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

Semester/Year		VII/IV	Program		B.Tech					
Subject Category	DC	Subject Code:	AE-701	Subject Name:	**Food & Dairy Engineering**					
Maximum Marks Allotted										
Theory				Practical		Total Marks	Contact Hours			Total Credits
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work		L	T	P	
60	20	10	10			100	3	1	-	4

Prerequisites:

Course Objective:

1. To introduce the students to dairy industry, properties and processing of milk, manufacture of dairy products , sanitation and effluent treatment in dairy industry
2. To expose the students to the fundamental knowledge of food, its properties and different methods of food processing

Course Outcomes:

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

The students will gain knowledge about Dairy and Food process engineering

1. Understand the process of manufacturing of dairy products and thermal processing of food.
2. Students will understand the importance of quality control and food preservation and packaging.

UNITs	Descriptions	Hrs.	CO's
I	**PROPERTIES AND PROCESSING OF MILK** Dairy Industry – importance and status – Milk Types – Composition and properties of milk - Production of high quality milk - Method of raw milk procurement and preservation - Processing – Staining - Filtering and Clarification - cream separation – Pasteurization – Homogenization - sterilization, UHT processing and aseptic packaging – emulsification - Fortification.	7	CO1
II	**DAIRY PRODUCTS** Manufacture of Milk Powder - Processing of Milk Products - Condensed Milk - Skim milk - Butter milk - Flavoured Milk, whey, casein, yoghurt and paneer - Manufacture of Butter - Cheese Ghee, ice creams and frozen desserts - standards for milk and milk products - Packaging of Milk and Milk Products - Cleaning and Sanitation - Dairy effluent treatment and disposal .	8	CO1
III	**FOOD AND ITS PROPERTIES, REACTION AND KINETICS** Constituents of food - thermal processing of foods - cooking, blanching, sterilization, pasteurization, canning - Interaction of heat energy on food components, reaction kinetics, Arrhenius equation,	9	CO1

	TDT curves - water activity, sorption behaviour of foods – isotherm models monolayer value, BET isotherms, Raoult"s law, Norrish, Ross, Salwin- Slawson equations		
IV	**PROCESSING AND PRESERVATION OF FOODS** Coffee, Tea processing - Concentration of foods, freeze concentration - osmotic and reverse osmotic concentration - drying and dehydration of food - Tray, tunnel, belt, vacuum and freeze dryers - rehydration of dehydrated foods - Fat and oil processing, sources, extraction, methods and equipment, refining of oils, hydrogenation, manufacture of margarine - Food preservation methods - preservation by irradiation, microwave and dielectric heating of food.	8	CO2
V	**PACKAGING ANDQUALITY CONTROL** Food packaging, importance, flexible pouches - retort pouches - aseptic packaging, granules, powder and liquid packaging machines - nanotechnology – principles - applications in food processing – food plant location - Quality control of processed food products - Factors affecting quality.	8	CO2
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

Text Book-

1. Chandra Gopala Rao. Essentials of Food Process Engineering. B.S. Publications, Hyderabad, 2006.
2. Walstra. P., Jan T. M. Wouters., Tom J. Geurts "Dairy Science and Technology", CRC press, 2005.
3. Ananthakrishnan, C.P., and Sinha, N.N., "Technology and Engineering of Dairy Plant Operations, Laxmi Publications, New Delhi, 1999.

Reference Books-

1. Subbulakshmi.G., and Shobha A. Udipi, Food Processing and Preservation, New Age International Publications, New Delhi, 2007.
2. Toledo, R.T., "Fundamentals of Food Process Engineering", CBS Publishers and Distribution, New Delhi, 1997.
3. Tufail Ahmed., "Dairy Plant Engineering and Management", Kitab Mahal Publishers, Allahabad, 1997.
4. Dairy Science and Technology Handbook, Volumes 1-3, John Wiley & Sons,1993.
5. Charm, S.E., "Fundamentals of Food Engineering", AVI Pub.Co.Inc, New York, 1997.

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

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

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DC	Subject Code:	AE-702	Subject Name:	Agricultural Business Management

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work		L	T	P	
60	20	10	10			100	3	1	-	4

Prerequisites:

Course Objective:

To introduce the importance of Agri-business management, its characteristics and principles, To impart knowledge on the functional areas of Agri-business like Marketing management, Product pricing methods and Market potential assessment

Course Outcomes:

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

The students shall be exposed to various trends in agricultural business management

UNITs	Descriptions	Hrs.	CO's
I	CONCEPTS OF AGRICULTURAL BUSINESS Agri-business - scope, characteristics, types. Management - importance, definition, management and administration, management thoughts, Small business - characteristics and stages of growth Management functions - planning, organizing, leading.	7	
II	AGRI – BUSINESS ORGANIZATION Principles, forms of agri-business organizations, staffing, directing, supervision and motivation. Controlling - types, performance evaluation and control techniques. Management approaches Profit Centered Approach, Management by objectives and Quality Circles. Strength, Weakness, Opportunities and Threat (SWOT) Analysis	8	
III	AGRICULTURAL MARKETING Functional areas of Agri-business - Production and Operations management - functions, planning physical facilities and managing quality. Agro-inputs and products inventory management - raw material procurement, inventory types, and costs. Marketing management- Marketing environment, marketing mix - Agricultural input marketing firms	9	
IV	AGRICULTURAL BUSINESS FINANCE Forms of agri-business organizations - Role of lead bank in agribusiness finance - Financial management. Acquiring	8	

	capital- Budget analysis. Concepts and determinants- Business project scheduling of raw material procurement - production management - launching products (branding, placement) - Input marketing promotion activities		
V	MARKET PROMOTION AND HUMAN RESOURCES 9 Agricultural products - marketing promotion activities - product pricing methods. District Industries Centre - Consumer survey - Agricultural inputs retailing - Market potential assessment - types of distribution channels - Return on Investment - Personnel management. Recruitment, selection and training - Technology in Agri Business	8	
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1.

Text Book-

1. Himanshu, "Agri Business Management – Problems and prospects", Ritu Publications, Jaipur, 2005.
2. Smita Diwase, "Indian Agriculture and Agribusiness Management", Krishi resource Management Network, Pune 2004

Reference Books-

1. 1. Chandra Prasanna, "Projects: Preparation, Appraisal, Budgeting and Implementation", Tata McGraw Hill Publications, New Delhi, 2001.
2. 2. Kotler, P., "Marketing Management. Analysis, Planning and Control", Prentice Hall Inc., New York, 2001.
3. 3. Rao, V.S.P., and Narayana, P.S., "Principles and Practices of Management", Konark Publishing Private Limited, New Delhi, 2001.
4. 4. Tripathy, P.C., and Reddy, P.N., "Principles of Management", Tata McGraw Hill Publications, New Delhi, 2000.

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 (Engg. College),Vidisha (M.P.)

Agricultural Engineering

VII-SEM B.Tech. Agriculture	Subject Code DE-V	Subject Name / Title	Maximum Marks Allotted						Contract Hrs. per weeks			Total Credits
			Theory				Practical					
			End Sem	Mid Sem MST	Quiz	Assignment	End Sem	Lab Work	L	T	P	
	AE-703(A)	Heat & Mass Transfer	60	20	10	10	-	-	3	-	-	3

Course Outcomes: At the end of the course, the students will able to:

CO 1	Understand the basic modes of heat transfer and compute temperature distribution in steady and unsteady state heat transfer through conduction
CO 2	Heat transfer analysis of extended surfaces
CO 3	Interpret and analyze forced and free convection
CO 4	Understand the Principle of Radiation, Evaluation of heat transfer by radiation between different Geometries and basic of Mass Transfer
CO 5	Design and analysis of Heat Exchanger

Mapping of course outcomes with program outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3				2							1
CO 2	3	3	2	2	2				1			1
CO 3	3	3	2	2	1	1						1
CO 4	3	3	2	2		1	1					1
CO 5	3	2	3	2	1	1			1	1		1
ME1851	3	2.75	2.25	2	1.5	1	1		1	1		1

UNIT-1

Basic Concepts: Modes of heat transfer, Fourier's law, Newton's law, Stefan Boltzman law; thermal resistance and conductance, analogy between flow of heat and electricity, combined heat transfer process; **Conduction:** Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates, thermal diffusivity, linear one dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, electrical analogies, critical-insulation-thickness for pipes, effect of variable thermal conductivity.

UNIT 2

Extended surfaces (fins): Heat transfer from a straight and annular fin (plate) for a uniform cross section; error in measurement of temperature in a thermometer well, fin efficiency, fin effectiveness, applications; **Unsteady heat conduction:** Transient and periodic conduction,

heating and cooling of bodies with known temperatures distribution, systems with infinite thermal conductivity, response of thermocouples.

UNIT 3

Convection: Introduction, free and forced convection; principle of dimensional analysis, Buckingham 'pie' theorem, application of dimensional analysis of free and forced convection, empirical correlations for laminar and turbulent flow over flat plate and tubular geometry; calculation of convective heat transfer coefficient using data book.

UNIT 4

Heat exchangers: Types- parallel flow, counter flow; evaporator and condensers, overall heat transfers coefficient, fouling factors, long-mean temperature difference (LMTD), method of heat exchanger analysis, effectiveness of heat exchanger, NTU method;

Mass transfer: Fick's law, equi-molar diffusion, diffusion coefficient, analogy with heat transfer, diffusion of vapour in a stationary medium.

UNIT 5

Thermal radiation: Nature of radiation, emissive power, absorption, transmission, reflection and emission of radiation, Planck's distribution law, radiation from real surfaces; radiation heat exchange between black and gray surfaces, shape factor, analogical electrical network, radiation shields.

Boiling and condensation: Film wise and drop wise condensation; Nusselt theory for film wise condensation on a vertical plate and its modification for horizontal tubes; boiling heat transfer phenomenon, regimes of boiling, boiling correlations

References:

1. Sukhatme SP; Heat and mass transfer; University Press Hyderabad
2. Holman JP; Heat transfer; TMH
3. Dutta Binay K; Heat Transfer; PHI
4. Kumar DS; Heat and mass transfer; SK Kataria and Sons Delhi
5. Kreith, Heat transfer,
6. Sachdeva RC; Fundamentals of engineering heat and mass transfer,.
7. Gupta & Prakash; Engineering heat transfer,

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

Semester/Year		VII/IV	Program		B.Tech					
Subject Category	DE	Subject Code:	AE-703(B)	Subject Name:	**Seed Technology and Processing**					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work		L	T	P	
60	20	10	10	30	20	150	3	0	0	3

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** 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.		CO1
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		VII/IV	Program		B.Tech
Subject Category	DE-V	Subject Code:	AE-703(C)	Subject Name:	**Remote Sensing And Geographical Information System**

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work					
60	20	10	10			100	3	-	-	3

Prerequisites:

Course Objective:

1. To introduce the principles and basic concepts of Remote Sensing and GIS
2. To introduce the remote sensing systems, data products and analysis
3. To introduce the spatial data models, analysis and presentation techniques
4. To study the applications of Remote Sensing and GIS in agriculture, soil and water resources

Course Outcomes:

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

1. The students will understand the remote sensing principles, remote sensing systems satellite data processing and available data products.
2. The students will understand decision making process using DBMS and utilization of these advanced techniques in addressing the real world problems.

UNITs	Descriptions	Hrs.	CO's
I	**CONCEPTS OF REMOTE SENSING AND SATELLITES** Definition- Historical background - Components of remote sensing – Energy source, electromagnetic spectrum, radiation principle, platforms and sensors - Active and passive remote sensing interference - Atmospheric effects on remote sensing – Energy interaction with earth surface feature - Data acquisition - Reflectance, spectral signatures for water, soil and vegetation.- Satellites - Types - Sun synchronous - Geo synchronous remote sensing satellites - LANDSAT,SPOT & IRS - Resolution - Spectral, spatial, radiometric and Temporal resolution -Recent satellites with its applications	7	
II	**DATA PRODUCTS AND IMAGE ANALYSIS** Data products –based on level of processing- o/p – scale – area/coverage – data availability –data ordering- data price - Image interpretation – Visual interpretation elements – interpretation key. Digital image processing – Image enhancement – image classification – Supervised and unsupervised – Vegetation Indices.	8	
III	**CONCEPTS OF GIS**	9	

	Definition – Map and their influences – Characteristics of Maps – Elements – Map scale, Projection, Coordinate systems – Sources of spatial data – History and development of GIS – Definition – Components – Hardware and Software.		
IV	**DATA INPUT AND ANALYSIS** Data – Spatial, Non-Spatial – Database models – Hierarchical network, Relational and Object Oriented Data Models – Raster and Vector – Methods of Data input – Data Editing – Files and formats – Data structure – Data compression. Introduction to analysis – Measurements – Queries – Reclassification – Simple spatial analysis – Buffering – Neighboring functions – Map overlay – Vector and raster – Spatial interpolation – Modelling in GIS – Digital Elevation Modelling – Expert systems	8	
V	**APPLICATION OF RS AND GIS** Crop Acreage estimation - Estimation of Crop Water Requirement – Crop condition - Soil mapping– classification of soil with digital numbers – soil erosion mapping- reservoir sedimentation using image processing - Inventory of water resources – water quality assessment - Application of Remote Sensing and GIS in Precision Agriculture - Monitor Crop Health - Management Decision Support Systems	8	
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1.

Text Book-

1. Anji Reddy. M, Remote Sensing and Geographical Information Systems, BS Publications, Hyderbad, 2001
2. Lillesand, T. M., and Kiefer, R.W., Remote Sensing and Image Interpretation, John Wiley and Sons, New York, 2000.

Reference Books-

1. Bettinger, P., and Michael, G.W., "Geographical Information System: Applications in Forestry and Natural Resources Management," Tata McGraw–Hill Higher Education, New Delhi, 2003
2. Ian Heywood., "An Introduction to GIS", Pearson Education, New Delhi, 2001.
3. Jeffery Star and John Estes, "Geographical Information System – An Introduction," Prentice Hall India Pvt. Ltd., New Delhi, 1998.
4. Patel A.N & Surendra Singh, "Remote sensing principles & applications", Scientific Publishers , Jodhpur 1992

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		VIII/IV	Program		B.Tech
Subject Category	DE-Vi	Subject Code:	AE-704 (A)	Subject Name:	Watershed Management

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work		L	T	P	
60	20	10	10			100	3	-	-	3

Prerequisites:

Course Objective:

1. To provide the technical know-how of analyzing the degradation of soil and water resources and implementation of the measures for soil and water conservation.
2. To provide a comprehensive treatise on the engineering practices of watershed management for realizing the higher benefits of watershed management.

Course Outcomes:

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

The students will have a thorough knowledge on watershed planning, development and management strategies through different soil and water conservation approaches.

UNITs	Descriptions	Hrs.	CO's
I	INTRODUCTION Watershed – Definition - concept - Objectives – Land capability classification - priority watersheds - land resource regions in India	7	
II	WATERSHED PLANNING Planning principles – collection of data – present land use - Preparation of watershed development plan - Estimation of costs and benefits - Financial plan – selection of implementation agency Monitoring and evaluation system	8	
III	WATERSHED MANAGEMENT Participatory watershed Management - run off management - Factors affecting runoff - Temporary & Permanent gully control measures - Water conservation practices in irrigated lands - Soil and moisture conservation practices in dry lands	9	
IV	WATER CONSERVATION PRACTICES In-situ & Ex-situ moisture conservation principle and practices - Afforestation principle - Micro catchment water harvesting - Ground water recharge – percolation ponds -Water harvesting Farm pond - Supplemental irrigation - Evaporation suppression - Seepage reduction	8	
V	WATERSHED DEVELOPMENT PROGRAMME River Valley Project (RVP) - Hill Area Development Programme	8	

	(HADP) - National Watershed Development Programme for Rainfed Agriculture (NWDPRA) - Other similar projects operated in India – Govt. of India guidelines on watershed development programme - Watershed based rural development – infrastructure development - Use of Aerial photography and Remote sensing in watershed management- Role of NGOs in watershed development		
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1.

Text Book-

1. Suresh, R. 2005. Soil and Water Conservation Engineering, Standard Publishers & Distributors, New Delhi.
2. Ghanashyam Das, "Hydrology and Soil Conservation Engineering", Prentice Hall of India Private Limited, New Delhi

Reference Books-

1. Gurmel Singh et al. 2004. Manual of soil and water conservation practices. Oxford & IBH publishing Co. New Delhi.
2. Suresh, R. 2008. Land and water management principles, Standard Publishers & Distributors, New Delhi.
3. Tripathi R.P. and H.P.Singh 2002, Soil erosion and conservation, Willey Eastern Ltd., New Delhi
4. Murthy, V.V.N. 2005, Land and water management, Kalyani publishing, New Delhi.
5. Tideman, E.M., "Watershed Management", Omega Scientific Publishers, New Delhi, 1996.

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	

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

Semester/Year		VII/IV	Program		B.Tech
Subject Category	DE-VI	Subject Code:	AE-704(B)	Subject Name:	**Special Farm Equipment**

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work					
60	20	10	10	-	-	100	3	-	-	3

Prerequisites:

Course Objective:

To study the special machineries used for agricultural applications

Course Outcomes:

1. Know about the farm machineries used in agricultural production
2. Know about construction, operation of different machines
3. Know about the operating parameters and performance of the machines

UNITs	Descriptions	Hrs.	CO's
I	**MOWERS AND WEEDING EQUIPMENT** Weeding and intercultural equipment. Junior hoe, guntaka, blade harrow, rotary weeders for upland and low land, selection, constructional features and adjustments, Spading machine, coir pith applicators, Mower mechanism, lawn mowers.	8	CO1
II	**SPRAYERS AND DUSTERS** Sprayers – Sprayer operation, boom sprayer, precaution, coverage, factors affecting drift. Rotating disc sprayers, Controlled Droplet Application (CDA), Electrostatic sprayers, Areal spraying, Air assist sprayers, orchard sprayers. Dusters - types - mist blower cum duster other plant protection devices, care and maintenance.	8	CO1, CO2, CO3
III	**REAPERS AND HARVESTERS** Construction and adjustments - registration and alignment. Windrowers, reapers, reaper binders and forage harvesters. Diggers for potato, groundnut and other tubers. Sugarcane harvesters - cotton pickers - corn harvesters - fruit crop harvesters – vegetable harvesters	8	CO1, CO2, CO3
IV	**THRESHERS AND OTHER MACHINERIES** Thresher – construction and working of multi crop thresher. Forest machinery - shrub cutters, tree cutting machines. post hole diggers, Chaff cutter, flail mowers, lawn mowers, tree pruners	8	CO1, CO2, CO3
V	**SPECIALIZED FARM EQUIPMENT** Pneumatic planters, air seeders, improved ploughs, reversible ploughs, suction traps, seed and fertilizer broadcasting devices, manure spreaders, sweep weeders, direct paddy seeders, direct paddy	8	CO1, CO2, CO3

	cum daincha seeder, coconut tree climbing devices, tractor operated hoist, tractor operated rhizome planter, Transplanters and Balers		
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Study of sprayers and dusters, measurement of nozzle discharge, field capacity etc.
2. Familiarization with various Farm machines related to harvesting, threshing, root harvesting, combine etc.
3. Study of various types of mowers, constructional details, materials and working.
4. Study of various types of reaper and reaper binder, constructional details, materials and working & performance.
5. Study of various types of threshers, constructional details, materials and working & performance.
6. Study of various types of harvester tools, constructional details, materials and working.
7. Study of various types of combine harvester, constructional details, materials and working.

Text Book-

1. Jagdishwar Sahay. 2010. Elements of Agricultural Engineering. Standard Publishers Distributors, Delhi
2. Michael and Ojha. 2005. Principles of Agricultural Engineering. Jain brothers, New Delhi.

Reference Books-

1. Kepner, R.A., et al. 1997. Principles of farm machinery. CBS Publishers and Distributers, Delhi.
2. Harris Pearson Smith et al. 1996. Farm machinery and equipments. Tata McGraw-Hill pub., New Delhi.
3. Srivastava, A.C. 1990. Elements of Farm Machinery. Oxford and 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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