural Research Institute (IARI) is India’s largest and foremost Institute in the field of research and higher education and training in agricultural sciences. It has served the cause of science and society with distinction through first rate research, generation of appropriate technologies and development of human resources. In fact, the Green Revolution was born in the fields of IARI and our graduates constitute the core of the quality human resource in India’s agricultural research and education. The Institute has all along been adjusting and improving its policies, plans and programmes to effectively respond to the needs and opportunities of the nation. During the fifties, the advancement of scientific disciplines constituted the core programme and provided the base for its fast expansion in the 1960’s and 1970’s in all its three interactive areas, namely, research, education and extension. Besides basic research, applied and commodity research gained great importance resulting in the development of several popular high yielding varieties of almost all major crops and their associated management technologies, which brought about an unprecedented increase in the national food and agricultural production. The main functions of the Institute cover the areas in basic and applied research in the major branches of agricultural sciences; post graduate education at the M.Sc. and Ph.D. levels for which the Institute has been accorded the status of a Deemed University under the University Grants Commission Act of 1956; specialized post graduate training courses; and extension education and transfer of technology in selected areas. The administrative control of the Institute is vested with the Indian Council of Agricultural Research (ICAR), which is an autonomous organization established under Societies Registration Act, 1860.

The Institute was originally established by the Government of India in 1905 at the village Pusa in north Bihar. After a devastating earthquake in 1934, it was shifted to New Delhi in 1936. That is why it is popularly known as the Pusa Institute. It is known also by its popular acronym IARI. The present campus of the Institute is a self-contained complex spread over an area of about 500 hectares.

The Institute has inherited a great tradition of agricultural research. Since its early days at Pusa, the Institute has been doing pioneering work in various fields of agricultural sciences. The Institute has expanded greatly in its activities, research facilities and scientific personnel in the post-independence years. When the Institute came to New Delhi in 1936 it had five Sections. Today, the Institute’s research and educational activities are carried out through a network of 36 Divisions/multi-disciplinary laboratories/ Centres of Excellence/units and 11 Regional Stations.

As per the research mandate of the Institute to conduct basic and strategic research with a view to understand the processes, in all their complexity, and to undertake need-based research, that lead to crop improvement and sustained agriculture productivity in harmony with environment to provide national leadership in Agricultural Research, Extension and Technology assessment and transfer by developing new concepts and approaches and serving as a national referral point for quality and standards, the Indian Agricultural Research Institute concentrated mainly its activities on:

i) School of Crop Improvement
ii) School of Crop Protection
iii) School of Basic Sciences
iv) School of Resources Management
v) School of Social Sciences

The laboratories are equipped on modern lines for conducting research of a high order. The experimental fields, which form an integral part of the Institute’s campus, cover an area of about 296 hectares, of which about 160 hectares are irrigated. The various Divisions of the Institute are manned by a large body of highly trained
and experienced scientific staff. The strength of the Post Graduate Faculty of the Institute at present is about 447 in 23 disciplines.

The Institute’s Central Library has built-up a collection of 6,00,000 documents, receives more than 5000 scientific serials annually from all over the world, and is regarded as the best agro-biological library in Asia. The library has over 10300 serial files in 40 languages received from more than 90 countries which forms 30% of the total scientific serials available in the country. It has spacious reading halls and a documentation centre. The main hub providing Email-internet connectivity through the Institute is located in the Library, which also offers CD-ROM facility through the Local Area Network.

Since its early years, the Institute has flourished as a centre for imparting post graduate training to officers of the State Departments of Agriculture in India, as also to other candidates, so as to equip them for manning superior posts in the fields of research, teaching and extension. In 1923, the training programme was placed on an organized basis as a two-year course of specialized post graduate training in different major fields of agricultural sciences, leading to the Associateship of the Institute (Assoc. IARI). This diploma course, recognized in 1946 as equivalent to the M.Sc. degrees of Indian Universities, was replaced by M.Sc. degree in 1958 when the Institute was granted the status of a “Deemed University” under the University Grants Commission Act of 1956 and authorized to award post graduate degrees of Master of Science and Doctor of Philosophy in agricultural sciences. With regard to educational standard and quality, it ranks among the best institutions of post graduate education in the world. A unique feature of the system of instruction at the Institute, which is largely modelled on the course-credit system, is that research, teaching and extension are fully integrated and also that the programme of instruction is broad-based so as to give the student a mastery not only in his/her major field of specialization but also in supporting minor fields. Currently, instruction leading to the post graduate degrees of the Institute is organized in twenty two subjects (disciplines).

The programme of instruction leading to M.Sc. and Ph.D. degrees in Agricultural Statistics, Molecular Biology & Biotechnology and Plant Genetic Resources and M.Sc. programme in Computer Application are given at the sister institutes namely Indian Agricultural Statistics Research Institute (IASRI), National Bureau of Plant Genetic Resources (NBPG) and NRC on Plant Biotechnology (NRCPB) which are located at this campus.

So far, 3138 M.Sc. and 4077 Ph.D. students have been awarded including 287 students from 39 foreign countries. At present, the total number of students is 714 (243 M.Sc. and 471 Ph.D.) which includes 49 students (17 M.Sc. and 32 Ph.D.) from 11 foreign countries namely Bangladesh, Egypt, Ethiopia, Iran, Libya, Nepal, Rwanda, Sudan, Sri Lanka, Syria and Vietnam.

The amenities available on the campus include a medical dispensary, two primary schools, two government senior secondary schools- one for boys and the other for girls, the Nehru Experimental Centre, a Shopping Complex, two branches of Kendriya Bhandar, a bank, and a post office. The Institute is easily reached, both from Delhi and New Delhi railway stations, by means of city bus. Adjacent to the Institute’s campus are located, the National Physical Laboratory (NPL), the National Institute of Science Communication (NISCOM) of the Council of Scientific and Industrial Research (CSIR), the Institute of Hotel Management, Catering and Nutrition, a Regional Centre of the National Bureau of Soil Survey and Land Use Planning, the National Seeds Corporation and the State Farms Corporation of India.
2. DISCIPLINES (SUBJECTS) FOR ADMISSION DURING 2010-11

The disciplines (main subjects of study) and sub-disciplines (major fields/specializations) within each discipline in which instructions are offered at this Institute, leading to the Ph.D. degree, are as follows:

<table>
<thead>
<tr>
<th>Discipline Code</th>
<th>Discipline</th>
<th>Sub-discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>AGRICULTURAL CHEMICALS</td>
<td>Agricultural Chemicals</td>
</tr>
<tr>
<td>02.</td>
<td>AGRICULTURAL ECONOMICS</td>
<td>Agricultural Development and Policy; Agricultural Finance and Project Analysis;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agricultural Marketing and Trade; Farm Management and Resource Economics; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agri-business Management</td>
</tr>
<tr>
<td>03.</td>
<td>AGRICULTURAL ENGINEERING</td>
<td>Agricultural Processing and Structures; Farm Power and Equipment; and Soil and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Conservation Engineering</td>
</tr>
<tr>
<td>04.</td>
<td>AGRICULTURAL EXTENSION</td>
<td>Agricultural Extension; Agricultural Communication; and Agricultural Management</td>
</tr>
<tr>
<td>05.</td>
<td>AGRICULTURAL PHYSICS</td>
<td>Agricultural Physics</td>
</tr>
<tr>
<td>06.</td>
<td>AGRICULTURAL STATISTICS</td>
<td>Agricultural Statistics</td>
</tr>
<tr>
<td>07.</td>
<td>AGRONOMY</td>
<td>Crop Husbandry; and Resource Management</td>
</tr>
<tr>
<td>08.</td>
<td>BIOCHEMISTRY</td>
<td>Biochemistry; and Nutrition</td>
</tr>
<tr>
<td>09.</td>
<td>ENTOMOLOGY</td>
<td>Insect Pest Management; Insect Physiology; Insect Biosystematics; Insect Toxicology</td>
</tr>
<tr>
<td>10.</td>
<td>ENVIRONMENTAL SCIENCES</td>
<td>Environmental Sciences</td>
</tr>
<tr>
<td>11.</td>
<td>GENETICS</td>
<td>Plant Breeding; and Genetics</td>
</tr>
<tr>
<td>12.</td>
<td>HORTICULTURE</td>
<td>Floriculture; Pomology; and Vegetable Science</td>
</tr>
<tr>
<td>13.</td>
<td>MICROBIOLOGY</td>
<td>Algology; Applied Microbiology; and Soil Microbiology</td>
</tr>
<tr>
<td>14.</td>
<td>MOLECULAR BIOLOGY AND BIOTECHNOLOGY</td>
<td>Molecular Biology and Biotechnology</td>
</tr>
<tr>
<td>15.</td>
<td>NEMATOLOGY</td>
<td>Nematology</td>
</tr>
<tr>
<td>16.</td>
<td>PLANT GENETIC RESOURCES</td>
<td>Plant Genetic Resources</td>
</tr>
<tr>
<td>17.</td>
<td>PLANT PATHOLOGY</td>
<td>Fungal Pathology; Mycology; Plant Bacteriology; and Plant Virology</td>
</tr>
<tr>
<td>18.</td>
<td>PLANT PHYSIOLOGY</td>
<td>Plant Physiology</td>
</tr>
<tr>
<td>19.</td>
<td>POST HARVEST TECHNOLOGY</td>
<td>Post Harvest Technology of Horticultural Crops; and Post Harvest Engineering and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology</td>
</tr>
<tr>
<td>20.</td>
<td>SEED SCIENCE AND TECHNOLOGY</td>
<td>Seed Science and Technology</td>
</tr>
<tr>
<td>21.</td>
<td>SOIL SCIENCE AND AGRICULTURAL CHEMISTRY</td>
<td>Soil Science; and Agricultural Chemistry</td>
</tr>
<tr>
<td>22.</td>
<td>WATER SCIENCE AND TECHNOLOGY</td>
<td>Water Science and Technology</td>
</tr>
</tbody>
</table>
3. NUMBER OF SEATS

(i) Open Scheme

The discipline-wise details of seats for Ph.D. to be filled during the academic session 2010-11 are indicated below:

**OPEN SCHEME**

<table>
<thead>
<tr>
<th>Discipline Code</th>
<th>Discipline</th>
<th>General</th>
<th>O</th>
<th>B</th>
<th>C</th>
<th>SC</th>
<th>ST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Agricultural Chemicals</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>02.</td>
<td>Agricultural Economics</td>
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<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>03.</td>
<td>Agricultural Engineering*</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>04.</td>
<td>Agricultural Extension</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>05.</td>
<td>Agricultural Physics</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>06.</td>
<td>Agricultural Statistics</td>
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<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>07.</td>
<td>Agronomy</td>
<td>4</td>
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<td>1</td>
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<td></td>
<td>6</td>
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<tr>
<td>08.</td>
<td>Biochemistry</td>
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<td>1</td>
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<td></td>
<td>5</td>
</tr>
<tr>
<td>09.</td>
<td>Entomology</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>10.</td>
<td>Environmental Sciences</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
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<td></td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>Genetics</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>12.</td>
<td>Horticulture**</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>13.</td>
<td>Microbiology</td>
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<td>1</td>
<td></td>
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<td></td>
<td>5</td>
</tr>
<tr>
<td>14.</td>
<td>Molecular Biology &amp; Biotechnology</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>15.</td>
<td>Nematology</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>16.</td>
<td>Plant Genetic Resources</td>
<td>3</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>17.</td>
<td>Plant Pathology</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>18.</td>
<td>Plant Physiology</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>19.</td>
<td>Post Harvest Technology***</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>20.</td>
<td>Seed Science &amp; Technology</td>
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<td>1</td>
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<td></td>
<td>4</td>
</tr>
<tr>
<td>21.</td>
<td>Soil Science &amp; Agricultural Chemistry</td>
<td>3</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>22.</td>
<td>Water Science and Technology</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
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<td></td>
<td>4</td>
</tr>
</tbody>
</table>

**TOTAL**     **76**  **23**  **19**  **10**  **128**

@ In addition to above seats, 4 more candidates will be admitted under physically handicapped category on the basis of relative merit within the category

**AGRICULTURAL ENGINEERING**

<table>
<thead>
<tr>
<th></th>
<th>General</th>
<th>O</th>
<th>B</th>
<th>C</th>
<th>SC</th>
<th>ST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Agricultural Processing &amp; Structure</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>b) Farm Power and Equipment</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>c) Soil &amp; Water Conservation Engineering</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**HORTICULTURE**

<table>
<thead>
<tr>
<th></th>
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<th>O</th>
<th>B</th>
<th>C</th>
<th>SC</th>
<th>ST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Floriculture</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>b) Pomology</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>c) Vegetable Science</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>***</td>
<td>POST HARVEST TECHNOLOGY</td>
<td>General</td>
<td>O B C</td>
<td>SC</td>
<td>ST</td>
<td>Total</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>a)</td>
<td>Post Harvest Technology of Horticulture Crops</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Post Harvest Engineering &amp; Technology</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

(ii) ICAR In-Service Nominees Scheme - 5 seats
(iii) Faculty Up gradation Scheme - 10 seats
(iv) Departmental (Scientific) - 10 Seats
(v) Departmental (Technical) - 23 seats for M.Sc. & Ph. D. both

Note: The PG School, IARI reserves the right to change the number of seats. In case of any change in the number of seats, the same would be posted on the Institute Website.

4. ACADEMIC TERMS

The academic session of the P.G. School, IARI shall commence on August 6, 2010 and is divided into three trimesters. The duration of the three trimesters for the 2010-11 academic year is indicated below:

- **Registration of newly admitted students**: 6th August, 2010
- **Orientation**: 7th August, 2010
- **I Trimester**: 9th August, 2010 to 27th November, 2010
  - **Winter Break**: 28th November, 2010 to 12th December, 2010
- **II Trimester**: 13th December, 2010 to 8th April, 2011
  - **Summer Vacation**: 9th April, 2011 to 1st May, 2011
- **III Trimester**: 2nd May, 2011 to 30th July, 2011
  - **Trimester Break**: 31st July, 2011 to 7th August, 2011

5. ELIGIBILITY

A. Open Scheme

(i) Essential Qualification for Admission

(a) Only those candidates who had their Bachelor’s Degree Programmes under 10+2+4 OR 10+2+3 OR 10+1+4 system (OR awarded B.Sc. degree under 10+2+2 system prior to 1985) and fulfill the qualifications as prescribed in this bulletin are eligible to apply for admission.

(b) **For General/OBC candidates**: At least 60% marks OR an overall grade point average (OGPA) of 7.50 out of 10.00 OR 3.75 out of 5.00 OR 3.00 out of 4.00 OR 2.25 out of 3.00 in M.Sc./M.Sc. (Ag.)/M.Tech./M.E.

   **For SC/ST/PH candidates**: At least 55% marks OR OGPA of 6.88 out of 10.00 OR 3.44 out of 5.00 OR 2.75 out of 4.00 OR 2.06 out of 3.00 in M.Sc./M.Sc. (Ag.)/M.Tech./M.E.

In universities where OGPA is awarded no equivalence of grades to percentage shall be considered for determining the eligibility qualification for appearing in the entrance examination or calculation of academic score. The percentage of marks shall be considered only for those candidates coming from universities that do not award grades and only award percentage of marks.

Note: Candidates who have appeared at the Master’s Degree final year Examination in 2010 are also eligible to apply and appear in written entrance examination provisionally for Ph.D. programme. However, they will have to submit documentary evidence of their eligibility on or before **July 6, 2010** failing which they shall not be considered for admission.
## (ii) Qualification for Admission to Different Disciplines

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Discipline</th>
<th>M.Sc./M.Sc.(Ag)/M.Tech./M.E. in</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Agricultural Chemicals</td>
<td>Agricultural Chemicals/Soil Science and Agricultural Chemistry/Environmental Science/Chemistry</td>
</tr>
<tr>
<td>02.</td>
<td>Agricultural Economics</td>
<td>Agricultural Economics/Dairy Economics/Livestock Economics/Agricultural Marketing and Cooperation</td>
</tr>
<tr>
<td>03.</td>
<td>Agricultural Engineering</td>
<td>Agricultural Engineering/Dairy Engineering/Water Science and Technology; M.Sc. in Dairy Engineering are eligible for Ph.D. in Agricultural Processing and Structures (Pre-requisite: B.Sc./B.Tech./BE in Agricultural Engineering)</td>
</tr>
<tr>
<td>04.</td>
<td>Agricultural Extension</td>
<td>Agricultural Extension/Extension Education/Dairy Extension/Fisheries Extension/Livestock Extension</td>
</tr>
<tr>
<td>05.</td>
<td>Agricultural Physics</td>
<td>Agricultural Physics/Agril. Chemistry/Soil Science/Agricultural Meteorology/Meteorology/Agricultural Engineering/Engineering/Physics/Bio-physics/Water Science and Technology</td>
</tr>
<tr>
<td>07.</td>
<td>Agronomy</td>
<td>Agronomy/Water Science and Technology</td>
</tr>
<tr>
<td>08.</td>
<td>Biochemistry</td>
<td>Biochemistry/Agricultural Biochemistry/Agricultural Chemistry/Molecular Biology and/OR Biotechnology/Life Sciences/Chemistry with Organic Chemistry as a special subject</td>
</tr>
<tr>
<td>09.</td>
<td>Entomology</td>
<td>Entomology/Agricultural Entomology/Zoology or Plant Protection with Entomology as specialization/Life Sciences</td>
</tr>
<tr>
<td>10.</td>
<td>Environmental Science</td>
<td>Environmental Sciences/Physical Sciences/Biological Sciences/Chemistry/any branch of Agricultural Sciences/Life Sciences</td>
</tr>
<tr>
<td>11.</td>
<td>Genetics</td>
<td>Genetics and/OR Plant Breeding/Plant Genetic Resources/any other branch of Biological Sciences with Genetics and/OR Plant Breeding as a subject</td>
</tr>
<tr>
<td>12.</td>
<td>Horticulture</td>
<td>Horticulture or Agriculture with major in Pomology/Olericulture/Floriculture/Post Harvest Technology of Horticultural Crops/ Food Science and/OR Technology/Genetics and/OR Plant Breeding/Plant Genetic Resources/Plant Physiology/Crop Physiology with specialisation in any of above sub-disciplines of Horticulture/Physiology/Plant Genetic Resources/Water Science and Technology</td>
</tr>
<tr>
<td>13.</td>
<td>Microbiology</td>
<td>Microbiology/Agricultural Microbiology/Soil Science and/OR Agricultural Chemistry/Genetics/Botany/Agricultural Botany/Molecular Biology and/OR Biotechnology/Life Sciences/Biochemistry with Microbiology as a special subject</td>
</tr>
<tr>
<td>14.</td>
<td>Molecular Biology &amp; Biotechnology</td>
<td>Molecular Biology and/OR Biotechnology/Biochemistry/Agricultural Biochemistry/Botany/Agricultural Botany/Genetics and/OR Plant Breeding/Life Sciences/Microbiology/Agricultural Microbiology/Plant Genetic Resources</td>
</tr>
<tr>
<td>15.</td>
<td>Nematology</td>
<td>Nematology/Entomology/Zoology/Botany/Mycology and/ OR Plant Pathology/Life Sciences/Molecular Biology and/ OR Biotechnology/Plant Protection with nematology as specialization</td>
</tr>
<tr>
<td>16.</td>
<td>Plant Genetic Resources</td>
<td>Plant Genetic Resources/Genetics/Plant Breeding/ Agricultural Botany/ Horticulture/Plant Biotechnology/ Seed Science &amp; Technology/Plant Physiology/any other branch of Biological Sciences with specialization in these subjects and/OR Plant Taxonomy/Economic Botany.</td>
</tr>
<tr>
<td>17.</td>
<td>Plant Pathology</td>
<td>Mycology and/OR Plant Pathology/Botany/ Agricultural Botany/ Molecular Biology and/OR Biotechnology/Genetics/Microbiology/Seed Science &amp; Technology/ Biochemistry/Plant Genetic Resources/Plant protection/ Life Sciences with Mycology and Plant Pathology as specialization</td>
</tr>
<tr>
<td>18.</td>
<td>Plant Physiology</td>
<td>Plant Physiology/Crop Physiology/Botany/Agricultural Botany/ Biochemistry/Life Sciences/Molecular Biology and/OR Biotechnology/Plant Genetic Resources</td>
</tr>
<tr>
<td>19.</td>
<td>Post Harvest Technology</td>
<td>a) For Post Harvest Technology of Horticultural Crops Horticulture/Post Harvest Technology/Food Science &amp; Technology b) For Post Harvest Engineering and Technology Agricultural Processing and Structures/Food Engineering/ Post Harvest Engineering/Biochemical Engineering.</td>
</tr>
<tr>
<td>20.</td>
<td>Seed Science &amp; Technology</td>
<td>Seed Science &amp; Technology/Genetics and/OR Plant Breeding/ Plant Physiology/Crop Physiology/Mycology and/OR Plant Pathology/Entomology/Nematology/ Botany/Agricultural Botany/Plant Genetic Resources</td>
</tr>
<tr>
<td>21</td>
<td>Soil Science &amp; Agricultural Chemistry</td>
<td>Soil Science and/OR Agricultural Chemistry/Chemistry/ Agricultural Physics with specialization in Soil Physics/ Environmental Sciences with specialization in Soil Science</td>
</tr>
<tr>
<td>22</td>
<td>Water Science &amp; Technology</td>
<td>Water Science and Technology/Agricultural Physics/Physics/ Chemistry/Mathematics (with Physical Sciences at Bachelors Degree Level)/ M.Tech in Agril. Engineering/Civil Engineering</td>
</tr>
</tbody>
</table>

(iii) Age Limit

The minimum age limit for admission shall be 21 years as on 31st July, 2010. No relaxation is admissible regarding the minimum age limit.

B. Admission of in-service candidates of Agricultural Universities under faculty up gradation scheme

i. Essential Qualifications: Same as given under Open Scheme.

ii. Not more than three candidates sponsored by any university shall be admitted in any one year under this stream. iii. The candidates sponsored under this scheme should be regular employees of the university and should be likely to continue in service after obtaining the training. The candidates should be sponsored on deputation terms entitling them to full salary and allowances. No fellowship shall be awarded to them by the IARI.

iv. The words “Sponsored for admission under Faculty Up gradation Scheme” should be clearly inscribed on the application form and on the forwarding letter. The sponsorship certificate as given at Annexure- I may be attached with the application and duly forwarded by the Vice-Chancellor or his nominee.
C. Admission under ICAR in-service nominee scheme
i. Essential Qualification: Same as given for admission under Open Scheme.
ii. The candidates sponsored under this scheme should only be those ICAR employees who have been selected for ICAR Senior Fellowship.
iii. The word “Sponsored for admission under reserved seats for ICAR employees” should be clearly inscribed on the application form and in the forwarding letter. The declaration as given in Annexure-I signed by the Director of the concerned Institute and a sponsorship letter from Deputy Director General (Education) ICAR or his nominee as given in Annexure-II should be attached with the application form.

D. Admission under departmental quota for IARI employees

Eligibility: Eligibility criteria for departmental seats are same as for ICAR In-Service Nominees Scheme. Number of seats and other details can be obtained from P.G. School, IARI.

6. RESERVATION

i. 15% of the total number of seats is reserved for Scheduled Caste and seven-and-a-half percent for Scheduled Tribe candidates subject to their being otherwise suitable. The reservation stated above is interchangeable i.e. if sufficient number of candidates are not available to fill up the seats reserved for Scheduled Tribe candidates, these can be filled up from among suitable Scheduled Caste candidates and vice versa. However, in the event of there being no eligible suitable Scheduled Castes candidates in the earmarked discipline, to fill up the mentioned number of seats, such unfilled seats shall be transferred to other disciplines, where eligible suitable Scheduled Castes candidates are available for filling these seats. An identical procedure as above will be followed in the case of Scheduled Tribes reservations also. After these two exercises, if any seat(s) still remain(s) unfilled in the Scheduled Castes and Scheduled Tribes categories respectively, such unfilled Scheduled Castes/Scheduled Tribes seat(s) shall be transferred to Scheduled Tribes/Scheduled Castes category and filled up by the available eligible candidate(s) in the concerned category. Under no circumstances, the Scheduled Castes and Scheduled Tribes seats shall be transferable from M.Sc. to Ph.D. programme and vice-versa. The Scheduled Castes/Tribes candidates who are selected for admission on the basis of merit may not be counted against the reserved quota and there is no maximum limit on the admission of the candidates belonging to the two categories.

ii. 18% of the total number of seats is reserved for other backward classes candidates subject to their being otherwise suitable as per the norms of ICAR/Govt. of India. If any seat(s) remain(s) unfilled, the unfilled OBC seat(s) shall be transferred to General Category.

ii. Three per cent of the total number of seats in each scheme of admission open to Indian nationals is reserved for Physically Handicapped candidates subject to their being otherwise suitable as per the norms of ICAR/Govt. of India.

7. PROCEDURE FOR APPLICATION

i. The Information Bulletin bears a serial number at the top right corner. This number, the course and the discipline to which the admission is sought, must be quoted in all correspondence.

ii. The Information Bulletin contains the following enclosures:
   i) One computerized application form which has to be filled very carefully and neatly, according to the instructions given in the Information Bulletin. This form does not have any number, but the applicant is required to fill the numbers in item ‘1’. This number should be same as given on the Admit cards/acknowledgement card/Information Bulletin. This clause is not applicable for those who have downloaded their application form, admit card and acknowledgement card from the IARI website. The column no.1 i.e. serial no. of the application form downloaded through the IARI website should be left blank by the candidate which will be filled in by the PG School. Illegibly filled forms are likely to be rejected.
ii) Admit card (in duplicate).

iii) Acknowledgement Card.

iii. A candidate who has already been awarded Ph.D. degree from IARI or any other university/Institute shall not be allowed for entrance examination for the same degree.

iv. A candidate can apply for admission to one discipline only.

v. The candidates who are appearing in the Master’s degree examination in 2010 are also eligible to apply provisionally for admission and appear in the entrance examination, but they will have to submit documentary evidence (including mark sheet for M.Sc. examination) of their eligibility latest by 4.30 P.M. on July 6, 2010.

vi. Candidates who are in employment must submit their application through proper channel. ADVANCE COPY WILL NOT BE CONSIDERED.

vii. The application form along with the admit cards and acknowledgement card (affixed with postal stamp of the amount indicated therein and filled legibly and correctly by the applicant) should be forwarded with necessary sets of documents completed in all respects so as to reach Registrar (Academic), Post Graduate School, IARI, New Delhi - 110012 on or before April 8, 2010, the last date notified. The last date for receipt of applications from the candidates residing in Assam, Meghalaya, Arunachal Pradesh, Mizoram, Manipur, Nagaland, Tripura, Sikkim, Ladakh Division of J & K State, Lahaul & Spiti District and Pangi Sub-Division of Chamba District of Himachal Pradesh, Andaman & Nicobar Islands and Lakshadweep complete in all respects is April 22, 2010. The application can also be given in person to the Registrar (Academic), Post Graduate School, on or before the last date notified. Any application received after the last date shall not be entertained.

Attested copies of the following certificates must be enclosed along with the application form failing which the application form shall not be considered.

(a) Proof of the date of birth.
(b) Matriculation (X) or equivalent certificate and marks sheet. (c) Intermediate (XII) examination certificate and marks sheet. (d) Bachelor’s degree certificate and marks sheet.
(e) Master’s degree certificate and marks sheet (for the candidates who have already completed their M.Sc. degrees).
(f) Other backward class, Scheduled Caste, Scheduled Tribe and Physically Handicapped Certificate (whichever is applicable) in the proforma as given at Annexure-III, IV and Annexure-V, respectively from the authorities empowered to issue such certificate of verification issued not more than six months before the date of application.
(g) Form of certificate to be produced by candidates who are appearing for their M.Sc. final examination 2010 in the proforma as at Annexure-VI.

viii. If a candidate furnishes wrong information or suppresses any relevant information, the application is liable to be rejected.

ix. Candidates must produce originals and attested copies of the following certificates (whichever is applicable) and documents in the order indicated below before they join the course, if selected, failing which candidates will not be allowed to join the course.

(a) Proof of the date of birth.
(b) Matriculation (X) or equivalent certificate and marks sheet. (c) Intermediate (XII) examination certificate and marks sheet. (d) Bachelor’s degree certificate and marks sheet.
(e) Master’s degree certificate and marks sheet.
(f) Other backward class, Scheduled Caste, Scheduled Tribe and Physically Handicapped Certificate (whichever is applicable) in the proforma as at Annexure-III, IV and Annexure-V, respectively from the authorities.
empowered to issue such certificate of verification issued not more than six months before the date of application.

(g) Form of certificate to be produced by candidates who are appearing for their M.Sc. final examination 2010 in the proforma as at Annexure-VI.

x. Admit Cards for the Entrance Examination to be conducted on 6th June, 2010 will be sent well in advance to all eligible candidates who have submitted their applications complete in all respects by the due dates. However, if a candidate does not receive the admit card well in advance of the date for Entrance Examination but is satisfied that he/she fulfils the eligibility requirements in terms of percentage of marks or OGPA as given in the this Information Bulletin he/she may contact the Dean or Registrar (Academic), Post Graduate School, IARI by phone or fax at the number given on the inside of the front cover of this bulletin.

xi. If any document submitted by the candidate is found to be false at any stage during his/her study at IARI, his/her admission will be cancelled.

xii. The candidate must give choice for centre of examination from the list of Cities given in this Information Bulletin, nearest to the permanent address or the university last attended, otherwise PG School will allot the examination centre accordingly.

xiii. The candidates selected for admission at this Institute shall be required to furnish a surety bond for an amount of Rs.50,000/- (Rs. fifty thousand only) on non-judicial stamp paper valuing Rs. 100/- duly attested by the notary as per the annexure VIII.

xiv. Ragging in any form is strictly prohibited at this Institute premises including hostels. The following could be the possible punishments for those who are found guilty of participation in or abetment of ragging. The quantum of punishment shall, naturally, depend upon the nature and gravity of the offence as established by the Disciplinary Committee or the court of law.

- Cancellation of admission.
- Suspension from attending classes. Withholding/withdrawing scholarship/fellowship and other benefits.
- Debarring from appearing in any test/examination or other evaluation process.
- Withholding results
- Debarring from representing the institution in any national or international meet, tournament, youth festival, etc.
- Expulsion from the hostel.
- Expulsion from the institution for periods varying from 1 to 3 trimesters.
- Expulsion from the institution and consequent debarring from admission to any other institution
- Fine up to Rs 25,000/-.
- Rigorous imprisonment up to three years.

8. SELECTION OF CANDIDATES

Academic Attainments (Record)

Weightage for academic attainments (High School to terminal degree) would be 20%.

Entrance Examination

The candidates will have to appear for Entrance Examination consisting of one paper of three parts: Part-I (General Agriculture) and Part-II & III (Subject Paper). The minimum qualifying mark is 50% for General/OBC (45% for SC/ST/PH candidates). Total marks would be considered for the preparation of merit. The weightage for entrance examination is 70%.
Interview

Candidates qualifying in the Entrance Examination will be called for interview in the ratio of maximum 1:4 (No. of seats: No. of students called for interview). The interview would be held on 7th July 2010 in respective Divisions or Institutes at IARI on campus.

The list of selected candidates will be displayed at P.G. School, IARI and the on website of IARI, www.iari.res.in on 9th July, 2010 and written intimation will be sent to all selected candidates.

The selected candidates will be allowed to join the Post Graduate School for pursuing further studies only after they are declared medically fit. In-service candidates from all schemes will have to produce the relieving order from their parent office/department at the time of enrolment.

9. COURSE-CREDIT SYSTEM

The student’s programme of studies is planned after taking due account of his/her previous academic training. This is done by an Advisory Committee which consists of Chairman from the major field of specialization and other members from the major and minor fields. Ph.D. students are required to take two minors (minimum of nine credits in each) from supporting disciplines. The course work of each student will also include the following compulsory courses.

A. Courses on Introductory Agriculture: The candidates, who have not been exposed to agricultural science discipline in their last examination, if admitted to Ph.D. programme at the IARI will have to take Introductory Agriculture courses of 37 credits during the first three trimesters and a training during summer vacation. These courses shall be over and above the prescribed credit load for the Ph.D. degree and will be graded and counted for calculating OGPA like regular courses.

B. Course on Agricultural Information System: This is a one-credit course and is compulsory for all the students.

C. Any one of the following courses:
   i) Foundation Course on Informatics (Simulation and Informatics)
   ii) Fundamentals of Economics and Business (Agricultural Economics)
   iii) Elementary Statistical Methods (Agricultural Statistics)

The details of the course credits, course numbers, course titles, etc. are included in the P.G. School Calendar. The student’s attainment in the courses taken by him/her is judged from the grade obtained in each course and the progress is measured in terms of the overall grade point average (OGPA). The maximum attainable OGPA is 10.00 and the minimum passing point is (6.50).

Although the minimum residential requirements for Ph.D. course is two academic years, this period is likely to be extended due to requirements in individual cases. Ph.D. students usually take 3 to 4 years, and sometimes even longer, to complete their programme of studies. All the requirements for the Ph.D. degree however, must be completed within five years from the date of admission.

The maximum period of leave that can be availed by any student during the course of studies is one trimester i.e. 12 weeks. In exceptional cases, the Dean may permit students to avail leave from the P.G. School for a maximum period of two trimesters, only on grounds of self illness.

The detailed rules and regulations as also the syllabi of the various courses are described in the Post Graduate School Calendar.
10. FEES AND EXPENSES

The students are liable to pay fees, funds and other charges as may be laid down from time to time. SC/ST students are entitled to the reimbursement of the tuition fees.

11. RESIDENCE

The residence in the hostel is compulsory for all students of the Post Graduate School. No exemption from compulsory residence in the Post Graduate Hostels is given to the students.

12. SCHOLARSHIPS, MEDALS AND AWARDS

Financial assistance in the form of IARI scholarship for Ph.D. students will be provided to the extent feasible, as per rules and regulations of the Post Graduate School of the IARI. The value of IARI scholarship is Rs.10, 500/- per month for a period of three years. The students are also entitled to get a contingent grant of Rs. 10,000/- per annum for the purchase of books, chemicals, equipment etc., subject to submission of surety bond as mentioned on page 10 of this Information Bulletin. Students who had availed the same scholarship previously will not be eligible for scholarship again.

13. DISCIPLINE

The Dean, Post Graduate School is charged with the general control of students and with the maintenance of discipline. The Dean shall have the discretion to remove any student from the rolls of the P.G. School of Institute for one or several of the following reasons.

(a) Failure to gain from the course of studies
(b) Misbehavior
(c) Failure to pay the dues (fees, etc.) in time
(d) Continuous absence from studies for a long period

Notes:
1. Students are prohibited from applying for admission to any other institution without prior permission of the Dean.
2. If any property/equipment on the campus is damaged and loss caused to the Institution as a result of violence, demonstration, strikes, etc. resorted to by the students, the loss would be recovered either directly from the persons specially identified (where possible) or collectively from such groups or associations as were responsible for causing the damage or loss to property.

14. STUDENTS’ SUPPORT SERVICES

i. **Library**: IARI Library, by virtue of its having the richest and the first literature resources, has been playing the de facto role of National Agricultural Library of India since long and has also been regarded as one of the ten best Agro-biological Libraries of the world. The Library has literature collection to the extent of 6 lakh documents, 1 lakh monographs, 10,500 serial files, 12,000 PG theses and large number of research bulletins, reprints, etc. The Library has also been functioning as the depository for the publications of FAO, AVRDC, IDRC and CGIAR International Institutes. The Library is the first Agricultural Library in India to become the member of the FAO’s Agricultural Library Network, AGRINET.
ii. **Medical Facilities:** A qualified Medical Officer looks after the health of the students, and is incharge of the Institute Dispensary located in the vicinity of the Hostels. The Medical Officer resides on the Institute campus and is thus available during day and night. The medical service is provided free to students at the dispensary.

iii. **Sports and Recreation:** The Post Graduate School encourages extra curricular activities that enrich cultural, physical and social life of students. Spacious playgrounds are provided near the student hostels and necessary facilities exist for outdoor games like cricket, football, hockey, volleyball, tennis, badminton and various athletic events. There are facilities also for indoor games in each hostel. There is a Students’ Sports Fund to which every student subscribes at the beginning of each academic year.

iv. **Student Welfare Fund:** With a view to render financial aid to students in distress and to support any other students’ activities, a Students’ Welfare Fund has been instituted. All students are required to contribute to the fund at the beginning of each academic year. No loan shall ordinarily be given from this fund in the first trimester of admission.

v. **Students’ Counseling and Placement Cell:**
A ‘Student Career Development and Industry Interface Centre’ has been established for career counseling and arranging frequent Institute-Industry interface. It has been organizing campus interviews for career counseling and placement of outgoing students in the jobs of their choice. A Job-Mela was organized with Concept Agrotech Consultants Ltd. (CACL), New Delhi in which eight firms from agriculture and allied sectors participated. Campus interviews are also organized to fill up the vacancies of Rural development Officers and Agricultural Officers in the Union Bank of India and Bank of India, respectively. A large number of our students have been offered jobs.

The Institute has also established a ‘Zonal Technology Management & Business Planning and Development Unit’ for looking after the commercialization of IARI technologies, Intellectual Property Right issues and filing of patents etc.

vi. **Post Graduate School Students’ Union:** All students admitted to the Post Graduate School automatically become members of Post Graduate School Students’ Union and are entitled to participate in the Union election.

vii. **Internet facility for IARI Post Graduate Students:** Internet facility for IARI post graduate students was inaugurated on May 15, 2006 at the Sharad hostel. Similar facility is being provided at all the hostels and guest houses for trainees and visiting faculty. Creation of this facility in students’ hostels is a step forward in the area of knowledge dissemination and awareness for establishing a healthy and productive relationship between scientists and students for overall national agricultural development. The facility is made available to IARI students free of charge. The course schedules along with contents and suggested reading are also available on IARI intranet system.

### 15. SYLLABI FOR ENTRANCE EXAMINATION FOR Ph.D.

The Entrance Examination will be in the form of one question paper of three distinct parts. The questions will be of multiple choice and matching types in part I & II (30 marks and 150 marks respectively) and short analytical type in part III (30 marks). Answers for part I & II are to be given on computerized OMR answer sheets (see Annexure-VII) and that of part III in the space provided for the purpose in the question paper. Negative marking to the extent of 0.25 marks for each wrong answer will be applicable in case of part I and II of the question paper.

**Part-I : General Agriculture**

Reference Book : Handbook of Agriculture, published by the ICAR.
PART-I : GENERAL AGRICULTURE

Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, pigeonpea, sugarcane, tomato, cauliflower, mango and rose.

Weathering of rocks; soil formation, major soils of India, soil erosion and its control; common farm implements; role of NPK and their deficiency symptoms; manures (FYM, compost and green manure) and fertilizers (urea, diammonium phosphate, single superphosphate and muriate of potash).

Structure and function and cell organelles - mitosis and meiosis; gametogenesis, fertilization and embryogenesis; chromosomal and extra-chromosomal basis of inheritance; mutation and polyplody; selection methods, hybridization, backcross; plant growth regulators; elementary knowledge of photosynthesis, respiration and nitrogen fixation.

Isomerism; titrimetry and volumetry; structure and function of carbohydrates, proteins, nucleic acids, enzymes and vitamins.

Major pests and diseases of rice, maize, pulses, oilseeds, vegetables, wheat, cotton, sugarcane and their management.

Important principles of economics, structural transformation in economy and its globalization; principles of extension education; important rural development programmes in India; organizational set up of agricultural research, education and extension in India, elements of statistics.

PART-II AND III: SUBJECT PAPER

AGRICULTURAL CHEMICALS (01)

Nomenclature and classification of organic compounds, chemical bonding; isomerism and stereo chemistry; properties and reactions of organic functional groups; aliphatic, alicyclic, aromatic and heterocyclic compounds; theory and application of chromatography and spectroscopy (IR, UV, NMR) in the study of organic compounds; chemistry of natural products; mono and sesqui-terpenes, steroids (cholesterol and Vitamin D), alkaloids (pyrrolidine, piperidine, pyridine, pyrole groups), lipids, carbohydrates, plant pigments, nucleic acids, amino acids and proteins.

Chemical equilibria; chemical kinetics, kinetic theory of gases, thermodynamics; surface chemistry, colloids, emulsions.

Titrimetry, theory of indicators; redox reactions.

Classification of pesticides; chemistry of botanical pesticides (pyrethroids, rotenoids, nicotinoids) and synthetic insecticides (DDT, BHC, cyclodiienes, malathion, methyl parathion, monocrotophos, phorate, carbaryl, carbofuran), fungicides (Bordeaux mixture, zineb, captan, ziram), herbicides (2,4-D, atrazine, diuron and butachlor), fumigants (EDB, EDCT, aluminium phosphide), rodenticides (Warfarin) and nematicide (nemagon); pesticide formulation - definition and classification, surfactants; pesticide residue chemistry.

Essential plant nutrients; chemistry, technology and use of important fertilizers; clays and clay minerals; soil organic matter, nitrification and denitrification; N2-fixation; radioactivity and radiotracer techniques.

AGRICULTURAL ECONOMICS (02)

Basic concepts in economics, theory of consumer demand, theory of production, market classification, theory of perfect and imperfect competition, theory of distribution, national income accounting, classical and Keynesian theories of income determination, money-concepts, functions, theories of demand for money, supply of money; general equilibrium of product and money markets; IS and LM functions; monetary and fiscal policies, banking - central and commercial, functions and problems of recent macro-economic policies of Government of India;
research methodology, steps in agricultural economics research, data collection, analysis and report writing; differential and integral calculus, differential equations, matrix algebra, solution of simultaneous linear equations, linear programming, statistical inference, correlation and regression analysis, time series analysis and theory of index numbers.

Nature and scope of agricultural production economics vis-a-vis farm management; farm business analysis, farm records and farm cost accounting; farm planning and budgeting, production function and resource allocation; cost, profit and supply functions; nature and analysis of risk in farming; systems approach in farming; role of credit in agriculture, principles of agricultural finance, farm financial management, supply and demand for farm credit; recent innovations in the extension of credit to agriculture, theory and practice of co-operation; problems of co-operatives, management of co-operative institutions; cost-benefit analysis of agricultural projects.

Scope of marketing in a developing economy; practice and problems of marketing agricultural inputs and outputs; functions and channels of marketing, co-operative marketing; agricultural price analysis; demand analysis; problems and prospects of storage and processing of agricultural products; agricultural exports - problems and prospects.

Theory of growth and growth models; agricultural policy, planning and development in India, inter-regional variations in agricultural development, agricultural technology and income distribution; agrarian reforms and output and input price policies; infrastructure and institutions for agricultural development, equity and ecological consideration in agricultural development.

**AGRICULTURAL ENGINEERING (03)**

Basic concepts in calculus, trigonometry, analytical geometry, linear algebra and algebra of real and complex numbers; instrumentation for measurement of forces, torque, temperature, moisture, fluid flow; basic principles of simulation; methods of statics, dynamics and mechanics of materials; common distributions of random variables and methods of statistical inference; energy sources - their utilisation and efficiencies on the farm; uses and application of computers.

In addition, attempt any one of the following three areas depending upon the major field of choice.

i. **Agricultural Processing and Structures**
   Application of engineering properties in designs; principle of heat transfer, boundary layer and turbulence; mass transfer operations, mechanisms of moisture movement; theory of drying, equilibrium moisture content; methods of storage and milling; design of material handling devices; mechanical separation; design consideration in farm structure and animal housing; seed processing equipments; plant layout.

ii. **Farm Power and Equipment**
   State of farm mechanisation; testing of power units and tractor systems; performance capacities of power and machines on the farm; management of power and machinery and their use on the farm; dynamics of machine elements; tillage and tractor machines; design considerations in farm machinery and power units; tractor hydraulics, symbols and circuits; ergonomic consideration in machine design.

iii. **Soil and Water Conservation Engineering**
   Principles of fluid mechanics; theory of ground water recharge, collection, analysis and interpretation of hydrological data; principles and practices of irrigation and drainage, soil erosion; types, measurement and control; stream gauging and sediment monitoring; soil conservation practices, command area development; watershed management; open channel flows; design and operation of water lifting devices; consumptive use of water; estimation of evapo-transpiration; irrigation water distribution methods; water harvesting; lining of waterways and canals; modelling of soil-plant-water relationships; stability of slopes and design of earthen dams.
AGRICULTURAL EXTENSION (04)

Objectives, philosophy and principles of extension education; extension role of agricultural universities; comparative studies of extension education system in selected developed and developing countries; different models of organising agricultural extension, particularly tools and methodology; agricultural information (knowledge) system; teaching and learning processes; principles of adult learning; audio-visual aids and their classification; modern communication and information technology; application of PERT/CPM principles of programme planning process; agricultural and rural development programmes in India.

Principles of extension management, different theories of management processes and functions of managerial organisational set-up for extension services in India including the T & V system; types of training programmes for extension personnel and farmers; model of modern training, modern technologies, experimental learning methods, entrepreneurial development process; factors affecting extension training.

Scope and importance of psychology in extension education, concept of human society; characteristics of rural people; socio-psychological basis of human behaviour, socio-psychological factors in transfer of technology; social structure; social interactions and processes; values and norms of rural social systems; rural institutions; role of leadership; process of diffusion and adoption; consequences of adoption of innovations; communication process and elements of communication; theories of communication, fundamentals of farm journalism; role of mass media; modern electronic media.

Process of scientific research; validity and reliability of measuring devices; methods of observation and data collection; techniques of tabulation; analysis of data and report writing; methods of statistical analysis; statistical designs.

AGRICULTURAL PHYSICS (05)

Scope of agricultural physics; different forms of energy; first and second laws of thermodynamics, free energy and work function relationship; radioactivity, law of radioactive disintegration, detection and measurement of nuclear radiation and stable isotopes; concepts of tracer methodology; application of radioisotopes and radiation in agriculture; electromagnetic radiation, visible and infrared region and their application to remote sensing in agriculture.

Weather and climate; climatic classification; Koppen and Thornthwaite systems; humid and dry climates; continental, maritime and desert climates; climatology of India; western disturbances, cyclones, arid and semi-arid regions.

Soils of India; factors and processes of soil formation; physical, physicochemical, biological and mineralogical properties of soils; soil compaction and mechanical impedance; stress strain relationships; structure and physical properties of water; Poiseuille’s law, Darcy’s law; soil water retention and movement under saturated and unsaturated conditions; infiltration, redistribution and evaporation of soil water; field water balance and water use efficiency; soil aeration; gaseous interchange; influence of soil temperature and aeration on crop growth and their management; soil erosion and control.

AGRICULTURAL STATISTICS (06)

Elements of probability theory, concepts of random variable and distribution function, conditional probability; Bayes’ theorem; moments; moment generating and characteristic functions; Chebychev’s inequality, law of large numbers; limit theorems; univariate (discrete and continuous) distributions; sampling distributions, transformations; multivariate normal distribution, Wishart’s distribution, Hotelling’s T2; discriminant function; elements of stochastic processes; theory of point estimation; Cramer-Rao inequality; Rao-Blackwell theorem; methods of estimation; confidence intervals; testing of hypothesis, tests of simple hypothesis against simple or composite hypothesis; likelihood ratio test; sequential probability ratio test; large sample tests; non-parametric tests.
Concepts of sampling and non-sampling errors; simple random sampling; stratified sampling, allocation of sample to strata gain due to stratification; ratio and regression methods of estimation; cluster sampling; two stage sampling; systematic sampling; sampling with probability proportional to size with replacement.

Principles of design of experiments; uniformity trials; completely randomized, randomized block and latin square designs; missing values in randomized block and latin square designs; analysis of non-orthogonal data in two-way classification (without interaction); factorial experiments and confounding in symmetrical factorial experiments - design and analysis of 2n and 3n experiments; split and strip plot designs; balanced incomplete block design (BIBD)-parametric relations and general properties; analysis of BIBD with recovery of interblock information.

Statistical analysis for segregation and linkage; random mating and equilibrium in large populations; inbreeding - effects of finite population size; polygenic systems for quantitative characters; genetic variance and correlation; heritability, repeatability; individual, family and combined selections; selection for improving several characters; cross-breeding.

**AGR runtime(07)**

Principles of crop production, crop plants in relation to environment, concepts involved in growth analysis; quantitative agro-biological principles and their validity; classification of climate, agro-climatic zones of India, their characteristic features; physiological limits of crop yield and variability in relation to the agro-ecological optimum; types of tillage - concepts and practices.

Principles and practices of weed control in component crops and cropping systems; crop weed competition, herbicide-formulations, classification, selectivity and mode of action, integrated weed management.

Introduction, origin, history, production, distribution, cultural practices, varieties, quality, biomass production and bioenergetics of major field crops, forage, vegetable, spices and condiment crops.

Soil fertility and its management; essential plant nutrients, their functions and deficiency symptoms in plants; organic manures, chemical and biofertilizers and fertilizer usage.

History of irrigated agriculture, soil-water-plant relationship, soil moisture stress and plant growth; drought resistance in crops, mechanisms of drought tolerance, and crop adaptability, soil and plant moisture conservation techniques, water harvesting and other agrotechniques for dryland agriculture; measurement of soil moisture, methods of scheduling irrigation, methods of irrigating crop plants, quality of irrigation water; watershed management concepts; management of excess soil water, agricultural drainage, principles and practices; problem soils - saline, alkali, saline-alkali and acid soils, principles and practices and prospects; wasteland management, soil erosion and its control.

Cropping systems - principles and practices; changing cropping patterns in different agro-climatic zones; sustainability - concept and practices; agro-forestry systems - concepts and practices.

Principles of experimental designs, analysis and interpretation of data, methods of statistical analysis and statistical designs.

**BIOCHEMISTRY (08)**

Importance of biochemistry in plant sciences; plant cell structure, cell organelles and their function; chemistry of bonding, isomerism, free energy, enthalpy and entropy; pH and buffers.

Enzymes and enzyme kinetics; structure, function and immobilization of enzymes; metabolism of carbohydrates, proteins, lipids and nucleic acids; structure and function of vitamins and hormones; metabolism of secondary plant products; nitrate assimilation and biological nitrogen fixation; sulphur metabolism; photosynthesis and respiration.
DNA replication, transcription, and translation, regulation of gene expression in eukaryotes and prokaryotes; viruses and bacteriophages; basic concepts of genetic engineering and its application in crop improvement; elementary concepts of immunology.

Fundamental principles of nutrition, balanced diet, calorie and protein requirement, nutritive value of foods. Chromatography, electrophoresis, isoelectric focusing; ultracentrifugation; radio isotopic techniques in biochemical studies; spectrophotometry and ELISA.

**ENTOMOLOGY (09)**

Position of insects in animal kingdom - their origin, phylogeny and distribution; history and basis of insect classification; distinguishing characters of insect Orders and economically important families; concept of species and speciation; rules and regulations of zoological nomenclature; morphology - external and internal; embryonic and post-embryonic development.

Insect ecology - biotic potential, biotic and abiotic resistance, effect of temperature, humidity and light on insect development and population dynamics; diapause, food chain, migration and dispersal.

Fundamentals of insect physiology, different systems, their structure and function, metabolism, sense organs, insect behaviour, host plant relationship.

Social and other beneficial insects; pests of field crops and stored food; principles of pest control; classification, mode of action and metabolism of insecticides; insecticidal residues; resistance and resurgence; parasites, predators and pathogenic microorganisms of crop pests, biological control.

Antifeedants, hormones, growth regulators, semiochemicals, host-plant resistance and genetic manipulation, insect quarantine; concept of integrated pest management; non-insect pests and their control.

**ENVIRONMENTAL SCIENCES (10)**

Fundamentals of components of environment - atmosphere, hydrosphere, geosphere, biosphere, pedosphere and their interaction, energy flow in ecosystems; ecosystems of the world; biogeographic regions; soil as a biological habitat; distribution and types of soil organisms and their significance in soil productivity; bio-geochemical cycles in different ecosystems; agro-ecological regions of India; global climatic changes - greenhouse gases and their impact on agriculture; biotic and abiotic interactions and their significance; natural resources - effect of anthropogenic factors on the degradation of natural resources; conventional and nonconventional sources of energy; environmental issues in agriculture and environmental impact assessment; environmental pollution and agricultural productivity; sources of soil, water and air pollution; inter-relationships of crop and animal production systems with environmental pollution in different eco-systems; management of rural water and agro-industrial effluents, environmental laws; analytical techniques for major environmental pollutants; spectrophotometry, chromatography; basic chemodynamics of environmental pollutants; chemistry of fossilfuels, fluorocarbon, nitrogen, carbon, halogens, phosphorus, heavy metals and their compounds; pesticides and other hazardous chemicals, basic photochemistry.

**GENETICS (11)**

Structure and function of cell and cell organelles, cell cycle; mitosis and meiosis; nucleic acids - their structure; Mendelian principles; chromosome structure and organization; types of chromosomes; chromosome function; linkage and crossing over - theories and molecular mechanism; recombination and gene mapping in diploids, fungi, bacteria, and human; ploidy variations - euploids and aneuploids; chromosomal aberrations; extrachromosomal inheritance; gene mutation-mechanism, induction; gene concept; complementation, genetic fine structure; genetic code, information transfer and protein synthesis, gene regulation and gene manipulation; gene transfer technology; origin and evolution of important crop plants like wheat, rice, maize, sugarcane, potato, brassica, cotton, etc.
Genetic basis of plant breeding; pure line selection; male sterility and incompatibility and their use in plant breeding; pedigree selection, mass selection and backcross method of selection; heterosis; plant introduction and exploration and their role in plant breeding; breeding for disease, insect and pest resistance; role of interspecific and intergeneic hybridisation; population improvement procedures; recurrent selection techniques; combining ability and its relationship with the components of gene action; seed production techniques; selection methods and changes in gene frequencies; mutation and its role in breeding; use of biotechnology in plant breeding. Molecular markers and their applications in genetic analysis and plant breeding.

HORTICULTURE (12)

Choose any one the following subdisciplines

i. Floriculture

Importance and scope of floriculture, garden designs and styles, lawns and their management; origin, classification and description of commercially important floricultural crops; factors affecting growth and flowering of ornamental plants; methods of propagation including tissue culture; growing of cut flower crops under protected conditions; pre-and post-harvest care of cut flowers; recent advances in production technology for rose, chrysanthemum, gladiolus, carnation, orchids, jasmines, tuberose, marigold and antirrhinum; growing of bougainvilleas. Role of male-sterility, self-incompatibility, polyploidy and mutations in the evolution of new varieties of flowers; heterosis breeding; male-sterility and its use in the production of F1 hybrids; breeding for disease resistance; use of antitranspirants in increasing shelf-life of plants and flowers; role of growth regulators in ornamental plants. Important statistical designs; methods of their statistical analysis; general principles of fruits and vegetable production, major methods of preservation and processing of horticultural and ornamental crops.

ii. Pomology

Area and production of fruits, climatic and soil requirement, cultivation practices of major fruit crops like mango, citrus, banana, grape, papaya, guava, pineapple, loquat, phalsa, jackfruit, mangosteen, sapota, cashewnut, ber, pomegranate, date palm, aonla and temperate fruits like apple, pear, peach, almond, plum, apricot and cherry. Principles of pruning and training, weed control; modern methods of propagation including micropropagation and use of growth regulators in fruit crops; water management; classification of fruit crops; use of biofertilizers; rootstocks and high density orcharding. Improvement of plant types of important fruit crops; physiological manipulations for overcoming problems like biennial bearing, spongy tissue, malformation, necrosis and black tip in mango; delayed maturity and uneven ripening in grapes and granulation in citrus. Important statistical designs; methods of their statistical analysis; general principles of flower and vegetable production; major methods of preservation and processing of horticultural crops.

iii. Vegetable Science

Area and production of vegetable crops in India, climatic and soil requirements, seed production techniques in vegetable crops and related problems. Origin, classification, cytogenetics, floral biology and breeding behaviour of different vegetables; methodology for the improvement of different self-and cross-pollinated vegetable crops including breeding for disease and insect resistance; Mendel's laws of inheritance. Role of different nutrients, their deficiency symptoms and remedial measures; improved vegetable production technology. Important statistical designs and methods of statistical analysis general principles of fruits and flower production; major methods of preservation and processing of horticultural crops.
MICROBIOLOGY (13)

Origin and development of microbiology; classification of bacteria, fungi, algae, protozoa; microscopy; methods of isolation, pure cultures, enumeration, sterilization, preservation; morphology and reproduction in bacteria, fungi, actinomycetes, algae, viruses.

Microorganisms in food, fermented foods; spoilages of food; food-borne diseases; microbial pollution of air and water; water purification; energy and metabolic pathways in microorganisms; fermentation and industrially useful microbial processes - citric acid, lactic acid, ethanol, vinegar, production of antibiotics, enzymes, vitamins, amino acids; mutations and genetic recombination, transformation, transduction and conjugation; soil microorganisms and their activities; rhizosphere and phyllosphere; microbial association, microbial decomposition of organic wastes, composting and biogas; nitrification and denitrification; symbiotic and non-symbiotic nitrogen fixation; microbial transformation of phosphates; use of microorganisms and biofertilizers.

MOLECULAR BIOLOGY AND BIOTECHNOLOGY (14)

Structure and organization of prokaryotic and eukaryotic cells; organization and expression of prokaryotic and eukaryotic genome; concept of gene; quantitative trait loci, mutation; genetic recombination; transformation; transduction; conjugation; structure, function and regulation of genes in pro- and eukaryotes; transcription and translation; recombinant DNA, restriction enzymes, vectors, plasmids, cosmids and bacteriophages, expression vectors, cloning strategies, construction and screening of genomic and cDNA libraries, nucleic acid hybridisation and DNA sequencing; restriction fragment length polymorphism; monoclonal antibodies and their application; enzyme engineering; genetic transformation of eukaryotes; crop improvement through genetic engineering; role of tissue culture in crop improvement; microbes in agriculture and industry; structure and function of proteins, nucleic acids, carbohydrates, lipids, enzymes; metabolism, glycolysis, citric acid cycle; respiration, bioenergetics; nucleic acid and protein biosynthesis; photosynthesis, nitrogen fixation.

NEMATOLOGY (15)

History of nematology; importance of nematodes in agriculture and public health; techniques in nematology; broader classification of nematodes, important plant parasitic nematode genera and their identification, principles of classification; gross morphology of nematodes.

Biology of nematodes; physiology of digestion; intermediary metabolism and excretion in nematodes; symptomatology, histopathology and host specialization.

Important plant diseases by nematodes; ecological factors influencing nematode activities and population dynamics; principles of nematode control and nematode management.

PLANT GENETIC RESOURCES (16)

Biodiversity and agricultural intensification; origin and history of agriculture; ecosystem diversity, ecological basis of genetic variations and adaptation; domestication, introduction and adaptation of economically important plants; centres of crop plant origin and diversity; taxonomy of cultivated plants; origin, evolution, global distribution and economic use of important cereals, pulses, oilseeds, fruits, vegetables, commercial crops and medicinal plants; Indian Gene Centre; genetic variation in crop plants and management of germplasm collections - principles of collecting plant genetic resources (PGR) - sampling strategies, parameters of genetic diversity; principles and strategies of germplasm regeneration - considerations for regeneration of self and cross-pollinated crops; characterization, diversity analysis and evaluation of plant germplasm using morphological, biochemical and molecular approaches; strategies of PGR conservation - ex situ and in situ conservation, biotechnological approaches for conservation - in vitro conservation, cryopreservation; seed structure, physiology, biochemistry and storage biology; policy issues -
exchange of PGR, plant quarantine, IPR related aspects; national and international programmes, global plant genetic resources networks.

**PLANT PATHOLOGY (17)**

Landmarks and pioneers of plant pathology; theory of microscopy and staining; structural and physiological differences amongst fungi, bacteria, rickettsias, mycoplasmas, viruses and viroids; principles of culturing and preservation of pathogens; characteristic symptoms; host-parasite relationships; symbiosis; economically important diseases of crop plants induced by fungi, bacteria, rickettsias, mycoplasmas, viruses and viroids; phanerogamic parasites, non-parasitic diseases; nutrition, growth, reproduction, life cycle, ultrastructure, genetics and classification of microorganisms; Mendelian principles; cell structure; seed germination; origin of life and evolution; beneficial microorganisms including mycorrhiza; variation in phytopathogens and their ecology; introductory epidemiology; transmission and detection of pathogen; host resistance; seed-borne pathogens and plant quarantine; chemical and biological control, integrated management practices.

**PLANT PHYSIOLOGY (18)**

Atoms, molecules and ions; molarity, molality and normality; pH, buffers, solutions and colloids; permeability, diffusion and osmosis; cell structure and function; structure and metabolic role of cell organelles; structure and function of chloroplast; photosynthetic pigments, photosystems, electron transport, ATP synthesis, C3, C4 and CAM pathways; redox potential; photosynthesis, chemosynthesis, photosynthetic efficiency, glycolysis, HMP, TCA and glyoxylate cycles; macro- and micro-nutrient elements and their functions, deficiency symptoms, role in metabolism; characterization, biosynthesis, isolation and role of plant hormones; enzyme-mode and mechanism of action; concept of water status, water potential and its components, water uptake, transpiration, stomatal physiology, xylem and phloem transport; photoperiodism, vernalization and flowering, florigen concept, phytochrome; nitrogen metabolism including nitrate reduction, ammonia assimilation, transamination, protein synthesis, nitrogen fixation; sulphur metabolism; fatty acid synthesis and degradation.

Abscission and senescence; seed physiology; dormancy; growth analysis, measurement of key growth functions such as NAR, LAI, RGR, growth response in relation to environmental factors; crop canopies and light utilization; source-sink relationship, dry matter partitioning; physiological basis of crop productivity - case histories of some crop plants viz, cereals, grain legumes and oilseeds; environmental stresses viz, high and low temperature, light, water, salinity, alkalinity, their terminology and measurement techniques; basic principles of methodology/instrumentation in plant physiological research e.g., chromatography, spectroscopy, centrifugation, radioactivity; electrophoresis, hydroponics; sex expression; phytotronics; environmental pollution, green house effects; foliar nutrition, tissue culture; post harvest physiology, plant physiology in relation to molecular biology.

**POST HARVEST TECHNOLOGY (19)**

Choose any one the following subdisciplines

i. **Post Harvest Technology for Horticultural Crops**

Role of fruits and vegetables in human nutrition; knowledge of post-harvest physiology with special reference to ripening; role played by ethylene, respiration and transpiration.

Biochemical changes in fruits and vegetables; important nutrients and enzymes associated with fresh and stored fruits and vegetables; storage of fresh fruits, vegetables and flowers; various methods of fruit and vegetable preservation such as heat processing, drying, dehydration, refrigeration, freezing and chemical preservation.

Principal methods for control of microorganisms; nature of microorganisms associated with fermented fruits, vegetables and their products, spoilage in canned fruits and vegetable and their control measures, laboratory methods for quality control; bacterial diseases and food poisoning; food laws; utilization of horticultural wastes;
Important statistical designs and methods of their statistical analysis; general principles of fruit, flower and vegetable production.

ii Post Harvest Engineering and Technology

Thermodynamics applied to processing. Fluid flow analyses, Test of hypothesis, Multiple regression, Similitude and Dimensional analysis, Instrumentation involved in food engineering and fundamentals of computers.

Losses at different stages of the food chain, Grading, Cleaning and Sorting, Shelling, Dehusking and Decorticating, Milling and polishing. Parboiling, Drying, Size reduction, Granulation and briquetting, Crystallization, Filtration, Evaporation, Distillation, Mixing, Clarification and Densification. Coagulation, Washing, Sizing and Mechanical separation. Sedimentation, Pressing and Expelling, Pelletization, Extrusion, Stabilization and Cryogenics, Agricultural commodity handling technology, Handling of agricultural wastes, Handling of value added products, Grain storage structures, On-farm and commercial storage structures for agricultural produce.

Machineries for processing of agricultural products - cereals, pulses, oilseeds, fruits and vegetables. Cost scheduling and appraisal. PERT and CPM techniques. Design of structure and equipment for agricultural product handling including feed and waste. Design of heat exchangers, dryers, humidifiers, crystallizers, evaporators, separators, filters, refrigeration and milling equipments.

**SEED SCIENCE AND TECHNOLOGY (20)**

Cell structure and function; cell division; pollination, fertilization and embryogenesis; apomixis; Mendelian principles; linkage; recombination and gene mapping; ploidy variations - euploids and aneuploids; chromosomal aberrations; extra-chromosomal inheritance; mutation; genetic basis of plant breeding; pure line, pedigree and mass selection; backcross and recurrent selection techniques; heterosis and combining ability; male sterility and incompatibility and their use in plant breeding and hybrid seed production; chemical composition of seeds; biosynthesis of carbohydrates, proteins and fats; mechanism and factors determining seed germination and dormancy; germination inhibitors and promoters; endogenous hormonal regulation of germination and dormancy; breaking of dormancy; seed vigour and viability; seed quality concept; system of seed quality control; testing, release and notification of varieties, deterioration of varieties; maintenance of genetic purity; area of seed production; management of hybrid seed production - isolation and synchronization of flowering; role of insect pollinators and their efficiency; factors responsible for mechanical injury to seed; seed legislation; seed certification - concept and procedures; measurement of seed quality; metabolic changes associated with seed deterioration; seed packaging, storage and marketing; insect ecology; principles of insect control in field crops; integrated pest management; fumigation and chemical treatment for pest control in store; fungal, bacterial and viral seed borne diseases of cereals, pulses, oilseeds and vegetables and their control; seed moisture; seed drying and processing; history of seed industry in India; national and international organisations for seed quality control and trade.

**SOIL SCIENCE AND AGRICULTURAL CHEMISTRY (21)**

Rocks and minerals; mineral weathering and soil formation; classification of soils, major soils of India; principal silicate structures; nature and properties of organic and inorganic constituents of soils, ion exchange phenomenon; activity of ions in soil system; fixation and release of nutrients.

Soil fertility evaluation; movement of water; problem soils, soil-related constraints in crop production and remedial measures, soil amendments; soil and water conservation; sampling and analytical procedures for soils, plants, water, manures, fertilizers and soil amendments; quality of irrigation water; fertilizer recommendations; soil organic matter, soil microflora; carbon, nitrogen and phosphorus cycles; biofertilizers; phosphate solubilization; Darcy’s law; Fick’s law, steady and transient state diffusion in soils.

Essential plant nutrients; manures; utilization of organic wastes and industrial by-products; fertilizers and their production, properties and usage; secondary and micronutrients.
WATER SCIENCE AND TECHNOLOGY (22)

History of water conservation; hydrometeorological resources of India and the world; physical, chemical, biological properties of water; water resources of India; irrigation development in India; command area development; Basic concepts of soil and fluid mechanics; infiltration; seepage; Darcy’s law; Stokes’ law; Bernoulli’s theorem; hydraulic conductivity; surface tension; soil water flow; composition of atmosphere and its constituents; climate characterization, climatic change, flood, monsoon; rain, water harvesting, ground water recharge and conservation; microclimate; various types of droughts, drought indices, climatic water balance, surface and ground water quality; national and international water quality standards; irrigation with poor quality water; water purification systems/procedures for rural and urban population; Subsurface drainage system; drainage for salinity control.

Evaporation; evapotranspiration; lysimetric studies of crops; crop water requirement; plant growth processes; water stress in plant; irrigation scheduling; field water balance; soil-plant-water relationship; basic concepts of soil physics, irrigation methods, irrigation efficiencies; water distribution networking (large and moderate scale); pressurized irrigation system and its design.

Ground water hydraulics; isotope hydrology; application of stable and radioisotopes in water resources development; geophysical techniques in ground water; surface hydrology; hydrometeorology; watershed based water management; Soil and water conservation practices; role of integrated water resource management for sustainable development; degradation of soil and water resources and their mitigation measures.

Water rights; water laws; water disputes; water pricing; water users associations; use of remote sensing and GIS in water resource management; Decision support system, expert system for planning and operation of water resources.

16. INSTRUCTIONS FOR FILLING UP OF APPLICATION FORM

General Instructions
1. Use only Capital Letters.
2. Write only one character/number in one box.
3. Start writing from first box on the left of each line.
4. Leave one box blank between two words.
5. Carefully study the example from printed in this bulletin

Item-specific columns of the form No.
1. a) Application Number: Check that this number tallies with the number on the admit card/acknowledgement card. In case of down loaded application forms this column may be left blank.
   b) Scheme of Admission: Select the applicable scheme and write in full.
2. Name of the applicant: Write name in English and Hindi as given in the last degree certificate.
   Note: If there are more than one middle names, use initials only.
3. Father’s name: Write father’s name in full.
4. a. Complete address for correspondence: Write complete postal address for correspondence with correct Pin Code.
   b. Complete permanent address: Write complete postal address with Pin Code. For State use the following codes:
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<th>State or UT</th>
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<td>Andhra Pradesh</td>
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5. Date of birth: Write 01 to 09 or 10 to 31 as the case may be for date. Similarly for month write 01 to 09 or 10 to 12 as the case may be. Write complete year, e.g. 1974 and so on.

6. Sex: If female, write : 1
   If male, write : 2
   
   Marital status : If married, write 1
   If unmarried, write 2

8. Category : If General, write 1
   If Other backward class, write 2
   If Scheduled Caste, write 3
   If Scheduled Tribe, write 4
   If Physically Handicapped, write 5

9. Scheme : If Open (includes all categories as in column 8), write 1
   If Departmental (Scientific), write 2
   If Departmental (Technical), write 3
   If under Faculty Up gradation Scheme, write 4
   If under ICAR In-Service nominee, write 5
10. Major Disciplines and sub discipline (if any) in which admission is sought: Give code as given in the following table.

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<td>Post Harvest Technology for Horticultural Crops</td>
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<td>22</td>
<td>WATER SCIENCE AND TECHNOLOGY</td>
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</table>
11. Choice of Examination Centres

You must give a choice, from the following list of City Codes, nearest to your permanent address/university last attended/studying, otherwise PG School will allot you examination centre accordingly.

<table>
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<tr>
<th>NAME OF THE CITY</th>
<th>CODE</th>
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<tbody>
<tr>
<td>BANGALORE</td>
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12. B.Sc./B.Sc.(Ag)/B.Tech./B.E.: (Write only the code)

   a. Stream Code
      Bachelor’s degree in agriculture 1
      Bachelor’s degree in non-agriculture 2

   b. Pattern:
      10+2+4 1
      10+2+3 2
      10+1+4 3
      10+2+2 (Prior to 1985) 4
      Any other 5

c. Year: Write the year in which degree was awarded

d. Name of University: Give acronym of the University, and name of city in full where it is located.

13. M.Sc./M.Sc.(Ag)/M.Tech./M.E.: (Write only the code)

   a. Stream Code
      Master’s degree in agriculture 1
      Master’s degree in non-agriculture

   b. Year: Write the year in which degree was awarded 2

c. Name of University: Give acronym of the University, and name of city in full where it is located.

14. Per cent marks secured

Enter the actual percentage of marks secured in Matric/10th, Inter/12th and H.Sc./PUC rounded upto first decimal point. For example:

   79.6

15. Percent marks or OGPA secured

Enter the percentage of marks / OGPA in B.Sc.(Ag.)/B.Sc./B.E./B.Tech. or equivalent and M.Sc./ M.Sc.(Ag.)/M.Tech./M.E. Enter percentage of marks rounded upto first decimal and OGPA upto 2 decimal points. In the case of
OGPA indicate clearly the maximum grade available. Where both per cent marks and OGPA are provided in the certificates, only OGPA be mentioned. For example:

\[
\begin{align*}
3.75 & \text{ out of } 0.4 \\
7.05 & \text{ out of } 1.0
\end{align*}
\]

**16. Specialization/major subject in M.Sc./M.Sc.(Ag)/M.Tech./M.E. examination:** Please indicate code as given here.

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<td>PLANT PATHOLOGY</td>
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17. **Declaration by the candidate**: You must read the declaration (given in the Information Bulletin) carefully.

18. **Signature**: You must sign carefully as the signature will be used for computer verification. Signature should be within the box.
ANNEXURE-I

SPONSORED FOR ADMISSION UNDER FACULTY UPGRADE SCHEME/ICAR IN-SERVICE NOMINEES SCHEME*

(* Strike off whichever is not applicable)

Declaration by the Employer of the Candidates

(In the case of candidates employed, this application shall not be considered valid unless the declaration is completed in full by the employer or the Head of the Institution).

i. Certified that the particulars given by the candidate in this form have been verified and found correct.

ii. The candidate will be granted Deputation Leave/Study Leave/Extra-Ordinary Leave or he/she will be given a scholarship or stipend of the value of Rs.__________ per month. On completion of the training, he/she will be required to serve this Department / Institute / University for a period of______years.

iii. If selected for admission, the candidate will be relieved to join the course as directed by the IARI on 6th August, 2010.

iv. If selected for the award of IARI (or other) fellowship, there will be no objection to his/her receiving the scholarship and contingency amounts attached thereto subject to the following conditions.

(a) ______________
(b) ______________
(c) ______________

v. Certified that I am competent to take the decision to sponsor him/her on the terms and conditions mentioned above/the decision to sponsor him/her on the above terms and conditions has been taken by and is being communicated under the direction of who is the competent authority.

vi. This University/Organisation/Department undertakes to pay dues outstanding against the candidate and not paid by him.

Signature ____________________

Designation ____________________

Address ____________________

(With Official Seal)
ANNEXURE-II

SPONSORED FOR ADMISSION UNDER RESERVED SEATS FOR ICAR EMPLOYEES CERTIFICATE REQUIRED FOR ADMISSION UNDER ICAR IN-SERVICE NOMINEES SCHEME ONLY

The ICAR In-Service Nominees have to submit the following certificate also in addition to the declaration by the employers of the candidates (Annexure-I).

It is certified that:

Name ____________________________
Designation _________________________
Office Address _______________________
_____________________________________

The candidate sponsored has been selected for the award of ICAR Senior Fellowship.

Signature __________________________
Deputy Director General (Education)
ICAR, New Delhi
FORM OF OBC CERTIFICATE

This is to certify that Shri/Smt./Kumari__________________________ son/daughter of______________________________ of village/town__________________________ in District/Division__________________________ of the State/Union Territory__________________________ belongs to the __________ Caste which is recognized as OBC category and does not fall in the creamy layer during the year 2010.

Signature ______________________

Designation ____________________

(With Official Seal)

Place ___________ State/Union Territory

Date ____________

List of authorities empowered to issue OBC certificate:

1. District Magistrate/Additional District Magistrate/Deputy Commissioner/Additional Deputy Commissioner/Deputy Collector/1st Class Stipendiary Magistrate/City Magistrate/Sub-divisional Magistrate/Taluka Magistrate/Executive Magistrate/Extra Assistant Commissioner not below the rank of 1st Class Stipendiary Magistrate.


3. Revenue Officers not below the rank of Tehsildar.

4. Sub-Divisional Officer of the area where the candidate and/or his family normally resides.

5. Administrator/Secretary to Administrator/Development Officer (Lakshadweep Islands).
ANNEXURE-IV

FORM OF CERTIFICATE TO BE PRODUCED BY A CANDIDATE BELONGING TO SC/ST CATEGORY IN SUPPORT OF HIS/HER CLAIM

FORM OF CASTE CERTIFICATE

This is to certify that Shri/Smt./Kumari ____________________________ son/daughter of ____________________________
village/town* ____________________________ in District/Division ____________________________ of the State/Union Territory* ____________________________ belongs to the ____________________________ Caste/Tribe* which is recognised as SC/ST* under


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

The certificate is issued on the basis of the SC/ST certificate to Shri/Shrimati* ____________________________ father/mother* of Shri/Shrimati/Kumari* ____________________________ of village/town* ____________________________ in District/Division* ____________________________ of the State/Union Territory* ____________________________ who belongs to the ____________________________ caste/tribe* which is recognised as Scheduled Caste/Scheduled Tribe* in the State/Union Territory* issued by the ____________________________ (Name of the prescribed authority) vide their No. ____________________________ dated ____________________________

3. Shri/Shrimati/Kumari* ____________________________ and/or* his/her family ordinarily reside(s) in Village / Town* ____________________________ of District ____________________________ of State/Union Territory of ____________________________

Signature ____________________________

** Designation ____________________________

(with Seal of Office)

Place ____________________________ State/Union Territory

Date ____________

* Please strike off the words which are not applicable.

# Please quote specific Presidential Order.

% Strike off 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 People’s Act, 1950.
** List of authorities empowered to issue SC/ST certificate:

1. District Magistrate/Additional District Magistrate/Deputy Commissioner/Additional Deputy Commissioner/Deputy Collector / 1st Class Stipendiary Magistrate/City Magistrate/Sub-divisional Magistrate/Taluka Magistrate/Executive Magistrate/Extra Assistant Commissioner not below the rank of 1st Class Stipendiary Magistrate.


3. Revenue Officers not below the rank of Tehsildar.

4. Sub-Divisional Officer of the area where the candidate and/or his family normally resides.

5. Administrator/Secretary to Administrator/Development Officer (Lakshadweep Islands).
ANNEXURE-V

FORM OF CERTIFICATE TO BE PRODUCED BY A CANDIDATE BELONGING TO PHYSICALLY HANDICAPPED CATEGORY IN SUPPORT OF HIS/HER CLAIM

FORM OF PHYSICALLY HANDICAPPED CERTIFICATE

This is to certify that Shri/Smt./Kumari ________________________________ son/daughter of ______________________ of village/town ______________________________ in District/Division _____________________________ of the State/Union Territory _____________________________ belongs to the Physically Handicapped category because __________________________________________________________ 
_____________________________________________________________________________ and he/she is fit for undergoing the Ph.D. programme in Agricultural Sciences at IARI.

Signature Name and Seal of the Medical Superintendent of the Govt. Hospital

Note: The criteria for ‘Physically Handicapped’ shall be as applicable under the rules and regulations of ICAR Government of India for pursuing post-graduate education in agriculture.
ANNEXURE-VI

FORM OF CERTIFICATE TO BE PRODUCED BY CANDIDATES WHO ARE APPEARING FOR THEIR MASTER’S FINAL EXAMINATION 2010

This is to certify that Shri/Smt./Kumari ___________________________________________________________ son/daughter of ___________________________________________________________ of village/town ________________________________ in District Division_______________________ of the State/Union Territory is a final year student of M.Sc./M.Sc.(Ag)/M.Tech. M.E. in the discipline of __________________________________________ and is likely to appear for his/her final year examination, 2010.

Signature and seal
Dean/Registrar of the University
or Principal of the College

Note: This certificate must be issued only by the Principal of the College/Registrar or Dean of the University where the student is studying in the final year of his / her Master’s Degree.
ANNEXURE-VII
POST GRADUATE SCHOOL
Indian Agricultural Research Institute, New Delhi
Ph.D. Entrance Examination for Session 2010-2011
Date of Examination: June 6th, 2010

OMR ANSWER SHEET

1. ROLL NO.
2. CENTRE OF EXAM. (Write name of the city only)
3. DISCIPLINE NAME
4. DISCIPLINE CODE

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</table>

GENERAL INSTRUCTIONS

1. Write all information under Serial Nos. 1 - 4 on Side - 1 in CAPITAL with a ball point pen.
2. Write all information in boxes 5 to 8 on Side - 2 of the Answer Sheet and shade the appropriate circles with an HB Pencil.
3. Please put your signature with a ball point pen in box 10 on side 2 of the Answer Sheet.
4. Shade the circles on Side - 2 with an HB Pencil only. For detailed instruction on this regard see INSTRUCTIONS FOR MARKING ANSWERS given below.
5. Please note that in this Answer Sheet the questions are classified into two parts. The upper part has multiple choice type questions progressing from top to bottom in five columns from question nos. 1-130. Each question has four answering options. Please shade the correct answer as given below.
   In the lower part three are matching type questions (No. 131 - 140) progressing from left to right. Each question has five sub questions from (i) - (v) with answering options a - e. Please shade the correct answer as shown in the example below.
6. GEN = General Category; OBC = Other Backward Class; SC = Scheduled Cast; ST = Scheduled Tribe and PH = Physically Handicapped
7. Sub - discipline codes are allotted for the candidates of Horticulture and Agricultural Engineering.
8. Answer Question Nos. 1-130 in the space provided in the Question booklet.
9. Please return the OMR Sheet and the Question Booklet to the invigilator after completion of the examination.

EXAMPLE FOR CROSS MATCHING TYPE

Question Nos. (1 - 30)  Cross Matching Type  (i)  (ii)  (iii)  (iv)  (v)

EXAMPLE FOR CIRCLING TYPE

(i)  (ii)  (iii)  (iv)  (v)

INSTRUCTIONS FOR MARKING ANSWERS

1. Use HB Pencil only for shading the circles on Side - 2 of the Answer Sheet.
2. Darken the circle completely so that the letter / number inside the circle is not visible.
3. Darken only ONE CIRCLE for each answer as shown in the example below. If you darken more than one circle, your answer will be treated as wrong.
   Correct Method  Wrong Method  Wrong Method  Wrong Method
   Correct Method

4. If you wish to change an answer ERASE completely the already darkened CIRCLE, then make a fresh mark.
5. Shade the CIRCLES only in the space provided. Please do not make any stray marks on the Answer Sheet.
6. Rough work MUST NOT be done on the Answer Sheet. Use your Test Booklet for doing the rough work.
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10. CANDIDATE’S SIGNATURE

11. INVIGILATOR’S SIGNATURE
FORM OF SURETY BOND TO BE EXECUTED BY A CANDIDATE WHO IS PURSUING PH.D AS SENIOR RESEARCH FELLOW IN ICAR DEEMED UNIVERSITIES THROUGH A COMPETITIVE EXAMINATION

I _________________________________ Son/Daughter of ________________________________ resident of _____________________________________________________________________________ pursuing Ph.D. in Indian Agricultural Research Institute, deemed to be university under ICAR (hereinafter called the obligor) and Sh./Smt./Kum.___________________________________________________________________Son/Daughter of ________________________________________________________________________ (full address ___________________________________________________________________________) (hereinafter called surety)
do hereby bind myself and my respective heirs, executors and administrators to pay to the Indian Council of Agricultural Research, a society registered under the Societies Registration Act-1860 Krishi Bhawan Dr. Rajendra Prasad Road, New Delhi-110001 (herein after called “The ICAR”) on demand the sum of Rs. 50000/- (Rupees Fifty Thousand only) together with interest thereon from the date of demand of Government rates for the time being in force on Government loans (if payments is made in a country other than India. Equivalent of the said amount in the currency of that country converted at the official rate of exchange between that country and India) and together with all costs between attorney and all client and all charges and expenses that shall or may have been incurred by the ICAR.

Whereas the obligor has been pursuing Ph.D. as Senior Research Fellow of the Indian Council of Agricultural Research as a result of the competitive examination held in the year 2010.

And whereas for the better protection of the ICAR, the obligor has agreed to execute this bond with such condition as here under is written.

And whereas the said surety has agreed to execute this bond as surety on behalf of the above bounden

Now the Condition of the above Written Obligation is that in the event of the named obligor, Sh./Smt./Kum.___________________________________________________________________leaving the studies after taking admission as SRF on the basis of the competitive examination without completion of Ph.D. of 3 years or on his/her being rusticated removed from the Deemed University, the obligor and/or the Surety shall forthwith pay to the ICAR as may be directed by the ICAR on demand the sum of Rs._____________________________________________________________________(Rupees ____________________________) together with interest thereon from the date of demand at Government rates for the time being in force on Government loans.

And upon the obligor Sh./Smt./Kum.___________________________________________________________________and ___________________________________________________________ the surety aforesaid, making such payment the above written obligation shall be void and if no effect otherwise, it shall remain in full force and virtue.

Provided always that the liability of the surety here under shall not be impaired or discharged by reasons of time being granted or by any forbearance. act or omission of the ICAR or any person authorized by them (whether with or
without the consent or knowledge of the surety) nor shall it be necessary for the ICAR to sure the obligor first before
suing the surety Sh./Smt./Kum./ for amounts due hereunder.

The bond shall in all respect be governed by the laws of India for the time being in force and the rights and
liabilities hereunder shall, where necessary, be accordingly determined by the appropriate courts in India.

Signed and dated this ________________________________ day of ___________________ one thousand nine
hundred and _____________________ signed and delivered by the obligor above named Sh./Smt./Kum.
___________________________________ in the presence of __________________________________.

Witnesses :
(Signature, Name and Address)
1. __________________________________________
2. __________________________________________

Signed and delivered by the surety above named Sh./Smt./Kum_______________________________________
in the presence of ____________________________________.

Witnesses :
(Signature, Name and Address)
1. __________________________________________
2. __________________________________________

*(In the case of married women candidate, her husband’s name is to be mentioned as wife of ________________
____________________________________)

Note: The following persons can also stand sureties for the students:
1. Parent/guardian of the student
2. Guide/teachers of the student
3. Sarpanch of the Village Panchayat to which the student belongs.
4. MLA
5. Local guardian of student, if any
6. Any other Central Government or State Government of Central Autonomous Bodies or equivalent status or
comparable higher status employees.
ACKNOWLEDGEMENT

Application No.          Date : .............. 2010

The undersigned acknowledges the receipt of your application bearing the above number for admission to Ph.D degree programme of I.A.R.I. for the academic year commencing on 6th August 2010.

Registrar (Academic)
Post Graduate School
Application for admission to Ph.D. Entrance Examination 2010-11

1. a) Application No.  
   b) Scheme of Admission i.e. Open/FUS/Deprt / ICAR in-service

2. Name of the Applicant (as given in the last degree certificate) - a) In English

   b) In Hindi

3. Father’s Name

4. a. Complete Address for correspondence

   P I N  

   State Code

   b. Permanent Residential Address

   P I N  

   State Code

   c. E-mail address

   d. Contact no. with STD Code

5. Date of Birth

   D D  MM  YY


10. Discipline in which admission is sought

   a) Discipline Name

   b) Discipline Code  c) Sub-discipline Code

11. Choice of Examination Centre

12. B.Sc. Examination

   a) Stream  b) Pattern  c) Year  d) Name of University

13. M.Sc. Examination

   a) Stream  b) Year  c) Name of University

14. Per cent Marks Secured in

   Matric / 10th  Inter / 12th  HSC / PUC

   *  *  *

15. Per cent Marks or OGPA Secured in

   Per cent Marks  OGPA  Out of

   B.Sc.:  *  *  OR  *  *  /  

   M.Sc.:  *  *  OR  *  *  /  

16. Specialisation / Major Subject in M.Sc. Examination

17. Declaration by the Applicant

   I declare that the particulars given above are correct. If any information given above is found to be wrong, I will have no objection to my selection being cancelled.

18. Signature of applicant

   (Please sign carefully as it will be used for computer verification. Signature should be within the box.)

*Must give a choice nearest to your native place/University last attended otherwise PG School, IARI, shall allot the examination centre accordingly.
Check-list of documents to be attached with the Application Form

(a) Admit Card
(b) Acknowledgment Card
(c) Attested copies of the following
   1. Proof of Date of Birth
   2. Matriculation (X) or equivalent certificate and marks sheet
   3. Intermediate (XII) of equivalent certificate and marks sheet
   4. Bachelor's degree certificate and marks sheet
   5. Master's degree certificate and marks sheet
   6. SC/ST/OBC/PH Certificate (whichever is applicable)
   7. Certificate required from candidates appearing for
      M.Sc./M.Sc.(Ag.)/M.Tech./M.E. final year examination 2010
(d) Forwarding letter from the Employer in case of in-service candidates
(e) Demand Draft details: meant for downloaded application forms only

Signature of the Candidate

Name of the Candidate ________________________

Date : _____________
For Candidate

POST GRADUATE SCHOOL
INDIAN AGRICULTURAL RESEARCH INSTITUTE
NEW DELHI

Ph.D Entrance Examination 2010-11

Application No.: Date & Time of Examination 06-06-2010 at 10.00 A.M.

ADMIT CARD

To be filled in by the Candidate

1. Name of the Candidate________________________________________
   (In BLOCK letters)

2. Name of the Discipline________________________________________
   Discipline Code    Sub-Discipline Code

3. Choice of Examination Centre Code
   (as per guidance given in Information Bulletin)                   Signature of the Candidate.................................

To be filled in by the P.G. School Office

Registrar (Academic)

Note: This Admit Card is provisional subject to the Candidate fulfilling the eligibility conditions as prescribed in this Information Bulletin

Complete Postal address (to be filled in by the Candidate)

________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
PIN ______________________
Instructions for Candidate

1. Day and Date of Examination : Sunday 06-06-2010
2. Duration : (Two-and-half hrs.) 10.00 A.M. to 12.30 P.M.
3. The candidate shall be present at centre 30 minutes before the commencement of the Examination.
4. No candidate will be admitted to the Examination hall after 30 minutes from the commencement of the Examination.
5. A candidate who does not produce the Admit Card shall not be allowed to sit in the Examination by the Centre Superintendent.
6. Candidate is not allowed to leave the Examination Hall before expiry of the time and handing over the answer sheet and Question paper (Text Booklet) to the Invigilator concerned.
7. The candidate shall not remove any page(s) from the Test Booklet and if any page(s) are found missing from his/her booklet, he/she will be proceeded against and shall be liable for criminal action.
8. The candidates must bring hall pen, H.B. pencil, sharpener and eraser of good quality.
9. Do not bring any books, notes, mobile phone and calculator on the Examination Hall.
10. The candidate must follow instructions strictly as contained in the Information Bulletin.
POST GRADUATE SCHOOL
INDIAN AGRICULTURAL RESEARCH INSTITUTE
NEW DELHI

Ph.D Entrance Examination 2010-11

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IARI PG Students' Hostels

HEMANT

MANDAKINI

SARASWATI

SHARAD

VASANT

SHISHIR