FIFTH DEANS' COMMITTEE

REPORT

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

FIFTH DEANS' COMMITTEE REPORT

Agricultural Education Division
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-II
Pusa, New Delhi - 110012

Compiled by:

Dr. N.S. Rathore
Deputy Director General (Agri. Edn.)

Dr. G. Venkateshwarlu
Assistant Director General (EQR)

Dr. K.L. Khurana
Principal Scientist

Education Division
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan-II
New Delhi-110012

Lasertypeset & Printed by:
M/s Royal Offset Printers, A-89/1, Naraina Industrial Area, Phase-I, New Delhi-110028

त्रिलोचन महापात्र, पीएच.डी.
एफ एन ए, एफ एन ए एस सी, एफ एन ए ए एस
सचिव एवं महानिदेशक

TRILOCHAN MOHAPATRA, Ph.D.
FNA, FNASc, FNAAS
SECRETARY & DIRECTOR GENERAL

भारत सरकार
कृषि अनुसंधान और शिक्षा विभाग एवं
भारतीय कृषि अनुसंधान परिषद
कृषि एवं किसान कल्याण मंत्रालय, कृषि भवन, नई दिल्ली 110 001

GOVERNMENT OF INDIA
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION
AND
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
KRISHI BHAVAN, NEW DELHI 110 001
Tel.: 23382629; 23386711 Fax: 91-11-23384773
E-mail: dg.icar@nic.in

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

CONTENTS

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 (RAWE) 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 RAWE 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 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-fules, 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.

AGRICULTURAL ENGINEERING

Defining UG & PG degree for general market needs & for specialized jobs and uniformity in UG & PG degree nomenclature

Possibility of change in UG degree nomenclature such as B. Tech. (Agricultural and Bio-systems Engineering) as proposed by the "Committee on Minimum Standards of Higher Agricultural Education-Agricultural Engineering" were discussed in detail. It was pointed out that, at present in our country, B. Tech. (Agril. Engg.) or B.E. (Agril. Engg.)is the approved required qualification for different jobs in the government sector. Majority of the delegates were of the view that changing the degree nomenclature would have adverse impact on the job opportunities of agricultural engineering graduates in various central and state government departments where they have to compete with other disciplines like with civil engineering/agriculture graduates in soil conservation. Similarly the recommendations of the "Essential Qualification and Degree Nomenclature Review Committee" were discussed for possible change in the PG degree nomenclature. Majority of the delegates were of the view that the PG degree nomenclature should be as per the nomenclature of different departments reflecting the major disciplines of Agricultural Engineering. Delegates were of the view that more departments may have to be created in future as per the need for specialisation in different aspect of agricultural engineering and as such the PG degree nomenclature should suit needed specialisation to avoid recruitment problems. Finally the following decision was taken regarding the UG and PG degree nomenclature for the disciple of Agricultural Engineering:

i) **UG Degree:** B. Tech. (Agricultural Engineering)

ii) **PG Degree:** M. Tech. / Ph.D (Agricultural Engineering) with specialisation in following streams:

S. No.	Specialization in M. Tech. / Ph.D.
1	Soil and Water Conservation Engineering
2	Irrigation and Drainage Engineering
3	Farm Machinery and Power Engineering
4	Processing and Food Engineering
5	Renewable Energy Engineering

Restructuring of UG programme for increased practical contents

Taking fourth Deans' Committee recommendations related to Agricultural Engineering as the base criteria, the issue was discussed at length. There was unanimous consensus on different aspects such as thorough restructuring of the distribution of different courses as per future challenges and recent developments, more emphasis on basic course of agricultural sciences for increased exposure of the student to the problems and practices of agricultural fields and inclusion of special courses on communication skills and personality development for increased employability of the graduating students. The delegates were also of the view that the total credit load as approved by fourth Deans' Committee for B. Tech. Agricultural Engineering is towards much higher side as compared to other degree programmes [e.g. 183 credits hours for B. Tech. (Agril. Engg.) as compared to 166 credit hours for B.Sc. (Ag.)] leaving practically no time for the B. Tech. (Agril. Engg.)students to engage themselves in innovative academic pursuits and detailed study of subjects of their interest. The proposed distribution of courses and credits hours for B. Tech. (Agril. Engg.) programme was discussed at length.

It was also decided to review the course titles/course contents in view of i) the proposed restructuring of B. Tech. (Agril. Engg.) programme, ii) feedback received by different institutes during their interaction with different stakeholders, iii) experience gained by different institutes in implementing the fourth Deans' Committee recommendations, iv) recent developments and emerging issues related to different aspects of Agricultural Engineering such as agricultural waste management, micro irrigation, increasing dependence on renewable energy sources etc., and v) job opportunities for agricultural engineering graduates in different industrial sectors. Considering the time constraint and more inclusive involvement of subject specialists, discipline wise coordinators were identified to review the course titles/course contents for different disciplines. The identified coordinators were asked to submit their respective report to the convener and co-convener for further necessary action.

Titles and Credit Hours of B. Tech. (Agricultural Engineering) Degree Programme

S. No.	Department with number of courses and Course title	Credit Hours
	Dept. of Basic Engineering Applied Sciences	**75 (45+30)**
	Basic Engineering (18)	**44 (25+19)**
1	Surveying and Levelling	3(1+2)
2	Engineering Mechanics	3(2+1)
3	Strength of Materials	2(1+1)
4	Design of Structures	2(1+1)
5	Fluid Mechanics and Open Channel Hydraulics	3(2+1)
6	Building Construction and Cost Estimation	2(2+0)
7	Soil Mechanics	2(1+1)
8	Engineering Drawing	2(0+2)
9	Workshop Technology and Practice	3(1+2)
10	Heat and Mass Transfer	2(2+0)

11	Machine Design	2(2+0)
12	Auto CAD Applications	2(0+2)
13	Thermodynamics, Refrigeration and Air Conditioning	3(2+1)
14	Theory of Machines	2(2+0)
15	Electrical Machines and Power Utilization	3(2+1)
16	Applied Electronics and Instrumentation	3(2+1)
17	Computer Programming and Data Structures	3(1+2)
18	Web Designing and Internet Applications	2(1+1)
	Applied Sciences (11)	**31(20+11)**
1	Principles of Agronomy	3(2+1)
2	Principles of Soil Science	3(2+1)
3	Principles of Horticultural Crops and Plant Protection	2(1+1)
4	Engineering Physics	3(2+1)
5	Engineering Chemistry	3(2+1)
6	Engineering Mathematics-I	3(2+1)
7	Engineering Mathematics-II	3(2+1)
8	Engineering Mathematics-III	3(2+1)
9	Communication Skills and Personality Development	2(1+1)
10	Entrepreneurship Development and Business Management	3(2+1)
11	Environmental Science and Disaster Management	3(2+1)
	Dept. of Soil and Water Conservation Engineering (4)	**10(6+4)**
1	Watershed Hydrology	2(1+1)
2	Soil and Water Conservation Engineering	3(2+1)
3	Water Harvesting and Soil Conservation Structures	3(2+1)
4	Watershed Planning and Management	2(1+1)
	Dept. of Irrigation and Drainage Engineering (4)	**10(6+4)**
1	Irrigation Engineering	3(2+1)
2	Drainage Engineering	2(1+1)
3	Groundwater, Wells and Pumps	3(2+1)
4	Sprinkler and Micro Irrigation Systems	2(1+1)
	Dept. of Farm Machinery and Power Engineering (5)	**14(8+6)**
1	Farm Machinery and Equipment-I	3(2+1)
2	Farm Machinery and Equipment-II	3(2+1)
3	Tractor and Automotive Engines	3(2+1)
4	Tractor Systems and Controls	3(2+1)
5	Tractor and Farm Machinery Operation and Maintenance	2(0+2)

	Dept. of Processing and Food Engineering (5)	**13(8+5)**
1	Engineering Properties of Agricultural Produce	2(1+1)
2	Agricultural Structures and Environmental Control	3(2+1)
3	Post Harvest Engineering of Cereals, Pulses and Oil Seeds	3(2+1)
4	Post Harvest Engineering of Horticultural Crops	2(1+1)
5	Dairy and Food Engineering	3(2+1)
	Dept. of Renewable Energy Engineering (3)	**9(6+3)**
1	Fundamentals of Renewable Energy Sources	3(2+1)
2	Renewable Power Sources	3(2+1)
3	Bio-energy Systems: Design and Applications	3(2+1)
	Elective Courses (Any 3 courses)	**9 (6+3)**
1	Floods and Control Measures	3(2+1)
2	Wasteland Development	3(2+1)
3	Information Technology for Land and Water Management	3(2+1)
4	Remote Sensing and GIS Applications	3(2+1)
5	Management of Canal Irrigation System	3(2+1)
6	Minor Irrigation and Command Area Development	3(2+1)
7	Precision Farming Techniques for Protected Cultivation	3(2+1)
8	Water Quality and Management Measures	3(2+1)
9	Landscape Irrigation Design and Management	3(2+1)
10	Plastic Applications in Agriculture	3(2+1)
11	Mechanics of Tillage and Traction	3(2+1)
12	Farm Machinery Design and Production	3(2+1)
13	Human Engineering and Safety	3(2+1)
14	Tractor Design and Testing	3(2+1)
15	Hydraulic Drives and Controls	3(2+1)
16	Precision Agriculture and System Management	3(2+1)
17	Food Quality and Control	3(2+1)
18	Food Plant Design and Management	3(2+1)
19	Food Packaging Technology	3(2+1)
20	Development of Processed Products	3(2+1)
21	Process Equipment Design	3(2+1)
22	Photovoltaic Technology and Systems	3(2+1)
23	Waste and By-products Utilization	3(2+1)
24	Artificial Intelligence	3(3+0)
25	Mechatronics	3(2+1)
	Total course work Credit Hours (140)	**140 (85+55)**

	Educational tour (During first week of January)	**2 (0+2)**
	One-year Student READY (Rural and Entrepreneurship Awareness Development Yojana) programme	**40 (0+40)**
	8-weeks Skill Development Trainings (I and II, each of 4-weeks) during semester break after IVth and VIth semester	10 (0+10)
	10- weeks Industrial Attachment/ Internship	10 (0+10)
	10- weeks Experiential Learning On campus	10 (0+10)
	20-weeks Project Planning and Report Writing	10 (0+10)
	Total Credit Hours Load of B. Tech. (Agricultural Engineering)	**182 (85+97)**

Semester-wise Course Programme

No.	Course No.	Title of the Course	Credit Hour
		Semester I	
1.		Engineering Mathematics-I	3(2+1)
2.		Engineering Physics	3(2+1)
3.		Engineering Chemistry	3(2+1)
4.		Principles of Soil Science	3(2+1)
5.		Surveying and Levelling	3(1+2)
6.		Engineering Mechanics	3(2+1)
7.		Engineering Drawing	2(0+2)
8.		Heat and Mass Transfer	2(2+0)
		Total	**22(13+9)**
		Semester II	
1.		Engineering Mathematics-II	3(2+1)
2.		Environmental Science and Disaster Management	3(2+1)
3.		Entrepreneurship Development and Business Management	3(2+1)
4.		Fluid Mechanics and Open Channel Hydraulics	3(2+1)
5.		Strength of Materials	2(1+1)
6.		Workshop Technology and Practices	3(1+2)
7.		Theory of Machines	2(2+0)
8.		Web Designing and Internet Applications	2(1+1)
		Total	**21(13+8)**
		III Semester	
1.		Principles of Horticultural Crops and Plant Protection	2(1+1)
2.		Principles of Agronomy	3(2+1)
3.		Communication Skills and Personality Development	2(1+1)
4.		Engineering Mathematics-III	3(2+1)
5.		Soil Mechanics	2(1+1)