SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DC	Subject Code:	AG-1861	Subject Name:	**Post Harvest Engineering for Cereals Pulses & Oil Seeds**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10	30	20	150	3		2	4

Prerequisites:

Course Objective:

The students would be exposed to fundamental knowledge in engineering properties of agricultural materials, different Post Harvest operations and processing methods of harvested crops and storage of crops

Course Outcomes:

At the end of the study the student will have knowledge on

1. Fundamental knowledge in engineering properties of agricultural materials
2. Different Post Harvest operations and processing methods of harvested crops.
3. Material handling equipment

UNITs	Descriptions	Hrs.	CO's
I	**FUNDAMENTALS OF POST HARVESTING** Post harvest technology – introduction, objectives, post harvest losses of cereals, pulses and oilseeds, importance - optimum stage of harvest. Threshing – traditional methods mechanical threshers, types, principles and operation. moisture content measurement, direct and indirect methods, moisture meters, equilibrium moisture content	8	CO1
II	**PSYCHROMETRY AND DRYING** Psychrometry – importance, Psychrometric charts and its uses. Drying – principles and theory of drying, thin layer and deep bed drying, Hot air drying, methods of producing hot air, Types of grain dryers, selection, construction, operation and maintenance of dryers ,Design of dryers	8	CO2
III	**CLEANING AND GRADING** Principles, air screen cleaners, adjustments , cylinder separator, spiral separator, magnetic separator, colour sorter, inclined belt separator, length separators, effectiveness of separation and performance index	8	CO2
IV	**SHELLING AND HANDLING** Principles and operation, husker sheller for maize, groundnut decorticator, castor sheller. Material handling – belt conveyor, screw conveyor, chain conveyor, bucket elevators, pneumatic conveying.	8	CO3

V	**CROP PROCESSING** Paddy processing – parboiling of paddy, methods, merits and demerits, dehusking of paddy – methods, merits and demerits rice polishers –types, constructional details, polishing, layout of modern rice mill, wheat milling, pulse milling methods, oil seed processing, millets processing.	8	CO2
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Determination of moisture content of grains by oven method and moisture meter.
2. Determination of porosity of grains.
3. Determination of coefficient of friction and angle of repose of grains.
4. Evaluation of thin layer drier
5. Evaluation of L.S.U. drier.
6. Determining the efficiency of bucket elevator and screw conveyor
7. Evaluation of shelling efficiency of rubber roll sheller
8. Determining the oil content of oil seeds.
9. Visit to modern rice mill
10. Visit to pulse milling industry

Text Book-

1. Chakraverty, A.Post harvest technology for Cereals, Pulses and oilseeds. Oxford & IBH publication Pvt Ltd, New Delhi, Third Edition, 2000.
2. Sahay, K.M., and Singh, K.K. Unit operations of Agricultural Processing. Vikas publishing house Pvt. Ltd., New Delhi, 1994.

Reference Books-

1. Pande, P.H. Principles of Agriculture Processing. Kalyani Publishers, Ludhiana, 1994.
2. Henderson, S.M. and R.L. Perry. Agricultural Process Engineering. John Wiley and Sons, New York. 1955.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech				
Subject Category	DE-I	Subject Code:	AG-1862(A)	Subject Name:	**Soil and Water Conservation Engineering**				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3		2	4

Prerequisites:

Course Objective:

1. To present the concepts of erosion so that students get a sound knowledge about the problems associated with it.
2. To enable the students to make use of the principles and concepts to solve issues related to soil and water management.

Course Outcomes:

After completion of the course, the student will be able to:

1. The students will be able to gain fundamental knowledge on the concepts of erosion.
2. Calculation of soil loss
3. They will have sufficient knowledge on soil and water conservation measures

UNITs	Descriptions	Hrs.	CO's
I	**SOIL EROSION PRINCIPLES** Approaches to soil conservation, Soil conservation in India, Erosion – Agents, Causes, Mechanics of water erosion, Soil erosion problems, Types of water erosion: Raindrop erosion, Sheet erosion, Rill erosion, Gully erosion, Stream bank erosion – Classification of Gully, wind erosion		CO1
II	**ESTIMATION OF SOIL EROSION** Runoff computation for soil conservation: SCS-CN method, Evolution of Universal Soil Loss Equation: Applications and Limitations, Modified Universal Soil Loss Equation, Revised Universal Soil Loss Equation- Permissible erosion, Land use capability classification, Classification of eroded soils.		CO2
III	**EROSION CONTROL MEASURES** Agronomic practices: contour cultivation, strip cropping, tillage practices, Soil management practices, Bunding: Types and design specifications, Mechanical measures for hill slopes, Terracing: Classification and design specification of bench terrace, Grassed waterways: Location, construction and maintenance –		CO3
IV	**WATER CONSERVATION MEASURES**		CO3

	In-situ soil moisture conservation – Water harvesting principles and techniques: Micro catchments, catchment yield using morphometric analysis, Farm ponds: Components, Design, Construction and Protection, Check dams, Earthen dam, Retaining wall.		
V	**Gully Control Structures**: Drop Spillway, Drop Inlet, Chute Spillways - Prerequisites for soil and water conservation measures. Types of temporary and permanent gully control structures. Wind brakes, shelter belts		CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Study of soil loss measurement techniques,
2. Problems on Universal Soil Loss Equation;
3. Preparation of contour map of an area and its analysis;
4. Design of vegetative waterways;
5. Design of contour bunding system and graded bunding system;
6. Design of various types of bench terracing systems;
7. Determination of rate of sedimentation and storage loss in reservoir;
8. Design of Shelter belts and wind breaks

Text Book-

1. Suresh, R., "Soil and Water Conservation Engineering", Standard Publication, New Delhi, 2007.
2. Ghanshyam Das, "Hydrology and Soil Conservation Engineering", Prentice Hall of India Private Limited, New Delhi, 2000.

Reference Books-

1. Murthy, V.V.N., "Land and Water Management Engineering", Kalyani Publishers, Ludhiana, 1998.
2. Gurmail Singh, "A Manual on Soil and Water Conservation", ICAR Publication, New Delhi,1982.
3. Mal, B.C., "Introduction to Soil and Water Conservation Engineering", Kalyani Publishers, New Delhi, 2002

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	DE-I	Subject Code:	AG-1862 (B)	Subject Name:	**Sustainable Agriculture And Food Security**				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3	1	-	4

Prerequisites:

Course Objective:

To study the importance of sustainable agriculture for the growing population, various resources required and their sustainability. Importance of science, food security and ecological balance.

Course Outcomes:

After completion of the course, the student will be able to:

1. Upon completion of this course, the students will gain knowledge on the need for sustainable agriculture
2. They will be able to comprehend the need for food security on global level and the Nutritional Security.
3. The students will be able to demonstrate how ecological balance is required for sustainability of agriculture

UNITs	Descriptions	Hrs.	CO's
I	**LAND RESOURCE AND ITS SUSTAINABILITY** Land Resources of India, Population and land, Land utilization, Net Area Sown, changes in cropping pattern, land degradation.	7	
II	**WATER RESOURCE AND ITS SUSTAINABILITY** Rainfall forecasting - Adequacy of Rainfall for crop growth – Rainfall, Drought and production instability – Irrigation potential – Available, created and utilized – River basins; Watersheds and Utilizable surface water – Utilizable water in future (Ground water & Surface water)	8	
III	**SUSTAINABLE AGRICULTURE & ORGANIC FARMING** Agro-ecosystems - Impact of climate change on Agriculture, Effect on crop yield, effect on Soil fertility – Food grain production at State Level – Indicators of Sustainable food availability – Indicators of food production sustenance – Natural farming principles – Sustainability in rainfed farming – organic farming – principles and practices.	9	
IV	**FOOD PRODUCTION AND FOOD SECURITY** Performance of Major Food Crops over the past decades –	8	

	trends in food production – Decline in total factor productivity growth – Demand and supply projections – Impact of market force – Rural Land Market – Emerging Water market – Vertical farming - Sustainable food security indicators and index – Indicator of sustainability of food Security – Path to sustainable development.		
V	**POLICES AND PROGRAMMES FOR SUSTAINABLE AGRICULTURE AND FOOD SECURITY** Food and Crop Production polices – Agricultural credit Policy – Crop insurance –Policies of Natural Resources Use – Policies for sustainable Livelihoods – Virtual water and trade - Sustainable food Security Action Plan	8	
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1.

Text Book-

1. B.K.Desai and Pujari, B.T. Sustainable Agriculture : A vision for future, New India Publishing Agency, New Delhi, 2007.
2. 2. Saroja Raman, Agricultural Sustainability – Principles, Processes and Prospects, CRC Press, 2013

Reference Books-

1. Swarna S.Vepa etal., Atlas of the sustainability of food security. MSSRF, Chennai, 2004.
2. Sithamparanathan, J., Rengasamy, A., Arunachalam, N. Ecosystem principles and sustainable agriculture, Scitech Publications, Chennai, 1999.
3. Gangadhar Banerjee and Srijeet Banerji, Economics of sustainable agriculture and alternate production systems, Ane Books Pvt Ltd., 2017
4. M.S.Swaminathan, Science and sustainable food security, World Scientific Publishing Co.,Singapore, 2010.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

Recommendation by Board of studies on	
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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VIII/IV	Program		B.Tech
Subject Category	DE-I	Subject Code:	AG-1862 (C)	Subject Name:	**Storage and Packaging Technology**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3	1	-	4

Prerequisites:

Course Objective:

1. To understand the underlying principles of spoilage and storage
2. To provide knowledge on different storage methods and packaging techniques.

Course Outcomes:

After completion of the course, the student will be able to:

1. The students will have a clear understanding of various methods of storage
2. Understanding of Different packaging techniques for food

UNITs	Descriptions	Hrs.	CO's
I	**SPOILAGE AND STORAGE** Direct damages, Indirect damages of perishable and durable commodities – control measures - factors affecting storage – types of storage – Losses in storage and estimation of losses.	7	CO1
II	**STORAGE METHODS** Improved storage methods for grain-modern storage structures-infestation-temperature and moisture changes in storage structures-CAP storage-CA storage of grains and perishables construction operation and maintenance of CA storage facilities	8	CO1
III	**FUNCTIONS OF PACKAGING MATERIALS** Introduction – packaging strategies for various environment – functions of package – packaging materials – cushioning materials – bio degradable packaging materials – shrink and stretch packaging materials.	9	CO2
IV	**FOOD PACKAGING MATERIALS AND TESTING** Introduction – paper and paper boards - flexible - plastics - glass containers – cans – aluminium foils - package material testing-tensile, bursting and tear strength	8	CO2
V	**SPECIAL PACKAGING TECHNIQUES** Vacuum and gas packaging - aseptic packaging - retort pouching – edible film packaging – tetra packaging – antimicrobial packaging – shrink and stretch packaging	8	CO2

Guest Lectures (if any)		
Total Hours	40	

Suggestive list of experiments:

Text Book-

1. Sahay, K.M. and K.K.Singh. 1996. Unit operations of agricultural processing. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Food Packaging Technology, Hand book, 2004. NIIR Board, New Delhi.
3. Pandey, P.H.2002. Post harvest engineering of horticultural crops through objectives. Saroj Prakasam. Allahabad.

Reference Books-

1. Himangshu Barman. 2008, Post Harvest Food grain storage. Agrobios (India), Jodhpur.
2. Chakaraverty, A. 2000. 3rd edition. Post harvest technology of cereals, pulses and oil seeds. Oxford & IBH publishing & Co.Pvt.Ltd. New Delhi.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

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Subject handled by department	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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Agricultural Engineering

Semester/Year			Program		B.Tech.
Subject Category	DE	Subject Code:	**AG-1863(A)**	Subject Name:	**Machine design and Drawing**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10	30	20	150	3	-	2	4

Prerequisites:

This course is focused on design process of machine components and design of temporary and permanent type joints. Also this course gives an idea of CAD drawing and assembly drawing.

Course Objective:

Course Outcomes:

After completion of the course, students would be able to -

6. Illustrate various design consideration for machine component design
7. Judge failure modes and compute factor of safety
8. Design various joints subjected to static load in different working conditions
9. Analyse suitability of various joints
10. understand the concept of geometric modeling

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1								
CO2	3	2	3	1								
CO3	3	3	3	1								
CO4	2	2	3	1								

CO5	2	3	2	1	2							

Contents:

UNITs	Descriptions	Hrs.	CO's
I	Basic Design concepts, design process, stages/phases in design, design considerations (strengths manufacturing, maintenance, environment, economics and safety): design for recycle and reuse, Design and safety factors for steady and variable loads, impact and fatigue considerations, Surface Finish, limits, fits and tolerance.	8	CO1 & CO2
II	Threaded Joints: Thread Nomenclature, Forms of Screw Threads, Designation of Indian Standard Thread, Designation of Bolts, Screws and Nuts, Common Screw Fasteners, representation of internal thread and external threads, Bolts Supporting Tensile Loads Only, static Stress in Screw Fastening, Eccentric Loading of Threaded Joints.	8	CO3 & CO4
III	Welded Joints**:** Representation of welds, strength of Welded Steel Joints, Design of Welded Joints for Static Loads, Strengths of Welds at Varying Loads, Initial Stress, Exercises Eccentric Loading of welded Joints.	8	CO3 & CO4
IV	Design of Cotter Joint and knuckle joint. Design of Keys and Coupling	8	CO3 & CO4
V	Basic fundamentals of CAD and Application of computer for design, CAD data exchange, Graphics standards, modes of graphics operation, Geometric Modeling. Types of mathematical representation of curves, parametric representation wire frame modeling	8	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments: (if any)

1. Prepare Orthographic views of given object
2. Prepare Isometric view of given object
3. Convert isometric view in orthographic views and vice versa
4. CAD initial setting commands-Snap, grid, Ortho, Osnap. Limits. Units, Object tracking. Opening, saving and closing a new and existing drawing/template
5. Identify various tools/commands for sketching.
6. Prepare 2D CAD drawing of given object
7. Identify various tools/commands for solid modelling

8. Prepare 3D parts of flange coupling
9. Prepare assembly of flange coupling
10. Prepare assembly of cotter joint
11. Prepare assembly of knuckle joint

Text Books-

5. Design of machine elements by V B. Bhandari Tata McGraw-Hill Education
6. Mechanical Engineering Design by Joseph Edward 'Shigley, McGraw-Hill
7. Machine Design by Robqrt. L., Norton
8. Design of Machine Elements: Volurrte, I by T. Krishña Rao, IK International
9. Machine Drawing by N. D. Bhatt.
10. CAD/CAM: Computer-Aided Design and Manufacturing Groover Pearson Education India

Reference Books-

3. Mechanical Design of Machine Elements and Machines by Jack A. Collins, Henry Busby, George Staab, Wiley
4. Machine Design by P.C. Sharma and D. K. Agarwal, S.K.Kataria & Sons.
5. Principles of Computer Graphics William M Neumann and Robert F.Sproul McGraw Hill Book Co. Singapore

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. The practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1. Dr. Chandra Pal Singh
Checked and approved by	Name 1.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DE-II	Subject Code:	AG-1863(B)	Subject Name:	**Seed Technology and Processing**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10	30	20	150	3		2	4

Prerequisites:

Course Objective:

1. To expose the students to scope and importance of good quality seed production.
2. To acquaint them with the principles and special techniques used in the process of production of good quality seed using specific examples.
3. To familiarize them with planning, development and organization of seed programmes.

Course Outcomes:

After completion of the course, the student will be able to:

1. The students will be able to appreciate the different methods of seed production, processing and testing
2. They will also have the knowledge on different seed programmes

UNITs	Descriptions	Hrs.	CO's
I	**SEED CHARACTERS** Definition and characteristics of seed and how it differs from grain; Propagation of crop plants through true seed and vegetative means; Features of good quality seed; Importance of seed in successful crop production; Floral biology: self and cross pollination; Methods of genetic improvement of crop plants such as selection, hybridization, mutation and polyploidy; Seed legislations promulgated in India from 1966 to date and the purpose of each of these legislations.		CO1
II	**SEED PRODUCTION AND CERTIFICATION** Multiplication of seed and seed material: systems of seed multiplication, classes of seed, multiplication models, multiplication ratio, field selection, planting ratio, isolation needs and rouging; Harvest and extraction of seed; Methods of hybrid seed production; Genetic deterioration during crop production cycles; Seed certification process: legal basis, pre-requisites for applicability, detailed description of the specific steps of the certification process (with particular emphasis on field inspection).		CO1
III	**SEED PROCESSING AND TESTING**		CO1

	Components of seed processing in a broader sense; Steps in seed processing in its narrower sense: preliminary cleaning, basic cleaning and grading, and equipment used in each of the steps; Seed treatment; Seed drying; Seed sampling; Seed testing: details of specific tests conducted for different purposes (service, certification and seed law enforcement); Standards prescribed for different crops.		
IV	**DEVELOPING SEED PROGRAMMES** Types of organizations involved in seed production (public, quasi-governmental, private and cooperative), and their objectives and features; Organizational set up of a seed company; Steps involved in planning and developing a seed programme; Seed marketing activities, and analysis of seed demand and supply; Costing and pricing strategies; Economics of production of different crop seed; Seed packaging; Opportunities for Indian seed companies to have a greater share of world seed market; Visit to seed organizations; Preparing seed projects to obtain credit; Export procedures and formalities; Seed/plant quarantine methods		CO2
V	**SEED PRODUCTION IN SPECIFIC CROPS** Principles and special techniques used for seed production in important horticultural crops by selecting representatives of vegetable / flower / fruit / spice / condiment / plantation crops.		CO2
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

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Text Book-

1. Singh, S.P., Commercial Vegetable Seed Production, Kalyani Publishers, Chennai, 2001.
2. Agarwal, R.L., Seed Technology, Oxford IBH Publishing Co., New Delhi, 1995.

Reference Books-

1. Subir Sen and Ghosh, N., Seed Science, Kalyani Publishers, Chennai, 1999..
2. Dahiya, B.S., and Rai, K.N., Seed Technology, Kalyani Publishers, Chennai, 1997.
3. George, Raymond, A.T., Vegetable Seed Production, Longman Orient Press, London and New York, 1985.
4. Hand Book of Seedling Evaluation, ISTA, 1979.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VIII/IV	Program		B.Tech
Subject Category	DE-II	Subject Code:	AG-1863 (C)	Subject Name:	**PRECISION AGRICULTURE AND SYSTEM MANAGEMENT**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3	1	-	4

Prerequisites:

Course Objective:

Course Outcomes:

After completion of the course, the student will be able to:

UNITs	Descriptions	Hrs.	CO's
I	Precision Agriculture – need and functional requirements. Familiarization with issues relating to natural resources. Familiarization with various machines for resource conservation	7	
II	Familiarization with equipment for precision agriculture including sowing and planting machines, power sprayers, land clearing machines, laser guided land levellers, straw-chopper, straw-balers, grain combines, etc., optimization of fertilizer application rate for cereals and horticulture crop, increase nutrient use efficiency	8	
III	Introduction to GIS based precision agriculture and its applications. Introduction to sensors and application of sensorsfor data generation. Problems related to cost analysis and inflation and problems related to selection of equipment, replacement.	9	
IV	Database management. System concept. System approach in farm machinery management, problems on machinery selection, maintenance and scheduling of operations. Solving problems related to various capacities, pattern efficiency, system limitation	8	
V	Application to PERT and CPM for machinery system management, break-even analysis, time value of money	8	
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

Text Book-

1. Kuhar J E. The Precision Farming Guide for Agriculturist.
2. Dutta SK. Soil Conservation and land management.
3. Sigma and Jagmohan. Earth Moving Machinery.
4. Wood and Stuart. Earth Moving Machinery.
5. DeMess MN. Fundamentals of Geographic Information System.
6. Hunt Donnell. Farm Power and Machinery Management.

Sharma DN and S Mukesh. Farm Power and Machinery Management Vol I.

Reference Books-

Modes of Evaluation and Rubric
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.
List/Links of e-learning resource

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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech				
Subject Category	DE-III	Subject Code:	AG-1864(A)	Subject Name:	**Agriculture Structures and Environment Control**				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3			3

Prerequisites:

Course Objective:

To make students familiar with different farm structures with environmental control parameters

Course Outcomes:

After completion of the course, the student will be able to:

1. Understand the importance of planning and lay out of a farmstead
2. Know about various standards for various dairy, piggery, poultry and other farm structures
3. Know about the different farm storage structures, silos, compost pit, implement sheds, farm houses, threshing floors, farm roads, fencing, water supply, sewage systems, and septic tanks.

UNITs	Descriptions	Hrs.	CO's
I	Planning and layout of farmstead. Scope, importance and need for environmental control, physiological reaction of livestock environmental factors, environmental control systems and their design, control of temperature, humidity and other air constituents by ventilation and other methods, Livestock production facilities, BIS Standards for dairy, piggery, poultry and other farm structures.		CO1,CO2
II	Design, construction and cost estimation of farm structures; animal shelters, compost pit, fodder silo, fencing and implement sheds, barn for cows, buffalo, poultry, etc.		CO2
III	Storage of grains, Causes of spoilage, Water activity for low and high moisture food and its limits for storage, Moisture and temperature changes in grain bins; Traditional storage structures and their improvements, Improved storage structures (CAP, hermetic storage, Pusa bin, RCC ring bins), Design consideration for grain storage godowns, Bag storage structures, Shallow and Deep bin, Calculation of pressure in bins, Storage of seeds.		CO3
IV	Rural living and development, rural roads, their construction cost and repair and maintenance Sources of water supply,		CO3

	norms of water supply for human being and animals, drinking water standards and water treatment suitable to rural community.		
V	Site and orientation of building in regard to sanitation, community sanitation system; sewage system and its design, cost and maintenance, design of septic tank for small family. Estimation of domestic power requirement, source of power supply and electrification of rural housing.		CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

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Text & Reference Book-

1. Pandey, P.H. Principles and practices of Agricultural Structures and Environmental Control, Kalyani Publishers, Ludhiana
2. Ojha, T.P. and Michael, A.M. Principles of Agricultural Engineering, Vol.1, Jain Brothers, Karol Bag, New Delhi
3. Nathonson, J.A. Basic Environmental Technology, Prentice Hall of India, New Delhi
4. Garg, S.K. Water Supply Engineering, Khanna Publishers, New Delhi
5. Dutta, B.N. Estimating and Costing in Civil Engineering, Dutta & Co, Luc know
6. Sahay, K.M. and Singh, K.K. Unit Operations of Agricultural Processing, Vikas pub. pvt. Ltd, Noida
7. Banerjee, G.C. A Text Book of Animal Husbandry, Oxford IBH Pub. Co., New Delhi

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

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SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DE-III	Subject Code:	AG-1864 (B)	Subject Name:	**Plastic Applications in Agriculture**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3			3

Prerequisites:

Course Objective:

Understand the importance of plastics in soil and water conservation, precision agriculture, and post-harvest management

Course Outcomes:

After completion of the course, the student will be able to:

1. Know about various applications in moisture conservation, canal and pond lining, use of plastic pipes in irrigation and drainage
2. Know about shade houses, poly houses, surface covered cultivation
3. Know about plastic fencing, nets for insects, birds etc.

UNITs	Descriptions	Hrs.	CO's
I	Introduction of plasticulture - types and quality of plastics used in soil and water conservation, production agriculture and post harvest management. Quality control measures. Present status and future prospective of plasticulture in India		CO1
II	Water management - use of plastics in in-situ moisture conservation and rain water harvesting. Plastic film lining in canal, pond and reservoir. Plastic pipes for irrigation water management, bore-well casing and subsurface drainage. Drip and sprinkler irrigation systems. Use of polymers in control of percolation losses in fields.		CO1
III	Soil conditioning – soil solarisation, effects of different colour plastic mulching in surface covered cultivation. Nursery management - Use of plastics in nursery raising, nursery bags, trays etc. Controlled environmental cultivation - plastics as cladding material, green / poly / shade net houses, wind breaks, poly tunnels and crop covers. Plastic nets for crop protection - anti insect nets, bird protection nets.		CO2
IV	Plastic fencing. Plastics in drying, preservation, handling and storage of agricultural produce, innovative plastic packaging solutions for processed food products. Plastic cap covers for storage of food grains in open. Use of plastics as alternate material for manufacturing farm equipment and machinery.		CO3

V	Plastics for aquacultural engineering and animal husbandry - animal shelters, vermi-beds and inland fisheries. Silage film technique for fodder preservation. Agencies involved in the promotion of plasticulture in agriculture at national and state level. Human resource development in plasticutlure applications.		CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

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Text & Reference Book-

1. Brahma Singh, Balraj Singh, Naved Sabir and Murtaza Hasan. 2014.Advances in Protected Cultivation. New India Publishing Agency, New Delhi.
2. Brown, R.P. 2004. Polymers in Agriculture and Horticulture. RAPRA Review Reports : Vol. 15, No. 2, RAPRA Technology Limited, U.K.
3. Central Pollution Control Board. 2012. Material on Plastic Waste Management. Parivesh Bhawan, East Arjun Nagar, Delhi-110032.
4. Charles A. Harper. 2006. Handbook of Plastics Technologies. The Complete Guide to Properties and Performance. McGraw-Hill, New Delhi.
5. Ojha,T.P. and Michael, A.M., 2012, Principles of Agricultural Engineering - I. Jain Brothers, Karol Bagh, New Delhi.
6. Pandey, P.H. 2014. Principles and Practices of Agricultural Structures and Environmental
7. Control. Kalyani Publishers, Ludhiana, India.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

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SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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---------AGRICULTURE ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	DE-III	Subject Code:	AG-1864(C)	Subject Name:	Rain Water Harvesting

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10	-	-	100	3	-	-	3

Prerequisites:

Course Objective:

Students create an integrated site design of their own based on design principles, analysis of water flows and quantities and assessment of overall site conditions. All assignments are components of a report template that students fill out through the process of the class, along with custom-made spreadsheets for the math involved in rain water calculation.

Course Outcomes:

After completion of the course, the student will be able to:

CO-1 : Define key rainwater harvesting concepts, terms, and principles Assess a site for rainwater harvesting potential.

CO-2 : water uses Make strategic decisions about what features and systems to use for a site Design.

CO-3 : conceptual integrated rainwater harvesting plan for a site Refine a conceptual rainwater harvesting plan with relevant systems details.

UNITs	Descriptions	Hrs.	CO's
I	**Rainwater Harvesting Principles-** Define key rainwater harvesting concepts and terms, understand rainwater harvesting principles, identify regulations which may affect rainwater harvesting on your project site.	9	CO1
II	**Site Analysis for Rainwater Harvesting-** Analyze a map to identify the watershed of a site, Identify the runoff coefficient from different surfaces, Identify water entry and exit points on a site, Calculate rainwater runoff volumes from different areas and surfaces, Calculate interior water uses.	8	CO2
III	**Rainwater Harvesting Systems-** Identify rainwater harvesting resource opportunities on a design site, Determine the most effective water harvesting strategies for locations on a design site, Calculate potential rainwater resources for specific	8	CO3

	locations.		
IV	**Rainwater Harvesting Design-** Understand the movement of the sun throughout the year and its impact on a site, Gain familiarity with standard methods and materials for system design, Define the integrated design principles.	8	CO4
V	**Integrated Design Systems-** Design rainwater harvesting collection and distribution system, Size rainwater flow features throughout the design, Comprehend the potential community impacts of rainwater harvesting design.	7	CO5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:
Text Book- 1. Qiang Zhu, John Gould, Chengxiang Ma, Yuanhong Li- Rain Water harvesting for Agricultural and water supply. 2. Michelle Avis and Rob Avis - Essential Rainwater Harvesting: A Guide to Home-Scale System Design. 3. Anthony Zagelow- Rainwater Harvesting and Use.
Reference Books-
Modes of Evaluation and Rubric
Quiz, Assignment, Mid term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.
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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	OC-II	Subject Code:	AG-1865 (A)	Subject Name:	**Groundwater, Wells and Pumps**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10	30	20	150	3		2	4

Prerequisites:

Course Objective:

Course Outcomes:

After completion of the course, the student will be able to:

1. Apply the knowledge of aquifer parameters and yield of wells. Analyze radial flow towards wells in confined and unconfined aquifers.
2. Creative design of wells and understand the construction practices. Analyze Interpret geophysical exploration data for scientific source finding of aquifers.
3. Evaluate the process of artificial recharge for increasing groundwater potential. Creative and effective measures for controlling saline water intrusion and apply appropriate measures for groundwater management.

UNITs	Descriptions	Hrs.	CO's
I	Occurrence and movement of ground water, aquifer and its types, classification of wells, steady and transient flow into partially, fully and non-penetrating and open wells,		CO1
II	Familiarization of various types of bore wells common in the state, design of open well, groundwater exploration techniques, methods of drilling of wells, percussion, rotary, reverse rotary, design of assembly and gravel pack, installation of well screen, completion and development of well		CO1,CO2
III	Groundwater hydraulics-determination of aquifer parameters by different method such as Theis, Jacob and Chow's, The is recovery method, well interference, multiple well systems, surface and subsurface exploitation and estimation of ground water potential, quality of ground water, artificial groundwater recharge planning, modeling, ground water project formulation.		CO2

IV	Pumping Systems: Water lifting devices; different types of pumping machinery, classification of pumps, component parts of centrifugal pumps; pump selection, installation and trouble-shooting; design of centrifugal pumps,		CO3
V	Pump performance curves, effect of speed on head capacity, power capacity and efficiency curves, effect of change of impeller dimensions on performance characteristics; Hydraulic ram, propeller pumps, mixed flow pumps and their performance characteristics; priming, self priming devices, roto-dynamic pumps for special purposes such as deep well turbine pump and submersible pump.		CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Verification of Darcy's Law;
2. Study of different drilling equipments;
3. Sieve analysis for gravel and well screens design;
4. Estimation of specific yield and specific retention;
5. Drilling of a tube well;
6. Measurement of water level and drawdown in pumped wells;
7. Study of artificial ground water recharge structures

Text & Reference Book-

1. Ground water Hydrology, By: H.M. Raghunath
2. Wells and Pumps Engineering, By: S.D. Khepar and A.M. Michael
3. Pump: Theory & Practices, By: V.K. Jain
4. Irigation Theory and Practicals, By: A.M. Michael
5. Ground Water Engineering, By: D.K. Todd
6. Assessment of Ground Water Resources, By: Karanth

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

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---------AGRICULTURAL ENGINEERING----------

Semester/Year		VI/III	Program		B.Tech
Subject Category	OC-II	Subject Code:	AG-1865(C)	Subject Name:	**Food Science**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
70	20	10			100	3			3

Prerequisites:

Course Objective:

Course Outcomes:

After completion of the course, the student will be able to:

1. knowledge of food chemistry, engineering and microbiology
2. the ability to carry out quality controls on food products
3. the development of new safe and quality foods with high nutritional value, attractiveness and safety for consumers

UNITs	Descriptions	Hrs.	CO's
I	**Introduction** Definition of Food Science: Role of food science in augmenting food supplies; activities of food scientists; characteristics of Indian food industry. **Structure of Food** Physical structures of foods; appearance texture' and flavour of foods, and their; use in assessment of food quality.		CO1
II	**Food Constituents** **Water:** water contents of foods, physical contents of water and ice, structure of water molecule and pure ice, association of water molecules, water, solute interaction, water-activity, solute mobility and food stability. **Carbohydrates:** Structure and nomenclature of carbohydrates, carbohydrate, of major importance In foods; hydrolysis, dehydration and browning reactions.		CO1
III	**Lipids:** Definition and classification, role and use of lipids in food, hydrolytically and oxidative rancidity, emulsions. **Proteins:** Type, structure and terminology, functional properties, distribution of proteins in various foods, denaturation of proteins, unconventional sources of proteins. **Enzymes** Enzyme nomenclature definitions, kinematics of enzyme activity, factors effecting enzyme		CO1

IV	**Microorganisms and Food** Classification and identification of micro organisms; factors effecting growth of micro organisms, kinetics of microbial growth and inactivation; sources of microbial contamination of foods; important micro organisms causing food spoilage; food poisoning; microbial production of ethanol and acetic acid.		CO2
V	**Food Laws, Food Standards and Food Safety** Indian food laws and their enforcing agencies; food standards, their role and maintenance in food industry; food adulteration, its causes; common adulteration and methods of detection.		CO3
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

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Text and Reference Book-

1. Potter, N.N. "Food Science", The A VI Publishing Company, 1986.
2. Desrosier, N.W. and Desrosier, J.N. "The technology of food preservation". The AVI Publishing Company, 1977.
3. Fennema, O.R. "Food Chemistry", Marcel Dekhar. 1976.
4. Frazier, W.C. "Food Microbiology". McGraw Hill Book Company.

Modes of Evaluation and Rubric

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

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