



आचार्य नरेंद्र देव कृषि एवं प्रौद्योगिक विश्वविद्यालय,

कुमारगंज, अयोध्या-224229 (उ०प्र०), भारत

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आज़ादी का
अमृत महोत्सव

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Provision of Student centric methods, such as experiential learning, participative learning and problem-solving methodologies are used for enhancing learning experiences

This University has adopted student READY (Rural Entrepreneurship Awareness Development Yojana)/Experiential Learning Programme to reorient graduates of agriculture and allied subjects for ensuring and assuring employability and develop entrepreneurs for emerging knowledge intensive agriculture. The following components of the programme have been implemented-

1. Rural Agriculture Work Experience & Agro Industrial Attachment for UG students of Agriculture.
2. Rural Horticulture Work Experience for U.G. students of Horticulture & Forestry.
3. Rural Awareness Work Experience for U.G. students of Community Science.
4. In Plant training for U.G. students of engineering & fisheries.
5. Experiential Learning Programme for U.G. students of all the degree programme.

Furthermore every student of B.V.Sc. & A.H. degree course, after passing the IVth professional examination undergo compulsory rotating internship programme for 12 months period as provision in Veterinary Council of India Act.

All the above mentioned components are interactive and are conceptualized for building skills in project development and execution, decision making, individual & team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts etc. with end to end approach.

Registrar

REGISTRAR

A.N.D.U.A.T.

Kumarganj, Ayodhya

FIFTH DEANS' COMMITTEE REPORT



AGRICULTURAL EDUCATION DIVISION
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-II
Pusa, New Delhi-110012

FIFTH DEANS' COMMITTEE REPORT



भारत
ICAR

Agricultural Education Division
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-II
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सचिव एवं महानिदेशक

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Foreword

A comprehensive, vibrant, and quality agricultural education system, in congruence with a dynamic research and technology development setting, is fundamental to the national progress and prosperity. The ICAR-Agricultural University system, through creating trained human resources, and generating and transferring new knowledge, technologies and products, had ushered in the Green, White, Yellow and Blue Revolutions, transforming the country from a food-deficit to a food-surplus nation.

The Rainbow Revolution notwithstanding, India is still home to one-fourth of the world's undernourished and poor people. Further, while the food demand is likely to double by 2050, serious yield and total factor productivity gaps exist in our food and agriculture system. Studies reveal that, with the business as usual, in face of the declining land, water and biodiversity resources and the intensifying volatilities of climate change and markets, by the year 2030, only 59 percent of India's total demand for food and agricultural products will be met. Thus, the challenge is to sustain ably produce more from less for more (MLM).

With the above backdrop, the urgency for strengthening our educational standard, graduates employability, and research and extension outcomes can hardly be over emphasised. The task is doubly challenging as, by and large, the youth is indifferent to agriculture as a profession and to agricultural education and sciences as a career. On the other hand, the sector is facing serious shortage of trained quality human resources. The ICAR has brought and continues to bring necessary reforms for quality assurance in agricultural education in this fast changing world. In this resolve, the Council has been periodically appointing Deans' Committees, which, in consultations and deliberations with all stakeholders, have been making recommendations on updating academic norms and standards towards meeting the challenges and opportunities.

This Fifth Deans' Committee, underpinning the congruence of excellence and relevance, has judiciously updated the curricula, course contents, and degree nomenclature, and recommended reforms in admission and examination, pedagogy, faculty requirement, governance etc. The Report also prescribes minimum standards for establishing a new college. Towards harnessing

India's demographic dividend, the Report explicitly details skill development, entrepreneurship, and enhanced employability of the graduates. Most uniquely, the Report addresses the academic legitimacy of new and emerging issues of food and agriculture systems.

The Council is extremely grateful to Prof. R.B. Singh, Chairman of the Fifth Deans' Committee, for his visionary guidance and steering the Committee to align and contextualise the academic pursuits with contemporary and projected national and global agricultural trends. The Council expresses its gratitude to the Chairman and all the distinguished Committee Members for their deep indulgence and contribution in preparation of this invaluable Report. The ICAR shall strive to effectively implement all the recommendations contained in this Report.

It gives me immense pleasure to congratulate Dr. N.S. Rathore, DDG, Agricultural Education Division, ICAR, for accomplishing this mammoth task under his meticulous guidance. I compliment Dr. G. Venkateshwarlu, ADG (EQR) for his imperative efforts and overall coordination of the meetings. Special thanks are due to Dr. K.L. Khurana, Principal Scientist (EQR) for his significant contribution in compiling, and to DKMA for bringing out this Report.



(Trilochan Mohapatra)
Secretary DARE & DG, ICAR

Preface

Human resource capital is the greatest national treasure, and ever-enriching this treasure must be the foremost national resolve. The thrust on creating trained quality human resources in the Agriculture Sector through the countrywide establishment of State Agricultural Universities (SAUs) in the 1960s onwards, along with the deemed universities, had ushered in the Green Revolution, followed by White, Yellow, and Blue Revolutions. The National Agricultural Research, Education and Extension (NAREE) system, one of the largest in the world, had congruently generated the needed scientists, teachers, researchers, technologists, technologies and technology transfer systems to transform India from Ship-to-Mouth situation to the Right-to-Food status.

Despite the Rainbow Revolution, often due to reasons beyond the national level production, the country is still home to almost one-fourth of the world's hungry and poor. Moreover, the total factor productivity (TFP) growth has slackened and farmer-non-farmer income inequity has widened. On the other hand, the food demand by 2050 is projected to almost double, and is to be realized in an environment-friendly sustainable manner from the shrinking land, water, and biodiversity resources. Further, the challenge is exacerbated due to proverbial uncertainties of the fast changing climate and markets.

The above asymmetries could largely be attributed to the sub-optimal performance of our NAREE. Among other things, the intensity for comprehensiveness is low. Wide disconnects exist among agricultural education, research and extension. The coverage of basic sciences in agricultural curricula has eroded and there is widespread academic inbreeding depression. The ICAR – nation's apex body for managing, guiding, coordinating, and regulating agricultural education and research, addresses these issues through several mechanisms. One of the mechanisms is the constitution of Deans' Committees for setting academic norms and standards and revision of curricula.

This Report is the outcome of the Fifth Deans' Committee. Internalizing the Bhubaneswar Declaration, and adopting a bottom-up approach involving all stakeholders (thus ensuring ownership of the recommendations), the Committee has contextualised academic aspects of the challenges and opportunities. Further, it has articulated the knowledge and skills needed among the graduates and recommended curricula reforms and innovations for enhancing employability, employment potential, entrepreneurship, and science-led transformation of India's food and agriculture system, enabling our graduates to become job-providers rather than job-seekers. Importantly, minimum standards for establishing new agricultural colleges have also been recommended. The supplement volume of the Report contains details of

recommended syllabi of eight major disciplines of agricultural sciences.

In developing the curricula, the Committee has internalized the Government's major initiatives *viz* National Food Security Mission, Rashtriya Krishi Vikas Yojana, Make-in-India, Start-up-India, Skill India, Digital India etc. Student READY, including RAWE and Experiential Learning, has been programmed for one full year. The required basic science courses have been included in the agricultural curricula. The Committee has identified six common courses related to climate smart agriculture, agribusiness, marketing, and ICT to be included across agricultural sciences. Further, four new degree programmes covering biotechnology, nutrition, community science, and sericulture have been designed. In order to meet region-specific needs and opportunities, several topical optional courses have been prescribed. The Committee has recommended, in all, 11 UG degrees in Agricultural Sciences, and further commended these to be declared as professional degrees.

Appreciating that this Report is part of the continued process and effort of the ICAR for dynamic improvement of national agricultural education system, critically addressing the contemporary issues, the Committee kept the major global initiatives and foresight in mind towards developing leadership in agricultural sciences to ensure economic attractiveness, global competitiveness, social equity, and environmental sustainability. It seeks to move Indian agricultural education from "Land Grant" to a "World Grant" system to emphasise that 'local' and 'global' elements are interdependent. Asserting that sciences underpin agriculture, the Committee has commended strengthening of science-based learning experience, and changing STEM (Science, Technology, Engineering, Mathematic) to STEAM, where A stands for Agriculture. Commensurately, frontier sciences, such as biotechnology, nanotechnology, information technology, renewable energy, along with social sciences and agri-business management have been duly internalized in the curricula.

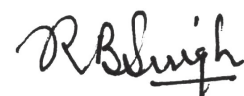
The Committee is beholden to Dr. Trilochan Mohapatra, Secretary, DARE and Director General, ICAR, and to his predecessor, Dr. S. Ayyappan, for reposing faith in the Committee and giving opportunity and guidance to examine, revise, and update the curricula to build quality human resources and to fortify academic standards in our vitally important agriculture sector.

The Committee would like to place on record its gratitude to all the Vice-Chancellors, Deans, and other stakeholders for their tremendous support in completing this challenging task. My grateful thanks are due to the Discipline Convener Deans, namely, Drs. J. Kumar (Agriculture), H.B. Lingaiah (Horticulture and Sericulture), A.K. Goel (Agricultural Engineering), D.C. Joshi (Food Science and Technology), S.A. Asokan (Veterinary and Animal Sciences), K.M. Shankar (Fisheries Sciences), P. Durairasu and K. Sudhakara (Forestry), Rita S. Raghuvanshi (Home Science), G.R. Patil and Narasimha Murthy (Dairy Technology), H.S. Vijay Kumar (Agriculture Marketing, Business and Cooperation), and H.S. Dhaliwal (Biotechnology) for their pivotal role in this arduous task. The valuable contributions of Subject Matter Specialists in their capacities as Members, Co-Conveners and Special Invitees of the Dean's Committee are gratefully acknowledged.

The Committee is deeply indebted to Dr. N.S. Rathore, DDG (Edn.), ICAR, and to his predecessor Dr. Arvind Kumar, for their indulgence and guidance. It expresses its gratitude to

Dr G. Venkateshwarlu, Member Secretary, for his commitment and support in numerous ways, to Dr. K.L. Khurana, Principal Scientist, for his timely efforts in compiling the Report, and to Dr Rameshwar Singh, Director DKMA, for bringing out the Report.

This Report drives transformative changes by updating, augmenting, and revising course curricula and academic framework to achieve necessary quality and need-based agricultural education to harness the demographic dividend of the country towards comprehensive sustainable food, nutrition, income, health, and livelihood security – the New Normal and Green Economy. The Report is expected to stimulate policy innovations and institutional reforms towards building vibrant human resource capital, knowledge economy, and world-class agricultural universities. We earnestly hope that this document will duly inform and motivate all stakeholders – educationists to policy makers, to congruently take specific actions to transform agricultural education to reshape India.



R.B. Singh
Chairman

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Executive Summary

The State of Agriculture Education

Quality human resource, the main driver of comprehensive development, is the greatest treasure of a nation. India's national agricultural education and research system - the agricultural universities and ICAR institutes, through creating desired trained humanware, ushered in the Rainbow Revolution, led by the Green Revolution launched in the 1960s.

The agrarian progress during the past few years has, however, slackened and serious asymmetries exist in science-led growth of agriculture, farmers' income and food and nutrition securities. These asymmetries are exacerbated due to the volatilities in climate change and markets, and the declining land, water and biodiversity resources.

The not so satisfactory state of India's food and agriculture system and agrarian economy could partly be attributed to the decline in quality of agricultural education, *viz* erosion of basic sciences from agricultural curricula, extensive inbreeding, serious skill gaps, and poor employability of agriculture graduates. Thus, bridging these gaps in the availability of quality human resources must be a high national priority.

The Indian Council of Agricultural Research (ICAR), an autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India is one of the largest national agricultural research and education system in the world. With **103 ICAR Institutes** and **73 agricultural universities** spread across the country, the ICAR, the apex body for coordinating, guiding and managing research and education in agriculture in the entire country, must address the asymmetries.

The Education Division of the Council, towards addressing the veritable asymmetries, undertakes planning, development, coordination and quality assurance in higher agricultural education in the country and, thus, strives for maintaining and upgrading quality and relevance of higher agricultural education through partnership and efforts of the components of the ICAR-Agricultural Universities (AUs) System comprising 61 State Agricultural Universities (SAUs), 5 Deemed to be Universities (DUs), 3 Central Agricultural Universities (CAUs) and 4 Central Universities (CUs) with Agriculture Faculty.

Quality assurance in higher agricultural education in the country has been pursued through policy support, accreditation, framing of minimum standards for higher agricultural education, academic regulation, personnel policies, review of course curricula and delivery systems, development support for creating/strengthening infrastructure and facilities, improvement of faculty competence and admission of students through All India competitions.

As foremost step for quality improvement in education, the ICAR has periodically been appointing Deans' Committees for revision of course curricula. In the series, Fifth Deans Committee was constituted and given terms of reference (TORs) considering contemporary challenges for employability of passing out graduates and to adopt a holistic approach for quality assurance and effective governance in agricultural education.

A comprehensive consultation process adopting a bottom up approach was undertaken for curricula development to ensure nation-wide acceptance of the Committee's Report and its ownership by all stakeholders. Inputs from different stakeholders of agricultural education were obtained at different levels. The Committee first deliberated on the skills which graduates must possess and then worked out backward to design course curricula. The Committee identified Conveners/Co-conveners and gave them the responsibility to have inputs from all the Deans of all the colleges of their disciplines based on the suggestions received from their faculty after holding meetings at University/College level. The suggestions received for all the disciplines were reviewed by the Committee.

The Committee has endeavored to make sure that the Report represents a national consensus in respect of its terms of reference and various issues that were flagged to it. In particular, the course curricula have been restructured to underpin relevant practical skills, entrepreneurial aptitude, self-employment, leadership qualities and confidence among graduates, attracting and retaining youth in agriculture, which among other things, will be helpful in implementing the new initiatives of the government, viz., Make-in-India, Start-up-India, Skill India etc.

During this “Decade of Innovations in India”, importance of cost effective, location specific and affordable innovations along the value chain and of new extension systems have been highlighted in the revised curricula. Further, the Committee has also considered the international dimension of agricultural education in context of technological, socio-economic, environmental, and livelihood security, and sought to achieve global level academic excellence and relevance. The updated curricula thus provide academic legitimacy to the new and emerging issues of food and agricultural system, and contextualize the new pursuits.

Salient Issues, Outcomes, and Solutions

The salient issues, outcomes and solutions under the different TORs are summarized below:

Defining UG & PG Degrees for General Market Needs and for Specialist Jobs and Uniformity in UG and PG Degree Nomenclature:

Considering the recommendations of the Committee to Review Essential Qualifications and Degree Nomenclature of various Programmes running in Agricultural Universities, and to provide distinct identity to the four year B.Sc. degree offered by SAUs over the three year degree course being run in some colleges under general universities, the Committee decided to add Honours to the degrees in Agriculture, Horticulture, Sericulture, Forestry, and Home Science. The degrees in Agricultural Engineering, Food Technology, Dairy Technology and Biotechnology have been proposed to be named as B. Tech with name of discipline as suffix. The degree in Fisheries Science is to be named as B.F.Sc.

The Master and Doctoral degrees will be named as M.Sc /M.Tech and Ph. D with name of the department/field of specialization as suffix.

Restructuring of UG Programmes for Increased Practical/Practice Contents

Towards enhancing employability and entrepreneurial ability of the graduates the Committee decided to increase the practical content in the courses wherever necessary. It was decided to restrict the maximum number of credit hours in a semester to 21-22 in order to provide time for library consultation and other activities like assignments, seminars and project preparation etc. The total

number of credit hours in 8 semesters including Student READY programme will range from 170 to 183 for all the programmes.

In order to harness regional specialties and to meet region-specific needs the Committee has recommended offering certain optional courses, such as coastal agriculture, hill agriculture, tribal agriculture etc. As regards individual course contents, universities/colleges may modify the contents to the extent of 30 percent whenever necessary as per the regional demands and needs.

Many new courses have been recommended to be introduced in emerging fields like GIS, Precision Farming, Conservation Agriculture, Secondary Agriculture, Hi-tech Cultivation, Specialty Agriculture, Renewable Energy, Artificial Intelligence, Mechatronics, Plastics in Agriculture, Dryland Horticulture, Introductory Nanotechnology, Agro-meteorology & Climate Change, Waste Disposal & Pollution Abatement, Food Plant Regulations and Licensing, Food Quality, Safety Standards and Certification, Food Storage Engineering, Food Plant Sanitation and Environmental Control, Emerging Food Processing Technologies etc.

The Committee has recommended also to include courses on Personality and Leadership Development, Yoga Practices and Human Values & Ethics in the list of non-credit courses.

Central Assistance for Strengthening of Higher Agricultural Education

The ICAR provides financial assistance to SAUs, DUs and CUs with Agriculture Faculty for strengthening and development of higher agricultural education system throughout the country.

The Committee has recommended continued augmented support for faculty & student amenities, curriculum delivery, development of facilities for UG practicals, computer labs, updation of professional/technical competence of para-professional staff/administrative staff, students study & educational tours, deans' offices, library and to skill development.

ICAR-funded '**Student Exchange Programme**' between colleges located in different agro-climatic zones is recommended towards promoting skill development in the graduating students for specialized jobs as per market needs and demands. Additional funds have been recommended to support the colleges for strengthening / expansion of existing Experiential Learning Programme (ELP) units and to create additional ELP units to accommodate more numbers of students round the year.

The Committee has further recommended that each college should have a **Demonstration cum Production Centre** for training students, field workers of Government Departments, and NGOs community leaders in income generation skills.

Guidelines for Assessing Training Needs and Performance of Teaching Faculties

Considering the fact that teaching faculty constitutes one of the most important pillars of the university education system besides infrastructure and course curricula, the quality of faculty cannot be underestimated when aiming for quality assurance. The Committee has thus strongly recommended that the need of competent and updated faculty should be taken as most important issue and be addressed on priority. The Committee emphasized that besides Assistant Professors for whom two trainings are a requisite for assessment and promotion to higher grade, at least one such training be made mandatory for other levels also, including Heads and Professors, Deans of Colleges and Directors, Vice-Chancellors and Directors of DUs, every five year.

Various trainings have been organized by ICAR, such as, induction training for scientists at entry level, overseas training for global exposure in key emerging areas; and structured trainings for heads of departments, comptrollers, faculty, and technical and Financial staff, pertaining to their specific needs. While further streamlining these provisions the Committee has recommended for increasing the number of overseas trainings so as to keep pace with the changes, and for strengthening international cooperation and identifying additional areas and programmes for training at winter/summer schools, etc. Further, training programmes have been recommended under CAFT exclusively on the new subjects/ courses included in the Report for the benefit of the faculty in SAUs. A separate training programme for the nodal officers/coordinators of Student READY is recommended for efficient execution of the programme.

Reforms in Governance of SA Us

With an objective to have uniformity in the governance of State Agricultural Universities, ICAR brought out the first Model Act in 1966 and has been revising it from time to time. The last revision was made by the Council in 2009. The Fifth Deans' Committee has recommended judicious adoption of the provisions of the ICAR Model Act by all the SAUs.

Minimum Standards for Establishment of New Colleges

ICAR had constituted committees for preparation of Minimum Standards for Higher Agricultural Education for different disciplines of agricultural sciences, specifically in terms of eligibility, minimum admission strength, divisions/departments/sections required, minimum teaching staff in different categories, administrative staff, and laboratory/field equipment/library facilities. The Deans' Committee considered the reports of the committees and endorsed the suggested norms and standards for establishment of a new college of the given discipline.

Further, assimilating the minimum standards suggested by the disciplinary committees, the Fifth Deans' Committee has prepared a framework for preparing Detailed Project Reports (DPRs) for establishment of new colleges. This move should greatly enhance the standards and harmonize the curricula quality across the country.

New Initiatives:

The world is currently witnessing huge technological, socio-economic and political transformations, necessitating nations to change their priorities, investments, and institutions, and to launch new initiatives accordingly. In this context, the Fifth Deans' Committee has recommended the following new initiatives for aligning Indian agriculture curricula with the current national needs and initiatives and with international trends.

The following new initiatives have been strongly advocated:

Student READY (Rural and Entrepreneurship Awareness Development Yojana)

In compliance with the Student READY programme launched by the Hon'ble Prime Minister of India on 25th July, 2015, the following components are proposed for conducting one year program in all the UG disciplines:

- Experiential Learning (EL)
- Rural Agriculture Work Experience (RAWEX)
- In Plant Training/ Industrial Attachment

- Hands-on Training (HOT) / Skill Development Training
- Students Projects

Common Courses

In view of the increasing importance of climate change, market competitiveness, information technology, entrepreneurship, and graduates employability, it was a general consensus that students of all disciplines need to be taught courses on the following concerned topics:

1. Environmental Studies and Disaster Management
2. Communication Skills and Personality Development
3. Information and Communication Technology
4. Entrepreneurship Development and Business Management
5. Agricultural Informatics
6. Economics and Marketing

New Degree Programmes

Keeping in mind the latest scientific developments impacting food and agriculture systems, considering new societal needs and demands, and in line with current national policy thrust, the Fifth Deans' Committee has proposed introduction of the following new courses:

- B. Tech (Biotechnology)
- B.Sc. (Hons) Sericulture
- B.Sc. (Hons) Community Science (Home Science renamed)
- B.Sc. (Hons) Food Nutrition and Dietetics

Holistic Distribution of Courses:

The Committee has attempted to distribute the courses in the following form to inculcate the Basics, Principles and Skills in a systematic way.

- | | |
|----------|---|
| I year | – Basic and fundamental courses (Traditional) |
| II Year | – Principles (Technology) |
| III Year | – Production system (For improving Talent) |
| IV Year | – Skill and entrepreneurship development (For federating Trading) |

Declaring Degrees in Agricultural Sciences as Professional Degrees:

The Committee strongly recommends that all degrees in the disciplines of Agricultural Sciences be declared as professional degrees, which include undergraduates in:

1. Agriculture
2. Agriculture Engineering
3. Biotechnology
4. Dairy Technology
5. Fisheries
6. Food Technology
7. Forestry
8. Community Science (Home Science)

9. Food Nutrition and Dietetics
10. Horticulture
11. Sericulture

Increasing Role of Basic Sciences in Agriculture

Over the years, the visibility of basic sciences in agricultural curricula has decreased. On the other hand, globally, greater emphasis is being placed on life sciences - biochemistry, microbiology, genetics, molecular biology, biotechnology, bio - remediation, bioenergy, biosecurity and computational biology. Agriculture graduates and scientists should increasingly seek employment and research opportunities in these frontier areas. Accordingly, agriculture curricula should put Agriculture in the middle of Science, Technology, Engineering and Mathematics ("STEM") to make it "STEAM", where A means Agriculture. While vocational education and RAWE and HOT will remain extremely important in the Indian context, the science-based hands on learning experience should be duly promoted. The revised curricula should increasingly be internalizing the "STEAM" concept.

Global Interdependence and International Agriculture

India, accounting for 17% of world's population and over 30% of world's smallholder farmers, and hardly 2.5% of the world's land and 4% of world's water resources, greatly impacts and gets impacted by the state of global food, agriculture and natural resource system. Thus, the major global initiatives and foresight must be kept in mind while developing leadership in agricultural sciences to ensure global competitiveness, equitable knowledge sharing, and environmental sustainability. Accordingly, the system should move from the Land-Grant to a "World Grant" pattern. The new curricula, courses and contents have been designed to duly inform the students of the new global initiatives, such as Global Green Economy; Knowledge Economy; Global Zero Hunger Challenge; UN International Year themes *viz.* International Years for Pulses, Family Farmers and Smallholder Farmers, Soil and Water; Sustainable Development Goals, 2030; and International Agriculture and Development Challenge, 2050.

Implementation of Recommendations:

The course curricula contained in the report are designed and geared to ensure excellence, relevance, and creation of skilled, talented, and entrepreneurial human resources and knowledge pools to harness demographic dividends, and to achieve high quality of products, farmers profitability, zero environmental footprint, climate resilience, high input and natural resources use efficiency, inclusiveness, and competitiveness.

In order to achieve the above goals, the recommendations of the Fifth Deans' Committee must be implemented judiciously and should be mandatory. The Committee underpinned that an effective process of monitoring, evaluation and accountability as per an agreed result framework is a must for ensuring judicious implementation of the recommendations. Further, it emphasized that only the accredited institutions and programmes should be eligible to seek ICAR development grant.

The Context: Transforming Agricultural Education to Reshape India

Introduction

Transformation of the Indian Agricultural Education in the late 1950s through the 1960s, augmenting science, technology and innovation, was the driver of the Green Revolution, which enabled India to free herself from the Ship-to-Mouth situation to attain the Right-to-Food status. Soon after independence, in 1949, Dr. S. Radhakrishnan, a great educationist, humanist and philosopher, in his Report to the Commission on University Education, had envisioned establishment of autonomous holistic rural universities that would teach not only agricultural sciences and practices but also humanities, mathematics and natural sciences, and usher in the generation and use of new knowledge, skill and technologies needed to develop India. This vision was realized through the implementation of the recommendations of the Indo-American teams, 1955 and 1959, for establishing agricultural universities on the Land Grant University (LGU) pattern, envisaging integrated research, education and extension for agriculture-led development. In 1958, the Indian Agricultural Research Institute (IARI), New Delhi, India's flagship institute, heralded the change by organizing its PG School on the LGU pattern, and was subsequently declared as a Deemed University (DU) by the University Grants Commission.

The first State Agricultural University on the LGU pattern was established in 1960 at Pantnagar, today famous as Govind Ballabh Pant University of Agriculture and Technology (GBPUAT). And, it was not a mere coincidence that the First Convocation Address of the University was delivered in 1963 by the then President of India, none other than the above-mentioned Dr. Radhakrishnan, whose report had triggered the establishment of SAUs. In his Address he had underpinned "We can't blame the farmers, we can't blame the land and we can't blame anything. We, who are the leaders of the country, must not fail the farmers. We must try to bring to them the most up-to-date knowledge. That is what we have to do. If we do that, I have no doubt on the discontinuance of the import of food grains from abroad I hope, the graduates of this University will set a different example and will do something substantial for the improvement of Agriculture". These words of the Bharat Ratna must always guide our

agricultural scientists, teachers, academicians, administrators, and students towards a knowledge-led agriculture.

A series of SAUs were established in the 1960s and 1970s, and in the initial decades contributed immensely to build trained human resources and to usher in the Green, Yellow, White, and Blue Revolutions in the country. Between 1960 and now, production of food crops, horticultural crops, livestock, and fisheries has increased four-to-ten-fold. The Rainbow Revolution had halved the incidences of hunger and poverty in the country, whereas the population had more than doubled.

But, despite the Rainbow Revolution and comprehensive National Agricultural Research and Education System (NARES) comprising 73 Agricultural Universities (AUs) consisting of 61 SAUs, 5 DUs, 3 Central Agricultural Universities (CAUs) and 4 Central Universities with Agriculture Faculty, and 101 ICAR institutes, often due to reasons beyond the national level production, the country is still home to almost one-fourth of the world's hungry and poor. Over 40% of world's undernourished children are our own children. It is estimated that the high under-nutrition in the country annually costs about 3% of the national GDP, let alone the entrenched human deprivation. The Second UN International Conference on Nutrition, 2014, had pledged to "improve nutrition by strengthening human and institutional capacities to address all forms of malnutrition through, inter alia, relevant scientific and socio-economic research and development". Moreover, the income inequities, especially between farmers and non-farmers, and other asymmetries, have widened, reflecting the stunted structural changes in the country.

One of the main reasons for the not-so-satisfactory situation is the sub-optimal performance of several of the AUs. Among other things, the intensity for comprehensiveness has declined, investment in agricultural research-education-extension is a low, and academic inbreeding depression is widespread. Consequently, the educational standards, faculty quality, graduates' employability, and research and extension outcomes have declined. These weaknesses are bound to lead to low individual achievements and overall poor performance, and also get reflected in the national indices such as hunger index, human development index, science index etc.

Lately, reports on Ranking of World's Universities have received global attention. Unfortunately, none of the Indian universities find place in the first 100 or 200 ranked universities of the world in the recent years. This situation has been noted by all stakeholders, namely, universities, institutions, scientists, students, industry and farmers. So much so, that the President and the Prime Minister of India have publically expressed their concerns on this unacceptable situation.

Moreover, the indifference of the youth to agricultural sciences and education is greatly hampering the availability of suitably trained human resources across the agricultural value chain, and resulting in inadequate innovations and technologies in the food and agriculture system. This gap must be filled today, as today's students will be the professionals in the 2030s and 2040s, when they will be challenged to provide science-led doubling of agricultural production from the shrinking land, water and biodiversity resources, "more from less for more" (MLM). In doing so, the fast changing trends and new and emerging challenges and opportunities should be duly internalized.

The Bhubaneswar Declaration on Indian Agricultural Education

The National Academy of Agricultural Sciences (NAAS) - the national think tank for agricultural research and education for development, in close collaboration with the Indian Council of Agricultural Research (ICAR) – the nation's apex body for agricultural research and education, organized its XI Agricultural Science Congress on "Transforming Agricultural Education for Reshaping India's Future" at Bhubaneswar in 2013. It was attended by more than 500 delegates, including several world leaders in agricultural education from India and abroad. The Congress had identified the following gaps and constraints in the Indian agricultural education system.

- Low priority to agricultural education as a career option, consequently the gross enrolment was only 0.03%; poor employability of the graduates
- Declining quality of students, poor quality of education due to obsolete and inadequate equipment, laboratory, farm and library facilities, leading to knowledge deficit all along the value-chain, particularly in new and emerging areas, such as biotechnologies, nanotechnology, informatics and communication, and more so in the private colleges
- Depleting number and quality of faculty members, lack of faculty competence in frontier and emerging areas, limited emphasis on refresher training, faculty improvement and incentives; dwindling faculty in SAUs with majority chunk of the posts remaining vacant
- Disconnect among agricultural education, employment, and industries' requirements; lack of adequate skill, entrepreneurship and experiential learning
- Poor inclusion of basic sciences in agricultural curricula; outdated curriculum delivery mechanisms; increasing irrelevance of Home Science colleges and curricula
- Extensive inbreeding and associated depressions; low access of agricultural education to rural students, especially to the tribals and socially-deprived communities
- Inadequate academic rigour in existing curricula, which are short in informing and sensitizing the students and faculty about the seriousness of the stubbornly high incidences of hunger, under-nutrition, poverty, inequality, fast degrading natural resources - land, water and biodiversity, and high vulnerability to climate change and market instabilities
- Inadequate and declining investment and financial resources in agricultural universities/ colleges; opening of new universities without matching resources; unmindful splitting of agricultural universities, and poor resources planning
- Poor governance, system's inability to take full advantage of modern tools of management for efficient governance (e-governance); widening disconnect amongst education, research and extension; isolation from international exposure and poor internalization of relevant international trends and developments
- Lack of evaluation, monitoring, impact assessment, accountability and incentive systems

Towards resolving the above asymmetries and transforming India's agricultural education system, and sharing the global experiences, the Congress had made the following recommendations comprising new approaches and actions:

- Embrace agricultural education for development (AE4D) as an integral component of the national agricultural policy to ensure adequate, consistent and predictable investments in

agriculture, especially education, research and extension in creating a world-class agricultural university system attuned to face local, national and international challenges and opportunities over short, medium and long terms

- Ensure and institutionalize transparent governance, autonomy, meritocracy, dynamic assessment of human resource requirement, judicious allocation of resources, transparent and effective flow of funds, transparent examination and student enrolment system, effective implementation, monitoring, evaluation, accountability and responsibility based system (measure to manage)
- Minimize inbreeding and splitting of universities, pay focused attention to standards, norms, and accreditation, create centers of excellence and institutes for agricultural education, science, knowledge, research, technology and innovation in an interdisciplinary and multifaculty mode
- Strengthen and streamline Centre-State partnership, identify national and state level public and private sector leaders with differentiated but reiterative responsibilities to work on the design and implementation of reforms and to develop a strong inter-ministerial and inter-departmental cooperation mechanism
- Revamp teaching/learning processes and methodologies to attract best of talents and blooming young minds for nurturing them leading to a nation-wide programme on “Youth for Leadership in Farming”
- Strengthen/initiate/institutionalize skill development, entrepreneurship and experiential learning programmes, and duly promote non-formal education and vocational training
- Support development of an active and continuous long-term relationship-based international cooperation, rejuvenate and dynamically strengthen initial very successful collaborations, such as between Indian SAUs and US Land Grant Universities, and launch need-based South-South and South-North collaborations.

The Bhubaneswar Congress had concluded that human capital should be seen as the greatest national treasure. Creating this treasure is thus the foremost challenge. Attracting talents to agricultural education, faculty competence improvement, addressing faculty shortage, reducing inbreeding and promoting national integration, linkages among institutions, and assurance of quality agricultural education are fundamental to achieving the desired quality human resources. It had emphasised that promoting education in basic and emerging sciences, creation of centers of excellence, modernization of AU farms and laboratories, strengthening education for agricultural extension and rural development, public private partnership for innovations in agricultural education and research, and vocational education will strategically enhance the desired outcomes. Manpower planning, enhanced financial support, IT for networking and communication, e-courses and distance education, and international collaborations were identified as essential components for knowledge-based development.

ICAR's Resolve for Quality Agricultural Education

The ICAR undertakes planning, development, coordination and quality assurance in higher agricultural education in the country. It strives for maintaining and upgrading quality and

relevance of higher agricultural education through partnership and efforts of the components of the ICAR-Agricultural Universities (AUs) system, referred to as the National Agricultural Education System (NAES), comprising 61 State Agricultural Universities (SAUs), 5 Deemed-to-be-Universities (DUs), 3 Central Agricultural Universities (CAUs) and 4 Central Universities (CUs) with Agriculture Faculty.

The quality assurance is undertaken by the Council through policy support, accreditation, framing of minimum standards for higher agricultural education, academic regulation, personnel policies, review of course curricula and delivery systems, development support for creating/strengthening infrastructure and facilities, improvement and incentivization of faculty competence, examination reforms, admission of students through All India competitions, and students counselling and placement. Through various scholarships and fellowships as tools for the HRD, it promotes national integration and reduces inbreeding, strengthens basic research through its National Professor and National Fellow Schemes, and also establishes and helps establish international linkages and collaborations for sharing successful experiences. As the AUs spend 90-95 % of their budget on salaries, ICAR's professional and financial support to the universities for quality assurance is most vital.

Recently, the ICAR has put in place norms and standards for accreditation of AUs and linked them with access to its grants. During the past several years, through its international initiatives, such as the National Agricultural Technology Project (NATP) and National Agricultural Innovation Project (NAIP) supported by the World Bank, the Council has internalized global vision and successful experiences in its agricultural education development programme. Such initiatives will further be explored to link the national system with global knowledge economy, and also to undertake International Experiential Learning. Suitable twinning arrangements with foreign universities could be explored for sharing innovative pilots for agricultural education, research, and technology dissemination. These initiatives will help further strengthen institutional reforms to emphasise learning-centred education, faculty and teaching facilities upgradation, and partnership with private industries.

The Fifth Deans' Committee: Business Unusual to Synergic Relevance with Excellence

The ICAR has periodically been appointing Deans' Committees for improving quality of agricultural education, including updating norms and standards, revising courses curricula and contents in context of the latest developments, setting uniform patterns of credit load and evaluation systems, and providing academic framework for addressing the challenges and opportunities. Based on in-depth analysis and comprehensive national level consultation, the Deans' Committees have been making recommendations for transforming the education system to reshape the country's agriculture-led development. The Fifth Deans' Committee is the latest in the series.

The Fifth Deans' Committee was constituted by the ICAR vide office order F. No. Edn. 5.1.2013-EQR dated: 10 July 2013 under the chairmanship of Prof. R.B. Singh with the following terms of reference (Annexure I).

- Defining UG & PG degrees for general market needs and for specialist jobs and uniformity in

UG and PG degree nomenclature

- Restructuring of UG programmes for increased practical and practice contents
- Central assistance for strengthening of Higher Agricultural Education
- Guidelines for assessing training needs and performance of teaching faculties
- Reforms in governance of SAUs
- Minimum standards for establishment of new colleges

The Committee held its first meeting on 22 Aug 2014 and deliberated on the TORs and reviewed the outcomes of the Fourth Deans' Committee. In particular, it examined the new issues and challenges emerging at the Bhubaneswar Congress and the consequent roadmap prepared by the NAAS for transforming agricultural education to reshape India. Further, it considered contemporary challenges for employability of passing out graduates and adoption of holistic approach for quality assurance in agricultural education.

Reviewing the baseline issues addressed by the Fourth Deans' Committee, the followings emerged as satisfying outcomes of the recommendations of the past Committee:

- Adoption of uniform syllabi across the country in identified eight disciplines of agricultural sciences;
- Streamlining of nomenclature of academic programmes, prescription of essential qualifications for Master and Ph.D programmes and various jobs in State and Central governments;
- Smooth conductance of examination, counselling and admission of students for UG and PG programmes through All India Entrance Examination conducted by ICAR, resulting from the uniformity in academic programmes; and
- Development of suitable human resources, improved skill, and enhanced entrepreneurship in some areas.

However, the Committee noted that several of the recommendations of the Fourth Deans' Committee have not been implemented satisfactorily, such as the degree nomenclature of some of the B.Sc and B.Tech programmes, inconsistent adoption of the norms, standards and regulations, and below-expectation adoption of the Experiential Learning modules. Thus, in true sense, several of the issues have remained unaddressed and are equally valid even today. While sharpening its full TORs, the Fifth Deans' Committee recapitulated the priorities and, as suggested by the ICAR, retained the unattended issues of the past committee(s).

Agriculture in the context of this Report is defined on the same broad lines as by FAO which includes crops, horticulture, livestock, fisheries, and forestry production and associated activities; value chains of food and other produces; natural resources including land, water and biodiversity; mechanization and energy; and the affecting social, economic, trade, market, cultural, ecological, and environmental and climatic factors. Thus, teaching, learning and education in these and related areas fall under the umbrella of Agricultural Education.

Adopting a hub (ICAR) and spoke (AUs) model and undertaking comprehensive consultation and a bottom up approach for curriculum development, inputs from different stakeholders of agricultural education were obtained at different levels. The Committee first deliberated on the skills which the graduates must possess and then did reverse engineering to design course curricula. The Committee identified Conveners/Co-conveners, as annexed, and gave them the

responsibility to have countrywide inputs from all the Deans of all the colleges of their disciplines based on the suggestions thus received from their faculty after holding meetings at University/ College levels. The suggestions received from all the disciplines were reviewed by the Committee.

The draft report was presented in the AU Vice Chancellors Conference on January 16, 2016. The VCs' comments received at the conference were duly internalized in the final draft report, which was shared with all the Vice-Chancellors. The final report has internalized the final comments of the VCs. The Committee has tried to make sure that inputs of all stakeholder groups are duly internalized and the report represents a national consensus in respect of various issues that were flagged during the process.

The Committee reiterated the importance of the development of national human resources capital in the field of agriculture and allied sciences rendering our graduates professionally competent, socially sensitive, and ethically strong. It was felt that highest priority should be given to agriculture for the alleviation of hunger, undernutrition, poverty, and inequity. Accordingly, the course curricula contained in the report are designed and geared to ensure excellence, relevance, and creation of skilled, talented, and entrepreneurial human resources and knowledge pools to harness demographic dividends, and to achieve high quality of products, farmers profitability, zero environmental footprint, climate resilience, high input and natural resources use efficiency, inclusiveness, and competitiveness.

The Committee appreciated that Agriculture is getting increasingly feminized and welcomed the enhanced enrolment of women in various agricultural courses. Gender-sensitive agricultural education and curricula must inform the gender issues, goal and perspectives in agriculture. The Home Science courses were found outdated thus revamped. Human nutrition, human behaviour, and community participation have been given greater attention in the revised curriculum. As family farming is becoming more common and responsibility of women in agriculture has increased, the Committee has sought greater support to women education to enable them to pursue innovative agriculture on their own.

The Committee emphasized that the Private Sector is now a formidable employer of agricultural graduates. Hence, there is a large demand for suitably trained and equipped graduates in agricultural sciences to meet the rapid expanding growth in the modern food and agro industry. This changing scenario of employment pattern requires a change in the curriculum approach to address needs of the industry. Generally, the industry feels that the present curricula inadequately prepare graduates for private sector employment. Accordingly, new academic programmes have been developed and existing curricula revised and upgraded to meet the requirements, including the Student READY and Food Technology programmes.

The Committee thus underpinned that India's agricultural education needs to be stimulated and improved to increasingly enable India's participation in global markets through export of agricultural commodities and technologies, support to domestic and international agribusiness, and development of new bio- and knowledge-based enterprises, including those for rural and agro-industrial services. In doing so, the voices of the farmers, industry, corporate sector, NGOs, Civil Society, scientists, teachers and, of course, students were heard and duly accommodated in the curricula.

The Committee felt the need to broaden the base of agricultural education, while sustaining

the core excellence in the scientific component. In this context, the following considerations were kept in mind: (i) deprivation of rural people, especially poor farmers, has increased and their problems are much more complex, (ii) a holistic approach underpinning multi- and interdisciplinary aspects is needed, (iii) in the globalized world, effective international collaboration will enhance capacities of universities, (iv) business unusual for financial, administrative and institutional changes are needed towards broadening the base, and (v) the human face of education should be kept in mind to reach the unreached viz. the tribals, and to empower the impoverished to live a dignified life.

Sharing the thoughts of world leaders in agricultural education from several countries and international organizations at the Bhubaneswar Congress and further through bilateral interactions of ICAR and NAAS with selected universities in the USA and elsewhere, the Committee has strived to selectively internalize the emerging global curricular trend. Such trends include Basic and Applied Sciences in Agriculture, and transformation from “STEM” (Science, Technology, Engineering and Mathematics) to “STEAM” where A stands for Agriculture (a recent USDA report). Basic and social sciences have considerably been integrated with state-of-the-art research in agricultural sciences to create synergistic quality education and research and to attract, nurture, and retain talented students and high quality research and academic faculty in food and agriculture system. Further, the move is hoped to integrate and mutually enrich undergraduate, graduate, Ph.D. and post-Ph.D programmes.

The Committee noted the various agriculture-related global trends and declarations such as the Zero Hunger World, the New Normal – Food, Nutrition, Health and Agriculture Nexus; Green Economy and Green Agriculture; Climate Smart Agriculture, Sustainability and Environmental Health; Big Data and Data Science; Entrepreneurship; and International Experiential Learning. It also appreciated the recent UN International Year’s thrust on water, family farms, soil, pulses, etc. which must stimulate our educational planners to design and deliver courses with international perspectives. In the globalized world, in view of the fast changes taking place, a question may be asked whether India’s agricultural education system could move from the Land Grant to a “World Grant” university system, as the world today is much more integrated and the commonality between local and global agriculture has heightened, as advocated by President Simon of Michigan State University.

Adequate coverage has been provided in respect of new technologies such as biotechnology, information technology, bioinformatics, GIS, remote sensing, precision agriculture, hi-tech cultivation, secondary agriculture, conservation agriculture, organic farming, international agriculture, processing and value addition, agribusiness management, and communication skills. The course curricula have been restructured and reoriented to develop much needed skills and entrepreneurial mind-set among the graduates to take up self-employment, to sustainably enhance rural livelihood security, and to propel agricultural transformation through science informed policy options and actions.

The curriculum on socio-economic fronts has been strengthened to capture the latest trends and their impact in the next 10 to 15 years. For instance, increasing roles of livestock, horticulture and fisheries in meeting the socio-economic goals of accelerated inclusive economic growth and overall nutritional security have been emphasized. Further, while maintaining desired national level uniformity in designing agricultural courses and curricula, adequate flexibility has been

provided to meet the agro-ecologically differentiated challenges and opportunities, viz hill agriculture, organic farming, coastal agriculture, dryland agriculture etc.

The committee deliberated on Agriculture Marketing & Cooperation and Agribusiness Management. The committee constituted by ICAR to frame Minimum Standards for Higher Education in Agribusiness Management opined that undergraduate programme in Agribusiness Management is not viable.

The concerned colleges offering undergraduate courses are not ready to agree upon a common nomenclature for the degree, considering expected future complications for the graduates who are being satisfactorily employed in their respective states. The committee thus decided not to include the courses on Agriculture Marketing & Cooperation or Economics & Marketing and Agribusiness Management in the Fifth Deans' Committee report.

Agriculture curricula in the past had little coverage of indigenous knowledge and innovations. In the contemporary agriculture, we need innovations more than ever before. The observance of this decade as the 'Decade of Innovation in India' is a recognition of this reality. Importance of cost effective, location-specific and affordable farm innovations emphasizing value chain management, new extension systems, promotion of agri-business models and entrepreneurship have been highlighted in the revised curricula.

In the past, we have generally been sub-optimal both at national and international levels in adequately communicating our outstanding achievements to the veritable stakeholders – political leaders, policy makers, scientists, development partners, farmers, consumers, and the civil society. The proposed curricula attempt to strengthen communication science and technology capacities to leverage ICT to ensure effective and timely communication of actual and potential impacts of the products and outcomes.

The Committee has made efforts to include relevant practical skills and entrepreneur aptitude, and to impart confidence among graduates. To reorient graduates of Agriculture and allied subjects for higher employability and greater entrepreneurship, the Student READY programme is to be introduced in all the Agricultural Universities as an essential prerequisite for the award of degree to ensure hands-on experience and practical training. Due attention has been given to areas of training and institutions for improving faculty competence for the purpose.

ICAR's 'Farmer FIRST' initiative must motivate our students and other stakeholders to move beyond the production and productivity and to address the complex and diverse realities of majority risk prone farmers through enhancing farmers-scientists-universities contact with multi-stakeholders participation. The concepts and domains that are new or new in emphasis like food and agriculture systems, trade, market chains, value chains, climate smart agriculture, and innovation systems have been reflected in the revised curricula.

Thus, both academic excellence and relevance (employability and entrepreneurial ability) have been emphasized. The required basic science courses have been included in the agricultural courses. The Committee has identified six common courses which need to be included for all programmes of agricultural sciences. Further, four new degree programmes have been designed. The Committee has recommended that all the 11 degrees in Agricultural Sciences be declared as professional degree and has suggested their nomenclature.

In delivering the curricula, the concerned courses may discuss major initiatives of the Government of India, such as the National Food Security Mission, Rashtriya Krishi Vikas Yojana, MGNREGA, Jan Dhan Yojana, Make-in-India, Krishi Sinchai Yojana, Digital India, Skill India, Start-up India, etc. Our students must continuously be reminded that towards shaping India to achieve the future we want, we cannot think of a vibrant, inclusive and happy India without a thriving, multifunctional and comprehensive agriculture. “If agriculture fails, nothing else will succeed”. All, from farmers to parliament, particularly the agriculture students, must have faith in Agriculture. The roadmap is: *Unnat Pathykrām to Unnat Krishi Shiksha to Unnat Krishi and Kisan to Unnat Bharat – Gramodaya se Bharat Uday*.

Academic Legitimacy and Contextuality of Challenges and Opportunities

India's agriculture now faces additional new challenges, which must be reflected in the national agricultural academic curricula and research priorities. In addition to freeing India of endemic and stubbornly high undernutrition and poverty, India now has to rapidly become competitive in global markets. Indian agriculture has to not only contribute to India's growth but support its shift to a climate smart bio-based more knowledge-intensive green economy. India needs to rapidly innovate in its agriculture. India's agriculture has resiliently to improve its productivity by more than 4 per cent annually from the shrinking available arable land and water resources to meet its burgeoning food and nutritional needs and to maintain food sovereignty to impact upon poverty, especially in rural areas. Thus, agriculture has to be economically viable, globally competitive, socially equitable and environmentally sustainable, and these facts must be duly internalized in the curricula.

Agricultural education is thus increasingly challenged to engage in a new global social contract to serve the needs of society, improve the quality of life and environment, build leadership, increase collaboration and develop new approaches to new challenges and uncommon opportunities. Agricultural education thus needs to evolve in tune with the fast changing national and international scenarios. The present situation demands a renewed thrust for enhanced quality and relevance of higher agricultural education so as to facilitate and undertake human capacity building for developing self-motivated professionals and entrepreneurs in view of the changing scenario of globalization of education, emergence of new areas of specialization such as biosensors, genomics, alternative sources of energy, nanotechnology, etc.

The graduates are required to possess professional capabilities to deal with the concerns of sustainable development (productive, profitable and stable) of agriculture in all its aspects. Further, there is need for agricultural graduates to possess knowledge, skills, including “soft skills” e.g. written and verbal communication ability, and also entrepreneurship to provide a class of village-based services such as advisories on new innovations, markets and avenues of development assistance for corporate and contract farming. Industry and universities partnership is essential if industry is to obtain well-trained agricultural professionals in cutting edge technologies for international competitiveness. Thus, it may be desirable to declare agriculture degree as a professional degree, and implications thereof should be critically examined.

Agriculture students must be aware that by 2035, India will be the most populous country in the world. Towards the year 2050, its population will reach about 1.9 billion, and nearly 70% of the

people will be in middle income group. The high population and income growths are continuously pushing up the demand for food, particularly high value quality foods, such as livestock and horticultural products. The food demand is likely to almost double by 2050. On the other hand, serious yield and productivity gaps exist in our food and agriculture systems. India's total factor productivity growth rate has been sluggish. With the business as usual, by the year 2030, only 59 percent of India's total demand for food and agricultural products will be met.

Today's graduates should be the torch bearers of the United Nations Zero Hunger Challenge Program. The challenge is to produce more from less for more (MLM) under the limited and declining land, water, and biodiversity resources and more difficult and complex environmental settings, climate change, carbon and GHG imbalances, intensifying biotic and abiotic stresses, and worsening socio-economic inequities and inequalities (average income of a farmer is 1/5th of that of a non-farmer). A business unusual is thus called for achieving: (i) sustainable intensification and diversification of production and zero waste to meet demand for nutrition and food quantity and quality, (ii) 100 percent increase in smallholder productivity and income; ensuring desired profitability, social justice, and attractiveness to agriculture as a profession, and (iii) ecosystem services that improve water quality and quantity, soil health, carbon capture, and biodiversity.

India's agriculture graduates should be fully aware of the developments in international agriculture both for locally adopting the success stories from across the world as well as for having worldwide employment opportunity and ability to enrich human resources, global science and technological progress. India has to reduce the distressing pressure on natural resources and on population dependant on agricultural production with complementary non-farm engagements. The NARES thus must shift from viewing agriculture as only a production and productivity challenge that can be solved by a set of generic technology packages to one where agriculture is a key contributor to sustainable and resilient growth, development and improvement of quality of life and the environment. Our graduates should be able to act in context of the stubbornly high incidence of food insecurity, stunted structural transformation, enhanced volatility both in agricultural production and market, accelerated environmental and ecological degradation, and widening inequalities.

While firming up the academic legitimacy and contextuality of the challenges and opportunities, the Committee suggested the following check-list to be used by planners and managers to assess outcomes and impacts of various programmes:

- Whether our agricultural education system is prepared to produce such leaders who would navigate us through the changing water and render our universities world-class?
- Do the staff and students have real-world experience as part of learning and could our graduates essentially become job creators rather than job seekers, and realise demographic dividend?
- Are we ready to change the Land Grants System to the "World Grant System"? How relevant are the existing teaching and skill development programmes and institutions?
- Is our agriculture backed by basic sciences and best of practices to convert "STEM" into "STEAM"?

- Are we prepared to adopt business unusual and disruptive innovations to effect the much needed changes in our agricultural education system, including centre-state congruence, the hub-spoke model?
- Do we have the necessary quality financial and other resources, commitment and political will to lead India to be a major knowledge hub in the world geared towards an all time Zero Hunger and prosperous India?

Disruptive Innovations to Promote Excellence in Agricultural Education

Higher education is emerging as an international service, and there is a growing concern the world over about quality, standards and recognition. Prioritizing the quality of higher education services by implementing or strengthening quality assurance measures is a strategy for increasing global stature. Quality assurance, which may include accreditation processes, is one of the universal tactics to enhance global competitiveness. A number of strategic funding programmes have been implemented to promote excellence by different countries and regions, such as China's 985 Project, Japan's Centres of Excellence and World Premier International Research Centres etc. India can emerge as a knowledge power only if an appropriate architecture for higher education is put in place. The Indian Government has decided to recast the country as "knowledge economy", purportedly by making higher education a top national agenda item and creating world-class universities. Some of the uncommon efforts are elucidated below.

Ranking of Agricultural Universities: The universities ranking exercises in recent years have revealed as to how the leading universities are reshaping the nations and the world, and have underpinned that the level of knowledge domains, meritocracy, governance, transparency, and international partnership underpin the quality of science, innovations, technologies, human resources, and competitiveness. Since quality education is the lifeline of progress, national developments can be viewed through the lens of education, research, technology and innovation.

In the era of globalization and increased internationalization of education, the ranking of the universities has become imperative as university ranking and indicators of excellence widen the basis of information for a well-informed university choice. In a country like India, where livelihood security of over 600 million real people directly depends on agriculture, the leading role of quality agricultural universities in the nation's progress can hardly be overemphasized. It is, therefore, desirable to work out "robust, transparent and sophisticated" criteria for ranking of agricultural universities in the country so as to give students informed choice as well as to build their reputation in the international arena, and to develop effective technologies and innovations.

The national agricultural education system may benefit from successful "robust" models for universities ranking available nationally and internationally. In this context, it is gratifying that the Ministry of Human Resources Development, Government of India, has recently developed a National Institutional Ranking Framework (NIRF) for engineering, management and a few other disciplines. The NIRF has identified 22 parameters in five major heads: (1) Outreach and Inclusivity, (2) Teaching, Learning and Resources, (iii) Research, Professional Practice and Collaborative Performance, (4) Perception, and (5) Graduation Outcomes. Some of the India-centric parameters include regional and international diversity, outreach, gender equity, and inclusion of disadvantaged sections of society.

Towards improving quality of agricultural education, the ICAR has adopted several measures viz. Accreditation and Quality Assurance, Curricula Development, Model University Act etc. In this resolve, involving the NARES, the NAAS has prepared a set of indicators/parameters for ranking of Indian Agricultural Universities, keeping in mind Indian context, particularly the educational aspirations, needs, employability, and livelihood security. As the ICAR institutionalizes the outcome/impact assessment and accountability pathway process, ranking of universities should be the foremost activity to be pilot-tested and hopefully all the agricultural universities and colleges will ultimately be part of the ranking process. Further, the efficacy of the “hub and spoke” model should dynamically be assessed.

Massive Open Online Courses (MOOC): Towards building a more knowledge intensive agriculture and associated food chains as also safeguarding the environment through sustainable use of natural resources, a new strategy for education and learning is required. In addition to formal on-campus education, open, informal, distance, off-campus, continuing learning for all should be promoted. Online learning should be used for linking learners, learning materials and mentors/teachers deploying technology mediation.

The Massive Open Online Courses (MOOC) are the recent disruptive innovations that can enable a small group of teachers/mentors to offer learning services to many people in the duration of a single course. MOOC can be meaningfully and effectively harnessed for training of public on a massive scale. Considering the need to explore the opportunities and challenges for capacity building in Indian agriculture using MOOC, the NAAS in partnership with the Commonwealth of Learning (COL), Vancouver, Canada convened a brainstorming session in 2014, and prepared a roadmap for adopting MOOC in NARS. Individual universities, as per the roadmap, should develop custom-designed MOOCs to meet the skill requirements of their students, as desired under the Skill India initiative.

Mentoring: Mentoring comprising “role modelling , giving counsel, providing acceptance and confirmation, and offering friendship”, if properly administered, would benefit our institutions to: build bridges across the hierarchy levels, empower change management, enhance work ownership and sharing of responsibility, retention of team members, expansion of learning ecosystem and good practices etc. This would result in enhanced transfer of skills, knowledge, products, technologies, and services, leading to elevated performance and contribution. The NAAS, through a brainstorming session has prepared a roadmap for mentoring, emphasizing the need for matching the experience and wisdom of mentor with the learning needs of mentee. The potential mentors could be given orientation training to enable them undertake mentoring in a systematic way so that the mentoring so achieved could be properly evaluated.

Attracting and Retaining Youth in Agriculture: The need for attracting and retaining intellect, especially the youth, in agriculture must be a high priority as the complexities of challenges and opportunities are intensifying. Mentoring all stakeholders, from the ground to the top level, by experienced and successful mentors should become a part of the teaching-learning process in the NARES, as being practiced in the Ministry of Human Resources Development (MHRD), and common in western countries. The Department of Science and Technology (DST) is already mentoring students through its Innovation in Science Pursuit for Inspired Research (INSPIRE) program and MHRD is funding such incentives under the program called Global Initiatives of

Academic Network (GIAN). The Handbook of Mentoring and Performance Audit prepared by the DST and MHRD could be used as a starting template for the agricultural system. The Department of Agricultural Research and Education (DARE), ICAR and NAAS may institutionalize implementation of the roadmap prepared by the Academy. Willing NAAS Fellows may participate in the initiative to encourage younger colleagues for excellence in agricultural sciences.

India is joining the Big Data Management. In a country of India's size and magnitude with varying agro-climatic situations, we need a centralized agriculture data base on a variety of issues that are of interest to scientists, students, farmers and industry. Through such an arrangement, in line with the Big Data movement, the data can be easily accessed by one and all. It is extremely important to use modern information and communication systems for marketing, sales and pricing activities to move with the time. This is a bright option for the graduating youths as well as for the e-market platform recently launched by the Prime Minister. These developments have been seeded in the curricula, and should figure more prominently as the necessary facilities and faculties are in place.

With the current thrust on Make-in-India, Start-up-India, Skill India, Digital India etc. we need to evolve agricultural education system that is harmonized with job markets and entrepreneurship and also meets the changing needs of agriculture and rural sectors. Special capacities are thus required to be built in education system for nurturing the students. These include creativity and innovation, use of high technology, and entrepreneurial and moral leadership. India is already a knowledge power and must become the leader in the knowledge revolution. And, this will also help the universities to occupy respectable places in the world ranking.

Several of the ICAR initiatives, such as the Rural Entrepreneurship and Awareness Development Yojana (READY), encompassing Experiential Learning Programme (ELP) and Rural Agricultural Work Experience (RAWEX) and in-plant/industrial attachment are highly relevant. The Council has stepped up efforts to attract talented students and young faculty, such as the Agricultural Science Pursuit for Inspired Research Excellence (ASPIRE) programme. Along with READY, Attracting and Retaining Youth in Agriculture (ARYA) programme, is most timely, and could mutually reinforce the Farmer First campaign of ICAR. These various initiatives should be congruent and regularly monitored for their implementation and impact assessment.

A few projects, such as the Bill and Melinda Gates Foundation (BMGF) initiatives, are innovating in the areas of social engineering and humanity towards enhancing and stabilizing livelihood security of resource-poor and vulnerable farmers. BMGF being a telecommunication giant, the Foundation may establish model Innovation Centres at selected SAU campuses to link farmers, agriculture, agribusiness and digital communication in a real-world situation to trigger new exciting opportunities, particularly for the young innovators in harnessing best of the science and technology in serving farmers to save and transform farming.

Incubation centres should be created in research university campuses. Such settings become incubators for new ideas and stimulate and trigger young minds to innovate. Several of such innovations find practical applications and synergise the university-industry linkage including joint appointments, and enrich the research and academic stream. With such a setup, a good number of students shall be working as interns with the companies, thus gaining invaluable

hands-on experience that will jump start their careers. The incubators for start-up companies will help convert innovations into commercial businesses thus boosting the Startup India initiative.

Education for Agriculture in the 21st Century and the Third Generation Universities should have the goal that every agricultural graduate becomes an entrepreneur. Thus, as suggested by the Committee, business management should be mainstreamed in major applied courses, e.g. Seed Technology, Dairy Technology, Fish Technology, Food Processing etc., besides establishing new Faculties or Departments of Agricultural Business Management. Private companies and cooperatives, manufacturing and distributing agricultural inputs and related products should, other things being equal, give preference to such agricultural graduates for employment and granting licenses and dealerships.

The proposed curricula and quality measures should render agriculture as an intellectually more stimulating discipline and an economically rewarding profession to attract talent and investment. An academic legitimacy has been provided to contemporary challenges and opportunities for greater understanding in the classrooms as well as by our policy makers. The efforts should revitalize the youth to find agriculture, agribusiness, agriculture related service sector, and the pursuit of agricultural science and technology generation as an attractive vocation, career and profession. In this context, new trans-disciplinary areas and entrepreneurship have been proposed as new subjects of formal study and informal learning to harness demographic dividends.

Given the comprehensive leadership of the ICAR and the commitment of the NARES, judicious implementation of the recommendations of this committee will go a longway in transforming Indian Agricultural Education to reshape India in the fast changing demographics, socio-economic, ecological and environmental regimes of the world.

New Initiatives Proposed by Fifth Deans' Committee

I. Student READY (Rural and Entrepreneurship Awareness Development Yojana)

To reorient graduates of agriculture and allied subjects for ensuring and assuring employability and to develop entrepreneurs for emerging knowledge intensive agriculture, the component envisages the introduction of the program in all the agricultural universities as an essential prerequisite for the award of degree to ensure hands on experience and practical training. Considering the variation in different streams of agricultural education and feasibility, the Committee proposes to include the following five components, which are interactive and are conceptualized for building skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts, etc. with end to end approach in Student READY program.

- i. Experiential Learning/Hands on Training
- ii. Skill Development Training
- iii. Rural Agriculture Work Experience
- iv. In Plant Training/ Industrial attachment
- v. Students Projects

The students will be required to have any three of the five components listed above depending on the requirement of their graduate education but it should be implemented for the complete year, so that their education upto level of III year may get right information in IV year and finally they should attend right stage of entrepreneurship.

II. Introduction of common courses in all agriculture disciplines

The Fifth Deans' Committee is of the opinion that some of the courses like Environmental Studies & Disaster Management, Communication Skills & Personality Development, Information & Communication Technology, Entrepreneurship Development & Business Management,

Agri-Informatics and Economics and Marketing need to be taught in all the undergraduate programmes of agricultural sciences, as these are ,must for overall enhanced professional capacity as well as for personality development and to deal with the unforeseen circumstances.

III. Introduction of new degree programs

Since Biotechnology has become an important subject in the field of agricultural sciences, the Committee has recommended introduction of B. Tech (Biotechnology) course in SAUs. Similarly, Sericulture being an important traditional subject, the Committee endorses its inclusion as one of the disciplines in agricultural sciences.

It has been observed that the degree in Home Sciences has been losing its importance in the recent past, particularly in terms of limited employability. The Committee has recommended to rechristen the discipline of Home Science to Community Science and introduce one more new course in Food Nutrition & Dietetics under the umbrella of Community Science.

IV. Development of DPRs for establishment of new colleges

The Deans Committees have been listing some minimum standards/requirements for the colleges. Fifth Deans Committee has developed a comprehensive Detailed Project Report (DPR) for establishing a college for each discipline.

V. Holistic distribution of courses

The Committee has distributed the courses in a systematic way so as to teach basic courses first followed by principles and finally skill development. It is planned to keep courses related to basic and fundamentals in first year, theory/practicals and principles with present State of Art of Technology in second year, modern and frontier area of education in third year and Student READY program of one year in final year.

VI. Declaring degrees in Agricultural Sciences as professional

The Indian Council of Agricultural Research constituted a committee to review Essential Qualifications and Degree Nomenclature of various programmes running in Agricultural Universities under the chairmanship of Dr R B Lal. This Committee has recommended to consider degree in agriculture as a professional degree. The Fifth Deans Committee endorses this view and recommends to declare all degrees in agricultural sciences as professional, like Veterinary and Animal Science, which include undergraduates in:

1. Agriculture
2. Agriculture Engineering
3. Biotechnology
4. Dairy Technology
5. Fisheries
6. Food Technology
7. Forestry
8. Community Science (Home Science)

9. Food Nutrition and Dietetics

10. Horticulture

11. Sericulture

VII. Making implementation of recommendations of Deans Committee mandatory

A lot of efforts are made to improve the quality of agricultural education to make it internationally competitive. Implementations of the recommendations of the Fifth Deans' Committee to be made mandatory for accreditation of academic programmes and academic institutions by the National Agricultural Education Accreditation Board (NAEAB).

Student READY Programme

Student READY programme was launched by the Hon'ble Prime Minister of India on 25th July, 2015

Introduction

The term **READY** refers to “Rural Entrepreneurship Awareness Development Yojana”.

To reorient graduates of agriculture and allied subjects for ensuring and assuring employability and develop entrepreneurs for emerging knowledge intensive agriculture, the component envisages the introduction of the program in all the Agricultural Universities as an essential prerequisite for the award of degree to ensure hands on experience and practical training.

Component of the programme: It is proposed to include the following components in Student READY programme.

- i. Experiential Learning/Hands on Training
- ii. Skill Development Training
- iii. Rural Agriculture Work Experience
- iv. In Plant Training/ Industrial Attachment
- v. Students Projects

In some disciplines where some components, say, Experiential Learning, is not possible at graduate level, the students will be given Hands on Training and/or Skill Development Training, but it should be (out of these 5 components) implemented for the complete year.

All the above mentioned components are interactive and are conceptualized for building skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts, etc. with end to end approach. Salient features of each component are summarised below.

- Experiential Learning helps the student to develop competence, capability, capacity building, acquiring skills, expertise, and confidence

to start their own enterprise and turn job creators instead of job seekers. This embraces the earning while learning concept. Experiential Learning is a major step forward for high quality professional competence, practical work experience in real life situation to graduates, production oriented courses, production to consumption project working, facilitates producing job providers rather than job seekers and inculcates entrepreneurial orientation.

- Rural Agriculture Work Experience also enables the students to gain rural experience giving them confidence and enhancing on-farm problem solving abilities in real life situations especially in contact with farmers, growers, other stakeholders.
- In-plant Training for a short period of time in relevant industry helps gain the knowledge and experience of the work culture. In-plant Training by reputed organizations either MNCs or organised sectors provide an industrial exposure to the students as well as helps develop their career in high tech industrial requirements.
- Skill Development component includes use of Agriculture Systems & devices for enhancing functional skill. It is expected that basic infrastructure and Experiential Learning Unit available in universities may help in boosting livelihood-ensuring opportunities.
- Student Project is essential for students interested in higher education. Through this component, they will know how to identify research problem, create experimental set up and to write report etc.

For the discipline of Dairy Technology, Food Science & Technology and Agricultural Engineering there will 20 weeks in-plant training in place of RAWE. The students of Veterinary Science discipline will undergo six months training at hospitals.

All the components as per suitability of course i.e. Experiential Learning, Skill Development Training, Rural Agriculture Work Experience (RAWE), Internship/In-Plant Training and Student Projects are included in the final year of study for 2 semesters, to provide entrepreneurial skills, confidence and hands on experience. There are 20 credits for Experiential Learning/Skill Development Training (24 weeks), 10 credits for RAWE (10 weeks programme) and 10 Credits for Industry Attachment/Student Project (10 weeks attachment to industry). For the students of Veterinary Science, Experiential Learning is moduled as per VCI pattern.

Some of the important components of Student READY programme are given as follows:

I. Experiential Learning (EL)

a) Concept

The word 'experiential' essentially means that learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in group, by observation, study of theory or hypothesis, and bring in innovation or some other transfer of skills or knowledge. Experiential learning is a business curriculum-related endeavour which is interactive.

EL is for building (or reinforcing) skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, marketing

and resolving conflicts, etc. The programme has end to end approach. Carefully calibrated activities move participants to explore and discover their own potential. Both activities and facilitation play a critical role in enhancing team performance.

b) Objectives

EL provides the students an excellent opportunity to develop analytical and entrepreneurial skills, and knowledge through meaningful hands on experience, confidence in their ability to design and execute project work.

The main objectives of EL are:

- To promote professional skills and knowledge through meaningful hands on experience.
- To build confidence and to work in project mode.
- To acquire enterprise management capabilities

c) Duration

The experiential learning programme will be offered for 180 days (one semester) period in the final year. As the programme is enterprise oriented, students and faculty are expected to attend the activities of the enterprise even on institutional holidays with total commitment, and without any time limit or restriction of working hours for ELP. The Experiential Learning Programme shall be run for full year by making two groups and rotating activities of the final year in two groups.

d) Attendance

The minimum attendance required for this programme is 85%. The attendance of a student will be maintained at the EL unit. The attendance particulars shall be communicated to the Chief Executive Officer (Associate Dean) by the Manager of the EL unit every week. The students will be eligible for the final evaluation of EL only when the attendance requirement is met with. Any student in the event of recording shortage of attendance has to re-register the EL when offered next by paying the assigned fee.

e) Students' Eligibility

To get the eligibility for registering for the EL programme, the students should have completed all the courses successfully. No student should be allowed to take up the EL programme with backlog/repeat courses. The assignment/allotment of the EL programme shall be based on merit of the student at the end of 5th semester. A separate certificate should be issued to the students after successful completion of EL course. Allotment of EL programmes amongst students to different modules should be done strictly on the basis of merit at the end of fifth semester.

II. Rural Agricultural Work Experience

The Rural Agricultural Work Experience (RAWEx) helps the students primarily to understand the rural situations, status of agricultural technologies adopted by the farmers to prioritize the farmers' problems and to develop skills & attitude of working with farm families for overall development in rural area. The timings for RAWEx can be flexible for specific regions to coincide with the main cropping season.

2. Objectives

1. To provide an opportunity to the students to understand the rural setting in relation to agriculture and allied activities.
2. To make the students familiar with socio-economic conditions of the farmers and their problems.
3. To impart diagnostic and remedial knowledge to the students relevant to real field situations through practical training.
4. To develop communication skills in students using extension teaching methods in transfer of technology.
5. To develop confidence and competence to solve agricultural problems.
6. To acquaint students with on-going extension and rural development programmes.

III. In Plant Training (IPT)

Technology and globalization are ushering an era of unprecedented change. The need and pressure for change and innovation is immense. To enrich the practical knowledge of the students, In-plant Training shall be mandatory in the last semester for a period of up to 10 weeks. In this training, students will have to study a problem in industrial perspective and submit the reports to the university. Such In-plant Trainings will provide an industrial exposure to the students as well as to develop their career in the high tech industrial requirements. In-plant Training is meant to correlate theory and actual practices in the industries. It is expected that sense of running an industry may be articulated in right way through this type of industrial attachment mode.

Objectives

- To expose the students to industrial environment, which cannot be simulated in the university.
- To familiarize the students with various materials, machines, processes, products and their applications along with relevant aspects of shop management.
- To make the students understand the psychology of the workers, and approach to problems along with the practices followed at factory
- To make the students understand the scope, functions and job responsibility-ties in various departments of an organization.
- Exposure to various aspects of entrepreneurship during the programme period.

The students will be required to submit report on various aspects and will be issued certificates upon successful completion of the student READY components. It is planned that **ICAR will provide Rs. 3000/pm per student for the duration of RAWE/ In- plant Training/ Hands-on Training (HOT) / Skill Development Training subject to a maximum of 6 months.**

Fifth Deans' Committee, after deliberations with the Conveners/Co-conveners and Subject Matter Specialists, recommends the discipline-wise Student READY programmes as follows:

AGRICULTURE

Semester VII

Rural Agricultural Work Experience (RAWE) and Agro-Industrial Attachment (AIA)

This program will be undertaken by the students during the seventh semester for a total duration of 20 weeks with a weightage of 0+20 credit hours in two parts, namely, RAWE and AIA. It will consist of general orientation and on-campus training by different faculties followed by village attachment/unit attachment in university/ college/ KVK or a research station. The students would be attached with the agro-industries to get an experience of the industrial environment and working. Due weightage in terms of credit hours will be given depending upon the duration of stay of students in villages/agro-industries. At the end of RAWE/AIA, the students will be given one week for project report preparation, presentation and evaluation.

The students would be required to record their observations in field and agro-industries on daily basis and will prepare their project report based on these observations.

Semester VIII

Experiential Learning Programme (ELP)/ Hands On Training (HOT)

This program will be undertaken by the students preferably during the eighth semester for a total duration of 24 weeks with a weightage of 0+20 credit hours. The students will register for any of two modules, listed below, of 0+10 credit hours each.

- Production Technology Bio-agents and Bio-fertilizer
- Seed Production and Technology
- Mushroom Cultivation Technology
- Soil, Plant, Water and Seed Testing
- Poultry Production Technology
- Hybrid Seed Production Technologies
- Floriculture and Landscaping
- Food Processing
- Commercial Horticulture
- Agriculture Waste Management
- Organic Production Technology
- Commercial Sericulture

In addition to these ELP modules other important modules may be given to the students by SAUs.

Indian Council of Agricultural Research has already provided financial help for establishment of two or more Experiential Learning units in different State Agricultural Universities, hence, each university is expected to plan EL program accordingly.

AGRICULTURE ENGINEERING

Student READY program of the Agricultural Engineering is proposed to have the following components:

1. Summer break after IV semester -Student READY Skill Development Training -I for five weeks in the summer break after IV semester with a credit load of 0+5 credit hours.
2. Summer break after VI semester- Student READY Skill Development Training -II for five weeks in the summer break after VI semester with a credit load of 0+5 credit hours.
3. Semester VII - Industrial attachment of 10 weeks with a credit load of 0+10 credit hours.
4. Semester VII - On campus Experiential Learning Program of 12 weeks with a credit load of 0+10 credit hours.
5. Semester VIII - Project Planning and Report Writing of 12 weeks with a weightage of 0+10 credit hours.

BIOTECHNOLOGY

The Student READY program of Biotechnology will comprise of the following three parts:

Semester VII

1. Any one of the following four modules for in-house skill development with a duration of 20 weeks carrying a weightage of 0+20 credit hours to be taken up during VII semester.
 - a. Plant Biotechnology
 - b. Animal Biotechnology
 - c. Microbial and Environmental Biotechnology
 - d. Bioinformatics

Semester VIII

1. Project Formulation, Execution and Presentation of 12 weeks duration to be taken up during VIII semester with a weightage of 0+10 credit hours.
2. Entrepreneurial Development in Biotechnology (On-campus/Off-campus) of 12 weeks duration to be taken up during VIII semester in Micro-Propagation; DNA Fingerprinting; Genetic Purity for Maintenance Breeding; Marker Assisted Selection; Haploid Production; Database Management Skills; Molecular Diagnostics; Recombinant Protein Production; Animal Cell Culture and Maintenance; Fermentation, Biopharma Production; Bioprocess Enrichment; Bioremediation; Bio-fuels, etc. with a weightage of 0+10 credit hours.

DAIRY TECHNOLOGY

Summer Breaks after II, IV and VI semesters (0+10 Credit hours)

Student READY Rural Dairy Work Experience Program-I (Summer Break after II semester) of 5 weeks with credit load of 0+5 credit hours to provide exposure to the students to the areas on Milk Production & Procurement to be taken up in State Dairy Federations/Dairy Development Departments/Private Dairies/Animal Husbandry Department/Cattle farm/Progressive dairy farmers.

Student READY Rural Dairy Work Experience Program-II (Summer Break after IV semester) of 5 weeks with credit load of 0+5 credit hours for exposure on Preliminary Dairy Operations to be taken up in Experimental Dairy/Referral lab/Dairy Plants / Exposure to product manufacturing operations in Dairy & Food Industry.

Semester-VII

Student READY In-Plant Training in Seventh Semester of 24 weeks with credit load of 0+20 credit hours. Plant visits and involvement in processing and manufacturing of value added products in each Dairy Technology course to have Industrial exposure in specialized products like Market Milk, Ice Cream, Milk Powders, Cheese, By-products etc. should be made compulsory.

Semester-VIII

Student READY Experiential Learning Module of 10 weeks with a credit load of 0+10 credit hours. The module will run concurrently in the final semester along with the regular courses. This shall include development of Detailed Project Report on setting up of enterprise in the selected areas of product manufacture and Evaluation of the Module.

FISHERIES

Student READY Program will be taken up during VII and VIII semesters and will have the following components:

VII Semester

Student READY–In-plant Attachment for 12 weeks (0+10 credit hours).

Student READY–Rural Fisheries Work Experience Program for 8 weeks (0+8 credit hours).

Student READY–Study Tour (in and outside State) for 4 weeks (0+2 credit hours).

VIII Semester

Student READY Experiential Module

This will include capacity building and skill development of the students in planning, development, formulation, monitoring and evaluation of project for entrepreneurial proficiency with a total credit load of 0+20 credit hours as detailed below:

- Skill Development will have 0+5 credit hours and include Aquarium Fabrication, Analysis of Soil and Water Quality Parameters, Preparation of Fish Products or in any appropriate applied aspect of fisheries.
- For Experiential Learning Program will have 0+12 credit hours, a minimum of two out of the following areas should be decided by each university:
 - Ornamental Fish Culture
 - Seed Production
 - Trade and Export Management
 - Aqua-clinic
 - Post-Harvest Technology
 - Aqua Farming.

- Project work: Student will select relevant or interested area of specialization such as Fish pathology, Fish diagnostic, Fish pharmacology, Fish toxicology, Fish nutrition, Fish immunology, Fish genetics and breeding, Ornamental fish production, Genomics in Aquaculture, Fish stock assessment, Aquatic pollution, Fish value addition, Fish in nutrition, Fish processing waste management, Quality control and quality assurance, Fish products and by-products etc.. He/she will prepare a research project plan and it will be presented in-front of committee appointed by the Dean of the respective college. Also, for each student, one advisor will be provided, who will guide the student in completion of proposed research plan. A total of 3 credit hours will be allotted for preparation of the project and its presentation as a seminar. This exercise will prepare students interested in higher education. They will be exposed with identifications of problems in experimental setup and project preparation.

FOOD TECHNOLOGY

Student READY Program will be taken up during VII and VIII semesters and will have the following components:

Semester –VII

1. Student READY - Experiential Learning with a credit load of 0+14 credit hours through relevant pilot plants for processing of various commodities, preferably on campus. This shall include development of Detailed Project Report on setting up of an enterprise in the selected areas of product manufacture and evaluation of the module. The Experiential Learning is intended to build practical skills and entrepreneurship attributes among the students with an aim to deal with work situations and for better employability and self-employment.
2. Student READY –Project with a credit load of 0+3 credit hours to undertake investigation of selected problems of special interests in Food Processing Technology to individual student. The work includes library work, field or laboratory research, recording data, analyzing data and writing of report, etc.
3. Student READY – Seminar including preparation of synopsis, presentation and discussion by each student on current topics / interests in Food Processing Technology with weightage of 0+1credit hours.

Semester –VIII

1. Student READY –Educationl Tour of two- three weeks to various industries within and outside the state of the university and submission of report on Industrial Tour carrying a weightage of 0+2 credit hours.
2. Student READY – In-plant Training of one semester duration with a credit load of 0+20 credit hours at relevant food processing industry, machinery manufacturer, marketing or other agencies. The In-plant Training is intended to expose the students to an environment in which they are expected to be associated in their future career. The students will be required to have hands-on-experience in one or more commercial establishments.

FORESTRY

Semester -V

Student READY Experiential Learning Module – I (5 weeks) (0+5 credit hours). Any one of the modules to be taken up during V semester:

1. Production and Marketing of High Value Forest Produce (FPU)
2. Raising Quality Planting Materials for Forest Regeneration (SAF/FBT)
3. Apiculture/Sericulture (FBU/NRM/WLS)
4. Ecotourism (BSS/WLS)
5. Wild Animal Health Management– WLS

Semester-VI

Student READY Experiential Learning Module – II (5 weeks) (0+5 credit hours). Any one of the modules to be taken up during VI semester:

- Production and Marketing of High Value Forest Produce (FPU)
- Raising Quality Planting Materials for Forest Regeneration (SAF/FBT)
- Apiculture/Sericulture (FBT/NRM/WLS)
- Ecotourism (BSS/WLS)
- Wild Animal Health Management – WLS

Semester -VII

Student READY Forestry Work Experience (FOWE) 24 weeks will be taken up in semester VII with a credit load of 0+20 credit hours. The program will have the following components:

- Orientation
- Forest Range Training Program
- Industrial Placement
- Weapon Training and First-Aid Training
- Socio-economic Surveys and Village Attachment
- Socio-economic Surveys and Village Attachment
- Report Writing and Presentations

Semester -VIII

Student READY Project Work & Dissertation 10 weeks (0+10 credit hours) to be taken up during the VIII semester.

COMMUNITY SCIENCE (HOME SCIENCE)

A) B.Sc (Hons) Community Science

The Student READY program will be taken up during VII and VIII semester. The program will be divided into two parts:

Semester VII

Student READY Experiential Learning Program: the students will take up any one of the following ELP modules for a period of 24 weeks with credit load of 0+20 credit hours during the VII semester.

Module 1- Product Development and Entrepreneurship

This module aims to grant practical knowledge to students regarding product development and entrepreneurship, covering all aspects related to income generation through production and sale of clothing and textile and interior decoration products and also the management of their entrepreneurial ventures. The students will take up the work out of the topics like :

1. Apparel Designing Technique-Flat Pattern and Draping
2. Principles of Textile Designing
3. Fashion Illustrations
4. Computer Aided Designing-Pattern Designing
5. Retailing and Merchandising- Textiles and Apparel
6. Instructional Video Production
7. Public Relations and Social Marketing
8. Event Management
9. Interior Design and Decoration
10. Computer Aided Interior Designing
11. Tourism and Hospitality Management
12. Web Designing and Multimedia Production

Module 2 - Community Nutrition and Welfare

This module aims to impart practical knowledge to students regarding community welfare encompassing all the aspects *viz.* diet counseling, food preservation, food service and hospitality management, nutraceuticals and health foods, early childhood care, education and counseling for parents and community and multimedia and video production. Students would be ready to conduct and manage community welfare programs independently. The students will take up the work out of the topics like

1. Print and Electronic Journalism
2. Web Designing and Multimedia Production Marketing
3. Instructional Video Production
4. Diet and Nutrition Counseling
5. Food Preservation and Storage
6. Food Service and Hospitality Management
7. Nutraceuticals and Health Foods
8. Methods and Materials for Teaching Young Children
9. Education and Counseling for Parents and Community
10. Early Childhood Care, Education and Management
11. Sanitation & Hygiene
12. Developmental Assessment of Young Children

Semester -VIII

Student READY In-plant training / Internship / RAWE will be taken up during VIII semester for a period of 20 weeks with a credit load of 0+20 credit hours.

B) B.Sc.(Hons) Food Nutrition and Dietetics

The Student READY program will be taken up during VII and VIII semester. The program will be divided into two parts:

Semester -VII

Student READY - In-plant Training: the students will be deputed to nearby hospitals, testing labs and processing units/foods industries for a period of 20 weeks during the VII semester with a credit load of 20 credit hours. The students will be provided a platform to study at least two topics in depth depending upon place of their training. At the end of the training they will make a presentation before faculty and other students.

Semester -VIII

Student READY Hands-on-training: The students will take up Hands-on-Training program for a period of 24 weeks with credit load of 20 credit hours during the VIII semester. The following aspects will be taken up during the training to develop competence, capability, capacity building, acquiring skill, expertise and confidence to start their own enterprise and turn job creators instead of job seekers.

1. Fruits and Vegetables: Preparation and Utilization – II
2. Nutritional Status Assessment Methods
3. Food Service Management – II
4. Diet and Nutrition Counseling
5. Special Project depending upon the regional requirement
6. Entrepreneurship Development and Business Management

HORTICULTURE

Student READY Program will be taken up during VII and VIII semesters and will have the following components:

Semester - VII

Student READY- Rural Horticulture Work Experience (RHWE) & Placement in Industries. This program will be taken up during the VII semester for a duration of 24 weeks and will be allotted 0+20 credit hours. The program will include orientation, village stay, all India study tour, industrial placement program, report writing and final examination.

Semester –VIII

Student READY Experiential Learning (Professional Package) will be for the duration of 20 weeks and will carry a weightage of 0+20 credit hours. Students can select any two modules from the following under STUDENT READY- Experiential Learning program depending on the facilities available at the college:

- Commercial Horticulture
- Protected Cultivation of High Value Horticulture Crops

- Processing of fruits and vegetables for value addition
- Floriculture and landscape architecture
- Bio-inputs: Bio-fertilizers and Bio-pesticides
- Mass multiplication of plant and molecules through tissue culture
- Mushroom culture
- Bee keeping

SERICULTURE

The Student READY program will be implemented during VII and VIII semester with the following components:

Semester - VII

STUDENT READY- Experiential Learning Program (ELP)/ Hands on Training(HOT) modules – the program will be taken up in VII semester for a period of 20 weeks carrying a weightage of 0+20 credit hours. The students can take up one of the following modules:

- Host Plant Production
- Cocoon Crop Production
- Silk Product Science
- Natural Resource Management

Semester –VIII

STUDENT READY-Rural Work Experience Program (Sericulture) will be taken up during VIII semester for a period of 24 weeks and a credit load of 20 credit hours. The students will have exposure to Placement in Grainage Technology, Seri Clinic, Placement in Silk Product Technology, Placement in Value Addition to Sericulture By-Products and Practical Extension Work in Villages

EVALUATION OF STUDENT READY PROGRAM

- Students shall be evaluated component-wise under village attachment/ agro-industrial attachment/ hands on training/skill development training/experiential learning/student projects.
- Each college of the University will designate a Student READY Program Coordinator and componentwise evaluation committees. These committees will evolve a method of evaluation depending upon the component undertaken giving due weightage to the observations made by the Scientists/Agro-industrial Officer and the Program Coordinator with whom they are attached.
- Since the credit hours allotted to the Student READY program are gradial, the minimum condition of attendance and grading system will apply for the program as will be applicable to other courses.
- It is expected that at the end of Student READY program, the students should gain competency for entrepreneurship, which should be innovative and creative in nature. The evaluation committee must ensure percentage increase in this competency at the end & successful organization of all Student READY programs.

Common Courses

It was a general consensus that students of all disciplines need to be taught the following courses:

I. Environmental Studies and Disaster Management (as per UGC guidelines-core module for under graduate courses of all branches of higher education)

Theory

Unit 1 : Multidisciplinary nature of environmental studies: definition, scope and importance

Unit 2: Natural Resources: Renewable and non-renewable resources. Natural resources and associated problems.

- a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual and communities in conservation of natural resources. • Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow

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कृषि एवं कृषक कल्याण मंत्रालय

(पशु पालन, डेयरी एवं मात्स्यिकी विभाग)

(भारतीय पशु चिकित्सा परिषद्)

अधिसूचना

नई दिल्ली, 8 जुलाई, 2016

मिसिल संख्या 12-5/2015-वीसीआई.—भारतीय पशु चिकित्सा परिषद् अधिनियम, 1984 की धारा 66 के साथ पठित धारा 22 की उप-धारा (1) तथा धारा 21 की उप-धारा (1) के वाक्यांश (ख) के तहत दिए गए अधिकारों का प्रयोग करते हुए, तथा भारतीय पशु चिकित्सा परिषद् ने एतद्वारा भारतीय पशु चिकित्सा परिषद् - पशु चिकित्सा के न्यूनतम मानदंड - डिग्री कोर्स (पशु चिकित्सा विज्ञान एवं पशु पालन स्नातक) विनियम, 2008 के अधिक्रमण में तथा केंद्र सरकार की पूर्वानुमति से भारतीय पशु चिकित्सा परिषद् ने निम्नलिखित विनियम तैयार किए हैं, जो इस प्रकार हैं:

भाग I**प्रस्तावना****1. संक्षिप्त नाम और परिचय:—**

(1) इन विनियमों को भारतीय पशु चिकित्सा - पशु चिकित्सा के न्यूनतम मानदंड- डिग्री कोर्स (बी.वी.एस.सी. और ए.एच.) विनियम, 2016 कहा जाएगा।

(2) बशर्ते कि वार्षिक प्रवेश संख्या में कोई भी वृद्धि परिषद् के अनुमति से की जाएगी और इस बारे में विश्वविद्यालय स्वयं एक पक्षीय निर्णय नहीं लेगा। संख्या में उक्त वृद्धि की अनुमति सुविधाओं और जनशक्ति में वृद्धि के अनुपात में की जाएगी जैसाकि परिषद् द्वारा भारतीय पशु चिकित्सा अधिनियम के अनुच्छेद 19 के तहत इन विनियमों में प्रावधान किया गया है।

(3) यह विनियम भारत सरकार के राजपत्र में इनके प्रकाशन की तारीख से लागू होंगे।

2. परिभाषाएं - (1) इन विनियमों में, जब तक कि अन्य संदर्भ में अपेक्षित न हो।

(क) "अधिनियम" का तात्पर्य है, भारतीय पशु चिकित्सा परिषद् अधिनियम, 1984 (1984 का 52);

(ख) "पाठ्यक्रम" का तात्पर्य है, किसी एक शिक्षण वर्ष में शामिल किए जाने वाले अध्यापन यूनिट, जैसाकि किसी विभाग के पाठ्यक्रम में निर्धारित किया गया हो।

(ग) "क्रेडिट घंटों" का तात्पर्य है, विश्वविद्यालय द्वारा जारी की गई पाठ्यक्रम सूची के अनुसार, किसी विशेष विषय के लिए मान्य कार्य की साप्ताहिक ईकाई। प्रति सप्ताह एक घंटे की लैक्चर कक्षा को एक क्रेडिट गिना जाएगा जबकि प्रति सप्ताह होने

Professional Year	Theory	Practical	Total
First (one year)	12	6	18
Second (one year)	15	7	22
Third (one year)	15	9	24
Fourth (one and a half year)	8	9	17
	50	31	81

(equivalent to 179 credit hrs. as per semester system)

- (2) In addition to the Core Courses above, a student shall have to successfully complete the Internship including Enterpreneurial Training as has been specified in sub-regulation (1) of regulation 8 for the award of Bachelor of Veterinary Science and Animal Husbandry degree.
- (3) Remount Veterinary Squadron or National Cadet Crop or Equestrian or National Social Service or Sports and games shall be non- credit (0+1) training programmes any of which for all the Professional Years shall be compulsory (except fourth) for the award of Bachelor of Veterinary Science and Animal Husbandry degree and the performance of the students in these training programmes shall be assessed and graded as 'Satisfactory' or 'Unsatisfactory' and student has to obtain 'Satisfactory' grading for successful completion of course requirements.
- (4) The Syllabus prescribed in regulation 11 is the minimum instructional syllabus and is illustrative of the course content for teaching different courses at the veterinary colleges in the country for Bachelor of Veterinary Science and Animal Husbandry degree programme:

Provided that there is scope for flexibility of addition of topics or courses in the programme as per need or regional or institutional demand from time to time and such changes shall be non-violative and commensurate to the basic structure, curriculum and infrastructure prescribed in these regulations.

12. **Internship.** – (1) Every student of Bachelor of Veterinary Science and Animal Husbandry degree course shall be required after passing the fourth professional examination to undergo compulsory rotating internship to the satisfaction of the University for a minimum period of twelve calendar months so as to be eligible for the award of the degree of Bachelor of Veterinary Science and Animal Husbandry and full registration with the council.
 - (2) Compulsory rotating internship shall include a full time training in veterinary and animal husbandry services (including emergencies and night duties, Sundays and holidays) and the intern shall devote whole time to the training and shall not be allowed to accept a whole time or part time appointment paid or otherwise.
 - (3) Internship shall be undertaken only after completion of all credit requirements of veterinary curriculum including Remount Veterinary Squadron or National Cadet Crop or Equestrian or National Social Service or Sports and games as applicable under these regulations.
 - (4) The university shall issue a provisional course completion certificate of having passed all the professional examinations and having successfully completed prescribed course work.
 - (5) The State or Union territory Veterinary Council shall grant provisional registration to the candidate on production of provisional Bachelor of Veterinary Science and Animal Husbandry course completion certificate and the provisional registration shall be valid for a minimum period of twelve months and maximum of sixteen months.
 - (6) After provisional registration with the State or Union Territory Veterinary Council, the candidate shall register for internship of twelve calendar months.
 - (7) Interns shall be actively involved in rendering veterinary service under the supervision of an experienced teacher.
 - (8) The intern shall assist the teacher or incharge in all activities of the units they are posted in.

- (9) During the period of internship the intern shall be provided accommodation or lodging and paid consolidated remuneration in the form of internship allowance as may be decided by the University or Institution from time to time.
- (10) The intern shall be entitled for fifteen days casual leave and the leave cannot be claimed as a matter of right until and unless the sanctioning authority sanctions it and an intern willfully absents from the training programme even if for part of a day or during off hours duty (including Sundays and holidays) he or she may be treated absent for that day and the candidate shall be required to undergo training for the additional days in lieu of the absence period and internship allowance shall not be paid for these additional days.
- (11) The internship programme shall be monitored by a Committee constituted by the Dean and the Committee shall comprise of Dean or Representative or nominee of the Vice Chancellor, incharge of Veterinary Clinical Complex, incharge of Livestock Farm Complex and Associate Professor (Internship) as members and this Committee shall monitor effective implementation of the internship training programme from time to time and shall be required to inspect the internship programme at different intervals of time randomly.
- (12) In case of unsatisfactory work or performance or shortage of attendance or both the period of compulsory rotating internship shall be extended by two months and the student shall be reevaluated, if again found unsatisfactory or is unable to secure 50 marks, he shall be given one more chance after another two months and if he still is found unsatisfactory due to any reason, the intern has to re-register afresh for internship programme for entire twelve calendar months including registration with the State or Union Territory Veterinary Council.
- (13) Internship allowance shall be paid only for twelve calendar months and no internship allowance shall be paid for the period of absence or unsatisfactory performance or extended period or re-registration period.
- (14) The compulsory rotating internship shall be in the following areas, namely:-
 - (i) posting in Veterinary Clinical Complex for Clinical training covering veterinary medicine, surgery and radiology, gynaecology and obstetrics, clinical emergencies, indoor ward care, lab diagnosis, ambulatory, hospital management, record keeping etc;
 - (ii) posting at Veterinary Clinical Complex of veterinary college of other state in India with provision of rent free accommodation;
 - (iii) posting in any four of Zoo or wild life centre or eNational Parks, Meat Plant or Abattoirs, Milk Plants, Poultry Farms, Field Hospital, Animal Welfare Organization, Vaccine Institute, Remount Veterinary Corps, Pharmaceutical, Feed Industry for hands on training in each establishment;
 - (iv) entrepreneurial training and management covering farm routines of cattle and buffalo farms, piggery or rabbitary, sheep and goat farms, and equine or camel unit etc. Poultry production and management covering layer and broiler production, hatchery and chick management and learning farm practices like record keeping and other related activities;
 - (v) each intern shall submit a Project Report on completion of entrepreneurial training and this training is aimed at developing entrepreneurial skill for self-employment and the university or college shall provide interest free loans, technical support and infrastructure for these activities. Inputs, day-to-day work and financial accounting shall be undertaken by the students;
 - (vi) the profits, if any, shall be kept by the students, provided, in case of loss, the Dean of the college through the Entrepreneurial Committee consisting of four faculty members (at least one subject matter specialist) may evaluate the reasons of such loss and provide compensation in case it is found that the loss has been inadvertent;

- (vii) the Incharge or nominee of each posting shall regulate the training of such interns and submit the evaluation report of each intern out of 20 marks which shall be accounted at the time of final evaluation;
- (viii) the remaining days shall be utilised for the final assessment of interns as prescribed in these regulation, with the objective of having achieved following core competency namely:-
- (a) restraint of cow, sheep, horse, dog and pig. Haltering, snaring, muzzling, tail switch, bandaging of horse for exercise and stable bandaging;
 - (b) animal identification, dentition and ageing of animals;
 - (c) housing layout or requirements of livestock and poultry;
 - (d) computation of ration of livestock of different breeds and age groups in health and disease;
 - (e) fodder management and interpretation of feed quality evaluation;
 - (f) physical evaluation of livestock health parameters (auscultation, percussion, recording of temperature, pulse, heart rate, respiration rate etc.);
 - (g) recording and interpretation of cardiovascular response;
 - (h) testing of milk and milk products for quality, clean milk production;
 - (i) carcass quality evaluation (ante-mortem & post-mortem examination);
 - (j) specific diagnostic tests for zoonotic diseases;
 - (k) sample collection, handling and dispatch of biological materials for laboratory examination;
 - (l) staining techniques for routine clinico-pathological examinations;
 - (m) relating post-mortem lesions to major livestock diseases;
 - (n) haematological evaluation (total leukocyte count, differential leukocyte count, haemoglobin, packed cell volume, erythrocyte sedimentation rate etc.) and interpretation;
 - (o) tests and their interpretation for haemoprotozoan diseases;
 - (p) body fluids collection, examination and interpretation as an aid to diagnosis;
 - (q) urine evaluation procedures and interpretation as indicators for diagnosis of diseases;
 - (r) fecal examination- procedures and interpretation;
 - (s) examination of skin scrapings and interpretation;
 - (t) interpretation of blood chemistry profile in diseases;
 - (u) deworming procedures and doses for different species of animals or birds;
 - (v) managing an outbreak of infectious or contagious disease;
 - (w) approach to diagnosis of a given disease condition;
 - (x) pre-anesthetic administration and induction, maintenance of general anaesthesia and dealing with anesthetic emergencies;
 - (y) local anaesthetic administration;
 - (z) nerve blocks- sites, functional application;
 - (za) suture material, suture pattern and tying knots;

- (zb) common surgical procedures including dehorning, docking, caesarian section, ovariectomy, castration, rumenotomy;
 - (zc) application of plaster castorsplint for fracture immobilization and other bandaging procedure in large and small animals;
 - (zd) soundness in horses;
 - (ze) rectal examination–palpation of pelvic or abdominal organs in cattle or horses or buffaloes,
 - (zf) detection of oestrus, artificial insemination, pregnancy diagnosis;
 - (zg) management of vaginal or uterine prolapse and dystocia;
 - (zh) andrological examination of bull, handling, preservation and evaluation of semen;
 - (zi) vaccination procedures , vaccination schedules and vaccine types for different diseases;
 - (zj) handling of radiograph, interpretation of a given radiograph of large and small animals;
 - (zk) client management;
 - (zl) managing a clinical practice, ambulatory van, transporting a sick animal requirements, etc.;
 - (zm) dosage regimens of important drugs;
 - (zn) drug administration techniques in different species of animals-oral, parenteral, rectal, intra-peritoneal and intra-uterine;
 - (zo) identification of major livestock or poultry breeds;
 - (zp) measuring climatic parameters and their interpretation;
 - (zq) communication technology tools.
- (15) Details of day to day work, posting and duration needs to be worked out by the Veterinary Institution as per its needs and infrastructure facilities and the activities of interns shall be regulated by an Associate Professor (Internship) posted in Veterinary Clinical Complex and Assistant Professor (Internship and Entrepreneurship) Livestock Farm Complex.
- (16) The intern shall have the following functions, responsibilities and duties namely:-
- (i) participation with clinical faculty in the hospital practice;
 - (ii) to Share the emergency and night duties on rotation in the large and small animal hospitals including Sundays and holidays;
 - (iii) participation with staff of the place of posting in Veterinary Practice, Production or Technology;
 - (iv) hands-on diagnostic and treatment procedures for hospitalized cases under the supervision of the attending veterinarian;
 - (v) to administer primary care to emergency cases and participate in service such as anesthesia, radiology, ultrasonography, endoscopy, laboratory and diagnostic procedures. Medicine, Gynaecology and Surgery rounds are held periodically allowing the interns to present cases and participate in topic discussion.
- (17) The training shall be supplemented by fortnightly sessions of clinical conference, farm operation and data analysis, preparation of feasibility reports, project report, campaigns or discussions in clinical training, farm training and technology.
- (18) The intern shall maintain a log book of day to day work which shall be verified and certified by the supervisor under whom he or she works and in addition, the interns shall prepare a brief project report on the basis of his or her case study or case analysis, survey reports etc. and shall be based on his or her own study during the internship and such reports be supervised by more than one teacher, if required and the interns shall present such report in seminar organised for the purpose.

- (19) The assessment of each intern shall be based upon the evaluation of log book or project report, his or her performance reports from all the minimum prescribed training postings, entrepreneurial output, clinical case reports and their presentation, viva and comprehensive examination in core competence in veterinary skills through a written test by an Evaluation Committee comprising of the faculty representing the concerned departments appointed by the Dean for this purpose and the distribution of marks for various components of assessment shall be as under, namely:-

Log book or Project Report:	10 marks
Performance in different postings:	20 marks
Entrepreneurial output:	20 marks
Case Reports or Presentation:	10 marks
Written test:	30 marks
Viva :	10 marks
Total:	100 marks

- (20) The minimum pass marks in internship assessment shall be 50 out of 100.
- (21) After successful completion of Internship, the Dean shall then issue the certificate of satisfactory completion of internship training as prescribed by the Veterinary Council of India.
- (22) A candidate shall become eligible for registration with State or Union Territory Veterinary Council only on the award of the B.V.Sc and A.H. degree or production of a provisional degree certificate by the University.

13. **Examination and Evaluation.** – (1) It shall be the responsibility of the teacher(s) or instructor(s) to ensure that the topics to be covered in the theory and practical in each course shall be recorded through a lecture or practical schedule and distributed to the students at the beginning of each course and the Head of the Department or Dean shall ensure that the schedule is adhered to and alternate arrangements are made to cover up the loss in case of any eventualities of unavoidable reasons that lead to non-adherence of the above schedule.
- (2) Work distribution chart of each teacher shall be available with Dean's office for inspection of the Council and in each subject, professors and senior teachers shall be actively involved in teaching, especially in conducting practical for degree course.
- (3) The examination shall be to assess whether the student has been able to achieve a level of competence and for academic assessment, evaluation of practical aspects of the curriculum shall receive much greater emphasis leading to separate examinations and requiring the student to secure a minimum of 50% marks, in theory as well as in practical, in each such examination.
- (4) The weightage of theory and practical shall be in the ratio of 60:40 respectively.
- (5) The distribution of marks for objective and subjective questions in each subject shall be in the ratio of 40:60 respectively in annual examinations provided the format of question paper in internal assessment shall be as per the choice of instructor(s).
- (6) The schedule of examination during Bachelor of Veterinary Science and Animal Husbandry course shall consist of internal assessment and annual examinations as detailed below, namely:-

Internal Assessment	Course coverage	Max. Marks 40	Weightage 10
First	30%	Max. Marks 40	Weightage 10
Second	60%	Max. Marks 40	Weightage 10
Third	90%		
Annual examination (Theory)	Paper-I Paper-II	Max. Marks 100 Max. Marks 100	Weightage 20 Weightage 20
Annual examination (Practical)	Paper-I Paper-II	Max. Marks 60 Max. Marks 60	Weightage 20 Weightage 20