



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

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	DE-IV	Subject Code:	AG-1871 (A)	Subject Name:	Food & Dairy Engineering				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory		Practical		Total Marks	L	T	P		
End Sem	Mid-Sem	Quiz	End Sem		Lab-Work				
70	20	10			3	1	-	4	
Prerequisites:									
Course Objective:									
<ol style="list-style-type: none"> 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									
<ol style="list-style-type: none"> 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						9	CO1	

	- cooking, blanching, sterilization, pasteurization, canning - Interaction of heat energy on food components, reaction kinetics, Arrhenius equation, 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 AND QUALITY 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-			
<ol style="list-style-type: none"> Chandra Gopala Rao. Essentials of Food Process Engineering. B.S. Publications, Hyderabad, 2006. Walstra. P., Jan T. M. Wouters., Tom J. Geurts “Dairy Science and Technology”, CRC press, 2005. Ananthakrishnan, C.P., and Sinha, N.N., “Technology and Engineering of Dairy Plant Operations, Laxmi Publications, New Delhi, 1999. 			
Reference Books-			
<ol style="list-style-type: none"> Subbulakshmi.G., and Shobha A. Udipi, Food Processing and Preservation, New Age International Publications, New Delhi, 2007. Toledo, R.T., “Fundamentals of Food Process Engineering”, CBS Publishers and Distribution, New Delhi, 1997. Tufail Ahmed., “Dairy Plant Engineering and Management”, Kitab Mahal Publishers, Allahabad, 1997. Dairy Science and Technology Handbook, Volumes 1-3, John Wiley & Sons, 1993. 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	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	



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

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech					
Subject Category	DE-IV	Subject Code:	AG-1871 (B)	Subject Name:	Food Quality And Control					
Maximum Marks Allotted						Contact Hours			Total Credits	
Theory			Practical		Total Marks	L	T	P		
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		100	3	1	-	4
70	20	10								
Prerequisites:										
Course Objective:										
Course Outcomes:										
After completion of the course, the student will be able to:										
<ol style="list-style-type: none"> CO1: Explain the application of food quality and food safety system CO2: Identify the hazard of the food chain to ensure food safety CO3: Examine the chemical and microbiological quality of food samples CO4: Detect the adulteration in food samples CO5: Review of legislative approaches for the management of food safety 										
UNITs	Descriptions						Hrs.	CO's		
I	Basics of Food Science and Food Analysis, Concept, objectives and need of food quality. Measurement of colour, flavour, consistency, viscosity, texture and their relationship with food quality and composition.						7	CO1		
II	Sampling; purpose, sampling techniques, sampling procedures for liquid, powdered and granular materials, Quality control, Quality control tools, Statistical quality control, Sensory evaluation methods						8	CO2,CO3		
III	Panel selection methods, Interpretation of sensory results. Instrumental method for testing quality. Food adulteration and food safety. TQM and TQC, consumer preferences and acceptance						9	CO4		
IV	Food Safety Management Systems GAP, GHP, GMP, Hazards and HACCP (Hazard analysis and critical control point), Sanitation in food industry (SSOP)						8	CO4		
V	Food Laws and Regulations in India, FSSAI, Food grades and standards BIS, AGMARK, PFA, FPO, ISO 9000, 22000 Series. CAC (Codex Alimentarius Commission), Traceability and Quality Assurance system in a process plant, Bio safety and Bioterrorism.						8	CO5		
Guest Lectures (if any)										
Total Hours						40				
Suggestive list of experiments:										
Text Book-										
Reference Books-										

1. Ranganna S. Hand book of Analysis and Quality Control for Fruit and Vegetable Products. Srilakshmi B, Food Science.
2. Sharma Avanthi. A text book of Food Science and Technology.
3. Mudambi Sumati R, Rao Shalini M and Rajagopal M.V. Food Science. Potter NN and Hotchkiss JH, Food Science.
4. Dev Raj, Rakesh Sharma and Joshi V.K, Quality for Value Addition in Food Processing.
5. The Food Safety and Standards Act along with Rules & Regulations. Commercial Law Publishers (India) Pvt. Ltd.

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

(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	DE-IV	Subject Code:	AG-1871(C)	Subject Name:	Agricultural Waste Management				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10			100	3	1	-	4
Prerequisites:									
Course Objective:									
To impart knowledge to students on various methods of agricultural waste management for eco-friendly energy and manure production.									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Various eco-friendly methods for agricultural waste management. 2. Nutritive value and energy production potential of agro wastes. 									
UNITs	Descriptions					Hrs.	CO's		
I	INTRODUCTION Availability of different types of agriculture wastes - its overall characteristics – classification of agro wastes based on their characteristics- its recycling and utilization potential- current constraints in collection and handling of agricultural wastes – its environmental impact.					7	CO1		
II	COMPOSTING Definition- Solid waste suitable for composting – Methods of composting - vermicomposting - Mineralization process in composting - Biochemistry of composting – Factors involved –Infrastructure required – maturity parameters – value addition – application methods					8	CO1		
III	BIOMASS BRIQUETTING Definition – potential agro residues and their characteristics for briquetting – fundamental aspects and technologies involved in briquetting – economic analysis of briquetting – setting up of briquetting plant- appliances for biomass briquettes.					9	CO1,CO2		
IV	BIOCHAR PRODUCTION Definition - characteristics of agro wastes suitable for Biochar production – Methods of Biochar production – fast and slow pyrolysis – characteristics of Biochar – role of Biochar in soil nutrition and carbon sequestration.					8	CO1,CO2		
V	BIOGAS AND BIO ETHANOL PRODUCTION Screening of suitable ligno cellulosic substrate for biogas					8	CO1,CO2		

	<p>production -determination of bio-energy potential of agro-waste by estimating total solids - volatile solids - Calorific value- per cent total carbohydrates, moisture, lignin and cellulosic contents – preparation of feed stocks for anaerobic bio- digestion – types of digesters – factors affecting - nutrient value and utilization of biogas slurry. Ethanol production from lingo cellulosic wastes - Processing of Biomass to Ethanol –pretreatment-fermentation-distillation.</p>		
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
<p>Text Book & Reference Books-</p> <ol style="list-style-type: none"> 1. Raymond C Loehr, “Agricultural Waste Management- problems, processes and approaches”. First edition, Academic press, 1974. 2. Diaz,I.F.,M. de Bertoldi and W. Bidlingmaier. 2007. Compost science and technology, Elsevier pub., PP.1-380. 3. Uta Krogmann, Ina Körne and Luis F. Diaz.2010. Solid waste technology and management (Vol 1 and2). Blackwel Pub Ltd., Wiley Online library. 4. Yong Sik Ok, Sophie M. Uchimiya, Scott X. Chang, Nanthi Bolan., ” Biochar- production characterization and applications”. 2015. CRC press 			
Modes of Evaluation and Rubric			
<p>Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.</p>			
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
(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	DE-V	Subject Code:	AG-1872(A)	Subject Name:	Drainage Engineering				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		100	3	1	-
70	20	10							
Prerequisites:									
Course Objective:									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Understand drainage problems in agricultural lands. 2. Understand usefulness and design considerations under steady and non-steady state drainage. 3. Acquire information on different drainage systems components and structures. 4. Reclamation of problematic soil by drainage 									
UNITs	Descriptions					Hrs.	CO's		
I	Introduction of Drainage, objectives of drainage, drainage problems, Surface drainage, drainage coefficient, types of surface drainage, design of open channel					7	CO1,CO3		
II	Sub-surface drainage purpose and benefits, investigations of design parameters, hydraulic conductivity, drainable porosity, water table, types and use of subsurface drainage system, Design of surface drains.					8	CO2		
III	Derivation of ellipse (Hooghoudt's) and Ernst's drain spacing equations, Design of subsurface drainage system. Drainage materials, drainage pipes, drain envelope					9	CO2,		
IV	Layout, construction and installation of drains, Drainage structures, Vertical drainage, Biodrainage, Tile Drains, interceptor and relief drains.					8	CO3		
V	Drainage of irrigated and humid areas, Salt balance, reclamation of saline and alkaline soils. Leaching requirements, conjunctive use of fresh and saline waters, Economic aspects of drainage					8	CO4		
Guest Lectures (if any)									
Total Hours						40			
Suggestive list of experiments:									
<ol style="list-style-type: none"> 1. In-situ measurement of hydraulic conductivity; 2. Determination of drainage coefficients; 3. Preparation of isobaths and isobar maps; 4. Measurement of hydraulic conductivity and drainable porosity; 5. Design of surface drainage and subsurface drainage systems; 									

6. Fabrication of drainage tiles;
7. Installation of subsurface drainage system;
8. Cost analysis of surface and sub-surface drainage system.

Text Book-

Reference Books-

1. Land and water management: Principles and Practices, By: V.V.N. Murthy
2. Horizontal Drainage System design, By: Dr. Cheddi Lal
3. Principles of Agricultural Engineering Vol-II, By: A.M. Michael & T.P. Ojha
4. Agriculture drainage, By: Dr. A.K. Bhattacharya

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
(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	DE-V	Subject Code:	AG-1872 (B)	Subject Name:	Agricultural Business Management				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	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 capital- Budget analysis. Concepts and determinants- Business						8		

	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:			
6.			
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
 (Engineering College), VIDISHA M.P.
 (An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech					
Subject Category	DE-V	Subject Code:	AG-1872 (C)	Subject Name:	Micro irrigation system design					
Maximum Marks Allotted						Contact Hours			Total Credits	
Theory			Practical		Total Marks			L		T
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					100	
70	20	10								
Prerequisites:										
Course Objective:										
1. To introduce the concept of micro-irrigation and design a Sprinkler & Drip irrigation system										
Course Outcomes:										
After completion of the course, the student will be able to:										
1. To expose the students to the fundamental knowledge in Pumps for Irrigation use.										
2. The students will have a thorough knowledge on micro irrigation, its concepts and design of a sprinkler and drip system										
UNITs	Descriptions						Hrs.	CO's		
I	WATER LIFTS AND PUMPS Pump classification Variable displacement pumps–Centrifugal pump- Submersible pump- Vertical Turbine pumps mixed flow – Jet and Airlift pumps-Pump selection and installation- Pump troubles and Remedies.						7	CO1		
II	PUMP VALVES Types of valves- Pressure relief valve- Gate valve-Isolated valve- Non return valve- Butterfly valveSolenoid valves- Automated control valve- selection, repair and maintenance.						8	CO1		
III	MICRO IRRIGATION CONCEPT AND APPLICATIONS Micro irrigation- Comparison between Traditional and Micro irrigation methods -Merits and demerits of micro-irrigation system, Types and components of micro irrigation system- Scope and potential problem of micro irrigation - Low cost Micro irrigation Technologies- Gravity fed micro irrigation - Care and maintenance of micro-irrigation System- Economics of micro-irrigation system - Automation in micro-irrigation- Surge and cablegation irrigation- Greenhouse irrigation system.						9	CO2		
IV	DRIP IRRIGATION DESIGN Drip irrigation - Components- Dripper- types and equations governing flow through drippersWetting pattern- Chemigation application- Pump capacity-Installation- Operation and maintenance of Drip irrigation system. - Design of surface and						8	CO2		

	sub-surface drip irrigation		
V	SPRINKLER IRRIGATION DESIGN Sprinkler irrigation- Components and accessories - Hydraulic design - Sprinkler selection and spacing- Capacity of sprinkler system - types - Sprinkler performance- Sprinkler discharge- Water distribution pattern- Droplet size, filtering unit, fertigation - System maintenance	8	CO2
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
1.			
Text Book-			
1. Suresh, R., "Principles of Micro-Irrigation Engineering", Standard Publishers Distributors, New Delhi, 2010			
2. Michael, A.M., "Irrigation Theory and Practice", Vikas Publishers, New Delhi, 2002			
Reference Books-			
1. Modi, P.N., and Seth, S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 1991.			
2. Jack Keller and Rond Belisher., "Sprinkler and Trickle Irrigation", Vannistr and Reinhold, New York, 1990.			
3. Sivanappan R.K., "Sprinkler Irrigation", Oxford and IBH Publishing Co., New Delhi, 1987.			
4. Keller.J and D. Karmeli, "Trickle Irrigation Design", Rainbird Sprinkler Irrigation Manufacturing Corporation, Glendora, California, USA			
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

(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech					
Subject Category	DE-VI	Subject Code:	AG-1873 (B)	Subject Name:	Process Equipment Design					
Maximum Marks Allotted						Contact Hours			Total Credits	
Theory			Practical		Total Marks	L	T	P		
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					3	-
70	20	10			100					
Prerequisites:										
Course Objective:										
To impart knowledge and skill to the students on design of different process equipment										
Course Outcomes:										
After completion of the course, the student will be able to:										
<ol style="list-style-type: none"> 1. Know the basics of design parameters and procedure 2. Understand the theory and principles for design of different process equipment 3. Develop the skill of designing different process equipment 4. Solve design problems 										
UNITs	Descriptions						Hrs.	CO's		
I	Introduction Design consideration and their interaction with material selection, equipment size and structural design, design codes, energy balance calculations for preliminary estimation of plant capacity and equipment size. Materials of Construction Metallic and non-metallic materials used in construction of food processing equipment, welding and machining of stainless steel.						7	CO1,CO2		
II	Storage and Pressure Vessels Design of shell, shell covers and other components; design of vessel for drum drying storage of liquid foods and food grains, etc.						8	CO1		
III	Materials Handling Solid conveying equipment - belt, screw, bucket and chain conveyors, pneumatic conveyors; conveying of fluids -Design of pipe and piping systems for Newtonian and non-Newtonian fluids: Sanitary pipe fitting and valves, design of CIP system.						9	CO3,CO4		
IV	Design of Heat Exchangers Plate, shell and tube, scraped surface heat exchangers used in heating and cooling of liquid foods.						8	CO3		
V	Grain Processing Equipment Cleaners, graders and other sorting equipment used in grain processing.						8	CO2		

Guest Lectures (if any)		
Total Hours	40	
Suggestive list of experiments:		
1.		
Text Book-		
1.		
Reference Books-		
Suggested Text Books and References		
<ol style="list-style-type: none"> 1. Joshi, M.V., "Process Equipment Design", 2nd Edition, MacMillan India, Limited, Delhi, 1981 2. Bhattacharjee, B.C. "Chemical Equipment Design", 1990 3. Kessler, H.G. "Food Engineering and Dairy Technology", V.A. Kessler, Freising. Germany, 1981 4. Geankokplis, C.J. "Transport Processes and Unit Operation" 3rd Ed. Prentice Hall India New Delhi, 1993 5. Brosnel and Young, "Process Equipment Design", John Wiley Inc. 1975 6. Kern, D.Q. "Process Heat Transfer". McGraw Hill 1990. 7. Spivakovsky, A. and Dyachkov, V., "Conveyors and related equipment", Trans. by Don Danemanis, Peace Publishers, Moscow. 		
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
(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	DE-VI	Subject Code:	AG-1873 (C)	Subject Name:	PROTECTED CULTIVATION				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10			100	3	-	-	3
Prerequisites:									
Course Objective:									
<ol style="list-style-type: none"> To impart knowledge on the protected cultivation of vegetables, fruits and flower crops. To sensitize the students on hi-tech production technology of fruits, vegetables and flower crops. 									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> The students will be able to appreciate the different methods of protected cultivation practices available for vegetable crops and flowers A clear understanding of precision farming techniques and its application to horticultural crops is possible 									
UNITs	Descriptions					Hrs.	CO's		
I	PROTECTED CULTIVATION AND ITS TYPES Importance and methods of protected culture in horticultural crops - Importance and scope of protected cultivation – different growing structures of protected culture viz., green house, poly house, net house, poly tunnels, screen house, protected nursery house - study of environmental factors influencing green house production – cladding / glazing / covering material – ventilation systems – cultivation systems including nutrient film technique / hydroponics / aeroponic culture – growing media and nutrients – canopy management – micro irrigation and fertigation systems					7	CO1		
II	PROTECTED CULTIVATION OF VEGETABLE CROPS Protected cultivation technology for vegetable crops - Hi-tech protected cultivation techniques for tomato, capsicum nursery, cucumber, gherkins strawberry and melons – integrated pest and disease management –post harvest handling.					8	CO1		
III	PROTECTED CULTIVATION OF FLOWER CROPS Protected cultivation technology for flower crops - Hi-tech protected cultivation of cut roses, cut chrysanthemum,					9	CO1		

	carnation, gerbera, asiatic lilies, anthurium, orchids, cut foliages and fillers – integrated pest and disease management – postharvest handling.		
IV	PRECISION FARMING TECHNIQUES Concept and introduction of precision farming – Importance, definition, principles and concepts – Role of GIS and GPS - Mobile mapping system and its application in precision farming – design, layout and installation of drip and fertigation – georeferencing and photometric correction – Sensors for information gathering – UAV - geostatistics – robotics in horticulture - postharvest process management (PPM) – remote sensing	8	CO2
V	PRECISION FARMING OF HORTICULTURAL CROPS Precision farming techniques for horticultural crops - Precision farming techniques for tomato, chilli, bhendi, bitter gourd, bottle gourd, cauliflower, cabbage, grapes, banana, rose, jasmine, chrysanthemum, marigold, tuberose, china aster, turmeric, coriander, coleus and gloriosa	8	CO2
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
2.			
Text Book-			
<ol style="list-style-type: none"> 1. Joe.J.Hanan. 1998. Green houses: Advanced Technology for Protected Horticulture, CRC Press, LLC. Florida. 2. Paul V. Nelson. 1991. Green house operation and management. Ball publishing USA. 			
Reference Books-			
<ol style="list-style-type: none"> 1. Lyn. Malone, Anita M. Palmer, Christine L. Vioghat Jach Dangeermond. 2002. Mapping out world: GIS lessons for Education. ESRI press. 2. David Reed. 1996. Water, media and nutrition for green house crops. Ball publishing USA. 3. Adams, C.R. K.M. Bandford and M.P. Early. 1996. Principles of Horticulture. CBS publishers and distributors. Darya ganj, 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			
Recommendation by Board of studies on			
Approval by Academic council on			

Compiled and designed by	
Subject handled by department	



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	OC-III	Subject Code:	AG-1874(A)	Subject Name:	Building Material & Structure Design				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					
70	20	10			100	3	-	-	3
Prerequisites:									
Course Objective:									
To make students familiar with different building materials, construction methods, estimation of farm buildings and related structures									
Course Outcomes:									
After completion of the course, the student will be able to:									
<ol style="list-style-type: none"> 1. Understand the importance of various building materials for construction work 2. Know about various components of a building with items of work 3. Know about methods of construction of agricultural buildings, sloped and flat roofed Buildings 4. Know about preparation of various types of estimates of buildings 									
UNITs	Descriptions					Hrs.	CO's		
I	Stones and bricks Classification of rocks - Characteristics of Stones -Testing of Stones-Manufacture of Bricks -Moulding - Drying and Burning of bricks-Properties of good Brick -Classification of bricks - Clay Products-Ceramics - Tiles - Earthenware and Stoneware and uses						CO1,CO2		
II	Lime and cement Lime- Natural Sources -Types of lime – Calcination-Cement - Raw materials – Water Cement Ratio- Manufacture of Portland Cement Wet and Dry process-Standard Specifications- Storage of cement-Timber – Definition - Defects in timber-Qualities of good timber						CO1,CO2		
III	Brick and stone masonry Concept of Foundation -Factors affecting Selection of Foundations -Types of soils-Subsurface Investigations -Bearing Capacity of soil -Testing &Improving Bearing Capacity of soil-Types of Foundations-Piles -Foundation in Black Cotton soil-Site Selection - Design of Foundation - General principles - precautions in brick masonry -Stone Masonry -Comparison between Brick and Stone Masonry -Classification -General Principles and Precautions in Stone Masonry –Specification						CO1,CO2		
IV	Building construction						CO3		

	Walls -Classification of walls - Dampness -Causes of Dampness -Methods of Preventing Dampness –Damp Proofing materials - Methods of providing Damp Proofing Materials- Mortars -Functions and Types of mortars - Preparation and Strength-Concrete -Characteristics -Types and uses- Measurement of Ingredients -their requirements and functions - Cube Strength of Concrete-Roofs -Classification - Floors – Types of Floor-Types of Plastering and Pointing –Painting and Distempering		
V	Estimating and costing PWD schedule of rates – data sheet – detailed estimate – abstract estimate - preparation of estimate.		CO4
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
.			
Text Book-			
<ol style="list-style-type: none"> 1. Deodhar, S.V. and Singhal, 2001. Civil engineering materials. Khanna publishers, 2B, Nath market, Naisark, Delhi -6. 2. Rangwala. S.C., 2000. Building construction. Charotar publishing house, Anand. 			
Reference Books-			
<ol style="list-style-type: none"> 1. Deodhar, S.V. and Singhal, 2001. Civil engineering materials. Khanna publishers, 2B, Nath Market, Naisark, Delhi -6. 2. Handoo, B.L. and Mahajan,V.M., 1995. Civil engineering materials. Sathyaprakasam, 16/7698, New market, New Rohtak road, New Delhi-5. 3. Arora, N.L. and Gupta, B.R., 1995. Building construction. Sathyaprakasham, 16/7698, New market, New Rohtak road, New Delhi -5. 4. Rangwala. S.C., 1991. Estimating and costing. Charotar book stall, station road, Anand. 			
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
 (Engineering College), VIDISHA M.P.
 (An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	OC-III	Subject Code:	AG-1874 (B)	Subject Name:	Human factors-engineering				
Maximum Marks Allotted									
Theory			Practical		Total Marks	Contact Hours			Total Credits
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:									
UNITs	Descriptions					Hrs.	CO's		
I	Introduction Importance of ergonomics and its application agriculture; Human biological: digestion and absorption of foodstuffs, liberation' and transfer of energy. Physiological stress Indices and their Methods of Measurement Concept of indirect calorimetry; physiological responses and techniques of their measurements; Energetic efficiency of muscular work					7			
II	Anthropometry and Bio-Mechanics Structural and functional body dimensions; Instrumentation and their methods of measurement; Analysis and application of anthropometric data. Visibility/Readability of Dials , Visual displays; Process of Seeing; Horizontal and Vertical fields of vision; colour discrimination; Quantitative and qualitative visual displays, signals and warning lights.					8			
III	Design of controls and Work Space Envelope Functions of controls; Identification. of controls; Design aspects of hand and foot controls mainly. Steering, clutch, accelerator, brake and pedal design on tractors; Arrangements of controls, work-space envelopes; Analysis and design of Job requirements. Energy Cost of Various Activities. Work physiology in agriculture; Scaling of physiological work.					9			

	Fatigue allowance and indices, shift work, work-rest scheduling.		
IV	<p>Physiological Factors Affecting Operator – Machine Performance</p> <p>Limitations of human in relation to stresses and demands of working environments; environments; Thermal: Heat exchange process and coefficients, physiological mechanics of heat regulation, management of temperature problems, work load and allowance in hot environment. Mechanical: Noise and loss of hearing, physiological effects acceptable ;limits, handling of noise problems, ear protection devices, Vibration sources of vibration, effects on physiological responses control of vibration on agricultural equipment. Illumination: Nature and measurement of light, colour systems, amount of illumination, roadway features influencing visibility, vehicle lights.</p>	8	
V	<p>Postural comfort and Operator Safety</p> <p>Problems-of posture and comfort; science of seating cushion functional requirements, static and dynamic compatibility of operator-seat-machine; Engineering principles applied to industrial and agricultural safety. Road. accidents, road signs and accident prevention; Safety symbols and signs, hand signals, colour codes for agricultural equipment.</p>	8	
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
2.			
Suggested Text Books and References			
<ol style="list-style-type: none"> 1. Sanders, M.S. and McComack. EJ. "Human Factors in Engineering and Design". Tata McGraw Hill, New York, 1992. 2. Obome. David, J. "Engineering at Work". John Wiley and Sons Ltd., 1982. 3. Astand, P.P. and Rodaid K . "Text Book of Work Physiology". McGraw Hill Book Company, New York, 1970. 4. Grandjean, E. "Fitting the Tack of the Man". Taylor and France Ltd., U.K. 1981. 			
Modes of Evaluation and Rubric			
<p>Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.</p>			
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
 (Engineering College), VIDISHA M.P.
 (An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VI/III	Program		B.Tech				
Subject Category	OC-III	Subject Code:	AG-1874 (C)	Subject Name:	Applied Electronics and Instrumentation				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					150
70	20	10	30	20	3				
Prerequisites:									
Course Objective:									
Course Outcomes:									
After completion of the course, the student will be able to:									
UNITS	Descriptions						Hrs.	CO's	
I	Basic Electronics Circuits Passive devices – Semiconductor devices – Transistors – Diode circuits – Amplifier circuits – Oscillator circuits – Thyristor circuits								
II	Integrated and Digital circuits Integrated circuits and operational Amplifier – Logic gates – Flip Flop – Counters – Digital to Analog – Analog to Digital converters – Microprocessor introduction.								
III	Basic concepts of measurement General measurement systems – Static & Dynamic characteristics of instruments – Transducer elements – Basic input circuits								
IV	Instrumentation for measurement of physical parameters Transducer for motion measurement – Force measurement – Torque and power measurement – Pressure and temperature measurement –Flow measurements – pH, Humidity, speed measurement using Photo electric & reluctance principles								
V	Principles of process control and microprocessor based instrumentation Automatic process control system and controllers – programmable logic controllers – introduction – computerized data acquisition system								
Guest Lectures (if any)									
Total Hours						40			
Suggestive list of experiments:									
1. Experiment on elementary analog and digital circuits. 2. Experiment on use of transducers and circuits for measurement of motion,									

pressure, temperature, humidity, speed and pH 3. Calibration of various instruments 4. Study of microprocessor and PLC based systems and their use for control applications 5. Data acquisition and control using computers.	
Text Book- 1. Principles of Electronics – V.K. Mehta - S.Chand. 2. Applied Electronics – R. S. Sendha, S.Chand. 3. Basic Electronics – B. L. Thareja, S.Chand.	
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	
Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	



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

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VIII/IV	Program		B.Tech				
Subject Category	OC-IV	Subject Code:	AG-1875 (B)	Subject Name:	Watershed Management				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory		Practical		Total Marks	L	T	P		
End Sem	Mid-Sem	Quiz	End Sem		Lab-Work	3	-	-	
70	20	10			100			3	
Prerequisites:									
Course Objective:									
<ol style="list-style-type: none"> 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. To provide a comprehensive treatise on the engineering practices of watershed management for realizing the higher benefits of watershed management. 									
Course Outcomes:									
<p>After completion of the course, the student will be able to:</p> <p>The students will have a thorough knowledge on watershed planning, development and management strategies through different soil and water conservation approaches.</p>									
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 (HADP) - National Watershed Development Programme for Rainfed Agriculture (NWDPA) - 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	8	
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			



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

(An Autonomous Institute Affiliated to RGPV Bhopal)

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

Semester/Year		VII/IV	Program		B.Tech				
Subject Category	OC-IV	Subject Code:	AG-1875 (C)	Subject Name:	Soil and Water Conservation Structures				
Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work					3
70	20	10			100				3
Prerequisites:									
Course Objective:									
Course Outcomes:									
After completion of the course, the student will be able to:									
UNITs	Descriptions						Hrs.	CO's	
I	Introduction; classification of structures, functional requirements of soil erosion control structures; flow in open channels-types of flow, state of flow, regimes of flow, energy and momentum principles, specific energy and specific force;						7		
II	Hydraulic jump and its application, type of hydraulic jump, energy dissipation due to jump, jump efficiency, relative loss of energy; runoff measuring structures-parshall flume, H - flume and weirs; straight drop spillway - general description, functional use, advantages and disadvantages, structural parts and functions; components of spillway,						8		
III	Hydrologic and hydraulic design, free board and wave free board, aeration of weirs, concept of free and submerged flow, structural design of a drop spillway-loads on headwall, variables affecting equivalent fluid pressure, determination of saturation line for different flow conditions,						9		
IV	Seepage under the structure, equivalent fluid pressure of triangular load diagram for various flow conditions, creep line theory, uplift pressure estimation, safety against sliding, overturning, crushing and tension; chute spillway general description and its components, hydraulic design, energy dissipaters,						8		
V	Design criteria of a SAF stilling basin and its limitations, drop inlet spillway- general description, functional use, design criteria; design of diversions; small earth embankments-their						8		

	types and design principles, farm ponds and reservoirs, cost estimation of structures.		
Guest Lectures (if any)			
Total Hours		40	
Suggestive list of experiments:			
Text Book-			
Reference Books-			
1. Land and water management; Principles and Practices, By: V.V.N. Murthy			
2. Soil and water Conservation Engineering, By: R. Suresh			
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			