

# AGRICULTURAL ENGINEERING EDUCATION IN INDIA - OPTIONS AND OPPORTUNITIES

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Agricultural Engineering has the unique and great importance as compared to other discipline of the engineering. Experience has shown that the level of economic development of any nation depends on its level of human resources particular science and technology. The India's great agricultural engineer Dr. AM Michel states that, "Nation needs great contribution from Agricultural Engineer around the world to provide sufficient and nutritional food to the individuals". Without contribution of those engineers this hypothesis may be considered as incomplete hypothesis. Agricultural engineering includes several discipline of science and principles of technologies which help to make agriculture sustainable, profitable and competitive enterprise through engineering interventions of farm mechanization, value addition and energy management in production and post-harvest operations. In present scenario all agricultural operations can be accomplished with help of Morden and precise equipment and tools within a very short dura-



tion and less investment. On international level demand of noble agricultural engineers are increasing as a consequence of increasing demand of precision agriculture equipment and tools.

## Agricultural Engineering and Mechanization%

Agricultural engineering is the branch of engineering that deals with the design of farm machinery, the location and planning of farm structures, farm drainage, soil management and erosion control, water supply and irrigation, rural electrification and the processing of farm products. Agricultural engineers develop and design new procedures,

tools and systems for agricultural products and environments. The profession has made significant contribution in the development of appropriate farm machinery, irrigation and post-harvest equipment and energy appliances.

Agricultural mechanization helps in increasing production, produc-

tivity and profitability in agriculture by achieving timeliness in farm operations, bringing precision in metering and placement of inputs, reducing available input losses, increasing utilization efficiency of costly inputs (seed, chemical, fertilizer, irrigation, water etc.), reducing unit cost of produce, enhancing profitability and competitiveness in the cost of operation. Earlier, it was considered that mechanization creates unemployment. The myth has been broken and it has been observed that, agricultural mechanization besides increasing production and productivity, also generates income and employment opportunities. Several studies conducted in different parts of India have shown that mechanization has helped in increasing production, productivity, generation of income and employment. The

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average farm power availability needs to be increased from the current 1.15 kW/ha to at least 2 kW/ha to assure timeliness and quality in field operations. All these works in agricultural operations are possible to be attended only when adequate agricultural mechanization infrastructure is created.

### Agricultural Engineering Education System in India:

The first program in agricultural engineering education in India was introduced in 1942 with Bachelor of Science degree at the Allahabad Agricultural Institute, Naini, Allahabad, Uttar Pradesh. The second program in agricultural engineering education in India was established in 1952 with Bachelor of Technology (B.Tech.) degree at the Indian Institute of Technology (IIT), Kharagpur, West Bengal. IIT introduced Master of Technology (M. Tech.) and Ph.D. degrees in agricultural engineering in 1957 and 1962, respectively.

With the establishment of State Agricultural Universities (SAUs) during 1960's, on the pattern of Land Grant Universities in the United States, the agricultural education in India changed significantly. The teaching, research and extension became integral part of the faculties. The first agricultural engineering program under this new pattern was started in 1962 at the Uttar Pradesh Agricultural University (now G B Pant University of Agriculture and Technology), Pantnagar. Presently, there are 24 institutions offering degree programs in agricultural engineering. Of these 16 offer programs leading to master degree and eight offer Ph. D. degree (Yadav et. al, 1997). ICAR works in a partnership mode with SAUs and has contributed significantly in developing first rate human resource by way of coordinating, supporting and guiding various aspects of higher agricultural engineering education. It provides funds for development and strengthening facilities in vital areas, training to faculty and scholarships/fellowships to the students for quality assurance.

### Employment opportunities of Agriculture Engineers Government and Private Sector:

Agricultural engineering is a very diverse engineering major. Students who consider this major typically don't picture themselves just working behind a desk solving problems; they are people who like hands-on problem solving and design implementation. They like to work in teams to solve societal problems related to agriculture. Agricultural engineers solve problems related to agricultural equipment, water quality and water management, biological products, livestock facilities, food process-

ing, and many other agricultural areas. Also, engineers in this field may work to solve environmental issues pertaining to agriculture or they may specialize in bio-process technology. They often must travel to worksites to observe whether processes or equipment are working correctly. These professionals work both indoors and out. Their work can depend on the weather or growing seasons, so sometimes agricultural engineers must work long hours to take advantage of the right conditions. Currently, the demand for AE's is at an all-time high. The job opportunities are plentiful and diverse. The graduates are employed in academic and R&D activities, agricultural production, equipment sales and service, financial management and consultancy, leading agricultural firms, government services, and consulting agencies seek after graduates in agricultural engineering and some are self-employed. An Agricultural Engineering degree will open doors around the world in large corporations and small businesses, including careers in water quality, food processing, environmental systems, structural design, erosion control, materials handling, agricultural power and equipment design and more.

The following are some of the sectors providing placement to the agricultural engineering graduates/post-graduates:

- designing and managing food production systems
- designing natural resource management systems
- developing and managing bioprocessing systems
- Development, research and teaching departments/ institutions/ universities of Central and State Governments
- Commercial Banks and Insurance Sector
- Area development/ watershed development agencies including NGOs, protecting surface and ground water quality
- Industries dealing with agriculture machinery, designing off-road vehicles and agricultural equipment
- Manufacturers and suppliers of irrigation system
- Agricultural and animal products processing industry, designing animal production facilities and environmental control systems
- Multi-Nationals dealing with production, field evaluation, and marketing of agricultural inputs including export marketing and consultancy services etc.

### Essential Qualifications to take admissions in agricultural engineering College:

In order to take admissions to agricultural engineering BE/B.Tech/M.E./M.Tech programmes candidates need to get qualified in entrance exams that are conduct-

ed by the respected institute/ university. All the candidates who got shortlisted in the entrance examination conducted will be declared as eligible to appear for admissions. List of Agricultural Engineering Entrance exams for taking admissions to Undergraduate/Post graduate courses are provided below. For Complete details regarding the Eligibility, admission process, scheduled dates and other notices of Entrance exam provided below log on to the respective exam official website

### Exam Pattern for the Agricultural Engineering Exam

The examination will have objective type questions with multiple choices. The total marks allotted for this examination is 160 marks. The time that is allotted for students to finish writing is three hours. Questions shall be posed from subjects as such:

- Mathematics
- Chemistry
- Physics

### Post-graduate degree in the discipline of Agricultural Engineering and universities

Three major specializations in the discipline of Agricultural Engineering and degrees in these at M.Tech. and Ph.D. level have been recommended as: (i) Farm Machinery & Power Engineering; (ii) Processing & Food Engineering; and (iii) Soil and Water Engineering. Other discipline are Renewable energy engineering, Irrigation and drainage engineering, Agricultural Structures and Environment Control Engineering, Dairy Engineering, and Aquacultural Engineering.

### Post Graduate Diploma in Management-Agriculture (PGDMA)

ICAR-National Academy of Agricultural Research Management NAARM initiated the Post Graduate Diploma in Management-Agriculture (PGDMA) program in the year 2009. PGMMA is a 2 year, fully residential programme approved by the All India Council for Technical Education (AICTE) designed to prepare students for management-related careers in the agriculture and food and allied sectors.

**1. Essential Qualifications:** The minimum qualification for admission to the PGMMA is a Four year bachelor's degree from any Agricultural University or Institution recognized by the ICAR / UGC in disciplines such as Agriculture, Agri-Business Management / Commercial Agriculture, Agricultural Marketing and Cooperation, Agricultural Engineering, Agricultural Information Technology, Agricultural Bioinformatics, Agricultural Biotechnology, Dairy Science/ Technology, Fisheries, Food Technology/Food Process Engineering, Forestry, Horticulture, Sericulture, Agricultural and Irrigation Engineering, Home Sci-

ence, B.Sc. (Cooperation and Banking Management) and Veterinary Sciences.

**2. Short listing of candidates:** Candidates are short-listed based on CAT/CMAT/XAT /MAT scores for next stage of selection i.e. Group Discussion (GD) and Personal Interview (PI).

**3. Final Selection :** Weights given to different components in the selection process are as follows:

|                         |      |
|-------------------------|------|
| CAT/CMAT/XAT/ MAT Score | 40 % |
| Group Discussion        | 25 % |
| Personal Interview      | 25 % |
| Academic Record         | 10 % |

### Conclusions :

Agricultural engineering has been accepted as one of the major disciplines which contributes significantly in increasing the productivity of agriculture in the country by way of increasing efficiency of inputs, conservation of resources and reducing post-harvest losses besides value addition of agro-produce. There is an urgent need for developing appropriate technology in Agricultural Engineering & Technology and imparting proper training to the farmers, which is possible only if the graduates and post graduates produced by the universities are themselves properly educated in the advances in engineering and technology as applicable to agriculture. This becomes more important at the post graduate level where they have not only to learn the recent advances in their subjects but have also to be trained in the modern and latest techniques in their disciplines so that they can participate and contribute in the development and advancement in their related fields. Therefore restructuring the curricula content and delivery system and recast the same to produce globally competitive manpower has gained primacy. Further, the shrinking job opportunities in the National Agricultural Research System (ICAR/SAUs) have put additional pressure on our education system to prepare students in tune with the demands of the private sector. The new and restructured PG programmes in Agricultural Engineering & Technology have been designed by taking into consideration demands of private sector harnessing commercial aspects, modern research tools and their applications, supplementary skills required, and enhancing the global competitiveness and employability of students.

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Views expressed are personal.

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