

PROPOSED CURRICULUM STRUCTURE FOR THE SEMESTER 6 of DIPLOMA IN ARRIGULTURAL ENGINERING

SL No	SUBJECT	Subject code	Question code	Packet code	contact period per week		Examination Pattern					Full Marks For			FULL MARKS	Credits	Page No.		
					lecture	sessional	Internal assessment(for theoretical sub		External assessment (for theoretical sub)			Theoretical subject	Sessional subjects						
							Mid Semester Exam(CT)	TA	Total internal	obj	Subj		Marks allotted For ESE	TW				PR	Total
THEORITICAL																			
1	Handling, Packaging and Storage of Agricultural Products				2	--	10	5	15	10	25	35	50	--	--	--	50	2	
2	Renewable Energy Sources				2	--	10	5	15	10	25	35	50	--	--	--	50	2	
3	Farm Machinery & Equipments				4	--	20	10	30	20	50	70	100	--	--	--	100	3	
4	Water shed and hydrology				2	--	10	5	15	10	25	35	50	--	--	--	50	2	
5	Elective - II				4	--	20	10	30	20	10	70	100	--	--	--	100	3	
SESSIONAL																			
6	Handling, packaging & storage Lab.				--	3	--	--	--	--	--	--	--	25	25	50	50	2	
7	Renewable Energy Sources Lab.				--	3	--	--	--	--	--	--	--	25	25	50	50	2	
8	Farm Machinery & Equipment Lab.				--	3	--	--	--	--	--	--	--	25	25	50	50	2	
9	Project work				--	6	--	--	--	--	--	--	--	50	50	100	100	1	
10	Seminar on Project				--	3	--	--	--	--	--	--	--	25	25	50	50	1	
11	Comprehensive Viva				--	--	--	--	--	--	--	--	--	50	50	100	100	1	
TOTAL					14	18	70	35	105	70	135	245	350	200	200	400	750	21	

Student contact hour per week is 31 hour.

Theory and Practical classes will be of 1(one) hour duration.

List of abbreviation used: CT – class test; TA - Teacher's Assessment (Attendance & surprise quizzes = 6 marks ; Assignment & group discussion = 4 marks.)

Obj: objective Subj - Subjective Minimum passing marks for Theoretical and Sessional subjects will be 40%

All other rules and regulations for assessment of practical and term work will be carried out as per prevailing norms

NO QUESTION SHOULD START WITH "WHY" OR ASKS FOR " GIVING OR CITING REASONS"

TW – Term work (to be evaluated by a board of departmental teachers) PR- Practical (to be evaluated by external teachers)

1 HANDLING, PACKAGING AND STORAGE OF AGRICULTURAL PRODUCTS

Name of course: Diploma in Agricultural Engineering

Subject: Handling, Packaging And Storage Of
Agricultural Products

Course Code: Agr. E Course Duration: 6 semester

Subject offered in semester: Sixth

Subject Code: Question Code:

Marks: 50

Teaching Scheme	Examination Scheme
Theory : 2 lecture per week	CT- 10
Tutorial: Nil	Attendance, Assignment & Quiz -5
Practical: Nil	End Semester Exam – 35
Credit:- 3	Total Marks - 50

Aim:-

The aim of this course is to provide sound technical knowledge on various materials handling equipments, packaging systems and machineries, and storage systems & structures.

Objective :-

Knowledge of various types of handling, packaging, and storage systems is essentially required for processing and preservation of agricultural products. Hence this course is formulated to trend the students with the knowledge of theory, design and operation of various handling equipments, packaging and storage systems.

SL. NO.	TOPIC	Contact period	Maximum Marks
Unit 1	Flow and mechanics of bulk solids	10	5
Unit 2	Packaging materials- selection, form and testing	3	7
Unit 3	Packaging for different foods	6	6
Unit 4	Vacuum packaging- theory, equipment and method	4	5
Unit 5	Packaging equipment	7	5
Unit 6	Storage of grains	13	9
	TOTAL	48	37

Content: Theory (Handling, Packaging And Storage Of Agricultural Products)

3 hrs/wk

- 1 Flow And Mechanics Of Bulk Solids
 - 1.1 Pressure Distribution
 - 1.2 Flow Through Hoppers And Ducts
 - 1.3 Mechanical Handling Equipment (Belt, Chain, Screw, Pneumatic And Bucket)
- 2 Packaging Materials- Selection, Form And Testing
- 3 Packaging For Different Foods
 - 3.1 Liquid Foods
 - 3.2 Frozen Foods
 - 3.3 Processed Foods
- 4 Vacuum Packaging- Theory, Equipment And Method
- 5 Packaging Equipment

- 5.1 Solid, Liquid And Semi-Liquid Foods
- 5.2 Types Of Fillers
- 5.3 Form-Fill-Seal Equipment
- 5.4 Sealing, Labeling, Capping And Canning
- 6 Storage Of Grains
 - 6.1 Biochemical Changes
 - 6.2 Storage Entomology
 - 6.3 Production, Distribution And Storage(Capacity, Estimate Models)
 - 6.4 Storage Factors Affecting Losses
 - 6.5 Storage Requirements
 - 6.6 Bag And Bulk Storage
 - 6.7 Bio-Engineering Properties Of Stored Products
 - 6.8 Functional, Structural And Thermal Design
 - 6.9 Controlled And Modified Atmospheric Storage(Effect Of O₂,N₂ And CO₂)

Text book:

1. Crosby, N.T.1981. Food packaging Materials Applied Science Publishers, London.
2. McFarlane Ian. 1983. Automatic control of food manufacturing processes. Applied Science Publishers, London.
3. Multon , J.L. 1989. Preservation and storage of grains, seeds and their by - products. CBS Publishers and Distributors, Delhi - 32.
4. Palling, S.J.(ed) 1980. Developments in Food Packaging. Applied Science Publishers Ltd., London.
5. Ripp, B. E. 1984. Controlled atmosphere and fumigation in grain storage. Elsevier Science Publishing Co.London.
6. Sacharow, S. and R.C.Grittin. 1980. Principles of food packaging. AVI Publishers Co., USA.
7. Shejbal, J. 1980. Controlled atmosphere storage of grains. Elsevier Scientific Publishing Co. London.
8. Wallace,B.Van Arsdel and Michael J. Copley. 1963. Food dehydration. The AVI Publishing Co.USA.

2 RENEWABLE ENERGY SOURCES

Name of course: Diploma in Agricultural Engineering
 Course Code: Agr. E Course Duration: 6 semester
 Subject Code: Question Code:

Subject: Renewable Energy Sources
 Subject offered in semester: Sixth
 Marks: 50

Teaching Scheme	Examination Scheme
Theory : 2 lecture per week	CT- 10
Tutorial: Nil	Attendance, Assignment & Quiz -5
Practical: Nil	End Semester Exam – 35
Credit:- 2	Total Marks - 50

Aim:-

The aim of the subject is to develop basic concepts of different sources of non- conventional energy, their principles and application for human development.

Objective :-

The subject emphasizes different aspects of non-conventional energy sources like solar, wind, bio-gas, bio-fuel, etc. The study also includes various methods and devices used to transform the energy in accordance to the human need.

SL. NO.	TOPIC	Contact period	Maximum Marks
Unit 1	INTRODUCTION- Renewable Energy Sources	5	5
Unit 2	Solar Energy	17	10
Unit 3	Biomass Energy	20	12
Unit 4	Wind Energy	6	8
	TOTAL	48	35

Content: Theory (Renewable Energy Sources) 3 hrs/wk

- 1.0 INTRODUCTION- Renewable Energy Sources
 - 1.1 Introduction To Conventional And Non-Conventional Energy Sources
 - 1.2 Patterns Of Fuel Consumption
 - 1.3 Potential Of Solar, Wind, Biogas, Biomass, Geothermal And Other Renewable Energy Sources.
- 2.0 Solar Energy
 - 2.1 Operating Principles And Function Of Engine Systems;
 - 2.1 Characteristics Of The Sun, The Solar Constant.
 - 2.2 Heat Transfer For Solar Energy Utilization
 - 2.3 Flat Plate Collector, Heat Conduction Through Plate, Typical Fin Problem.
 - 2.4 Radiative Heat Transfer Coefficient, Beam And Diffuse Radiation
Introduction To Solar Energy Measuring Instruments
 - 2.5 Introduction To Solar Gadgets Viz., Solar Cooker, Water Heater, Drier, Still, PV System.
- 3.0 Biomass Energy
 - 3.1 Production Of Biomass, Broad Classification, Conversion Of Solid, Liquid And Gaseous Fuels.
 - 3.2 Aerobic And Anaerobic Bio-Conversion Process, Principles And Raw Materials
 - 3.3 Properties Of Biogas, Benefits Of Biogas, Utilization, Biogas Appliances
 - 3.4 Manure, Domestic Fuel, Sanitation And Health, Motive Power, Numerical Problems On Selection Of Size Of Biogas Plants
 - 3.5 Pyrolysis, Gasification And Their Economics.
- 4.0 Wind Energy
 - 4.1 Wind Energy Potential, Installed Capacity
 - 4.2 Wind Power Generation Mechanism; Study Of Various Types Of Wind Machines

Text book:

1. Solar Energy Principles of Thermal Collection & Storage, By: S.P. Sukhatme, Pub- Mcgraw Hill
2. Wind Energy, By: Sumeel B Athawala, Pub-National Book Trust India
3. Non-Conventional Energy Sources, By: Amalendu Chakraborty, Pub-Oxford & Ibh Publishing House Pvt. Ltd.
4. Fundamentals of Renewal Energy Sources by G.N. Tiwari and M.K. Ghosal, Narosa Publishing House. New Delhi

3 FARM MACHINERY & EQUIPMENTS

Name of course: Diploma in Agricultural Engineering
 Course Code: Agr. E Course Duration: 6 semester
 Subject Code: Question Code:

Subject: Farm Machinery & Equipments
 Subject offered in semester: Sixth
 Marks: 100

Teaching Scheme	Examination Scheme
Theory : 4 lecture per week	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz -10
Practical: Nil	End Semester Exam – 70
Credit:- 3	Total Marks - 100

Aim:-

The aim of the subject is to develop the basic knowledge regarding use of agricultural machineries principle of operation, adjustment and maintenance of different agricultural machinery used at various stage of crop production.

Objective :-

This subject deals with the basic knowledge of agricultural machineries, their working principles and techniques for performance evaluation. The selection of suitable machineries for various uses in crop production is also dealt in this subject. The cost estimation for various uses of agricultural machineries is also taken care under this subject.

SL. NO.	TOPIC	Contact period	Maximum Marks
Unit 1	INTRODUCTION- Farm Mechanization	2	5
Unit 2	Tillage implements	15	15
Unit 3	Sowing and Interculture implements	10	10
Unit 4	Harvesting and Threshing Implements	10	12
Unit 5	Silage and Feed preparation	7	7
Unit 6	Land development and Miscellaneous equipments	10	9
Unit 7	Ergonomics	6	7
Unit 8	Farm Economics	4	5
	TOTAL	64	70

Content: Theory (Farm Machinery & Equipments) 3 hrs/wk

- 1.0 INTRODUCTION- Farm Mechanization
 - 1.1 Status and scope of farm mechanization
- 2.0 Tillage implements
 - 2.1 Machinery classifications; Primary and secondary tillage equipment
 - 2.1 Principles of construction, operation of primary and secondary implements
- 3.0 Sowing and Interculture implements
 - 3.1 Sowing and planting equipments, Description, operation and calibration
 - 3.2 Inter-cultivation tools, plant protection equipment,
- 4.0 Harvesting and Threshing Implements

- 4.1 Principle of crop harvesting and threshing
- 4.2 Crop harvesting tools
- 4.3 Crop threshing tools
- 5.0 Silage and Feed preparation
 - 5.1 Chaff cutters and silage filling equipment
- 6.0 Land development and Miscellaneous equipments
 - 6.1 land development machinery
 - 6.2 special farm machines for sugarcane, cotton, potato, and horticultural crops operation
- 7.0 Ergonomics
 - 7.1 Human engineering and safely in farm machinery.
- 8.0 Farm Economics
 - 8.1 Performance and cost analysis

Text book:

1. Farm Machines & Equipments; by: C.P.Nakra, Pub-Dhanpat Rai Publicatoin Pvt. Ltd.
2. 3917, Ganesh Building, Roshanpur, Nai Sarak, Delhi-6
3. Solved Problems in Agricultural Engineering; by: Radhey Lal & A.C. Dutta, Pub-Saroj Prakasan, 64, Katra, Allahabad-2
4. Principles of Farm Machinery, by: Kepner, Bainer & Barger; Pub-The AVI Publishing Company, INC
5. Elements of Farm Machinery; by A.C. Srivastava, Pub-Oxford & Ibh Publishing Co. Pvt. Ltd.
6. Principles of Agricultural Engineering, Vol.-I, by Michael A. M. & Ojha T. P.
7. Elements of Agricultural Engineering; by J. Sahay; Pub- Agro Book Agency, New Chitragupta Nagar, Patna – 20

4 WATER SHED AND HYDROLOGY

Name of course: Diploma in Agricultural Engineering
 Course Code: Agr. E Course Duration: 6 semester
 Subject Code: Question Code:

Subject: Water Shed And Hydrology
 Subject offered in semester: Sixth
 Marks: 50

Teaching Scheme	Examination Scheme
Theory : 2 lecture per week	CT- 10
Tutorial: Nil	Attendance, Assignment & Quiz -5
Practical: Nil	End Semester Exam – 35
Credit:- 2	Total Marks - 50

Aim:-

The course aim to make understand different components of hydrological cycle, different form of precipitation, evapo-transpiration, infiltration, porous and their estimation, run-off study, hydrograph, flood and draught.

Objective :-

This subject deals with the major natural resources specially water which is one of the important input to the crops. The knowledge of the subject will certainly help the students to learn hydrological cycles and efficient management with proper planning to save these scare natural resources.

SL. NO.	TOPIC	Contact period	Maximum Marks
Unit 1	INTRODUCTION	2	2
Unit 2	PRECIPITATION	10	6
Unit 3	ABSTRACTIONS FROM PRECIPITATION	5	3
Unit 4	GEOMORPHOLOGY OF WATERDHEDED	4	3
Unit 5	RUNOFF	10	5
Unit 6	HYDROGRAPH	12	8
Unit 7	HEAD WATER FLOOD CONTROL	8	3
Unit 8	HYDROLOGY OF DRY LAND AREAS	4	3
Unit 9	INTRODUCTION TO WATERSHED MANAGEMENT AND PLANNING	2	2
	TOTAL	48	35

Content: Theory (Water Shed And Hydrology) 3 hrs/wk

1.0 INTRODUCTION:

1.1 Hydrologic cycle

2.0 PRECIPITATION:

2.1 Forms, rainfall measurement

2.2 Mass curve, hyetograph and mean rainfall depth

2.3 Frequency analysis of point rainfall, plotting position

2.4 Estimation of missing data

2.5 Test for consistency of rainfall records

3.0 ABSTRACTIONS FROM PRECIPITATION:

3.1 Interception

3.2 Infiltration

3.3 Evaporation and evapo-transpiration

4.0 GEOMORPHOLOGY OF WATERDHEDED:

4.1 Stream number, stream length, stream area, stream slope and Horton's laws

5.0 RUNOFF:

5.1 Affecting factors

5.2 Measurement of runoff; stage and velocity,;;

5.3 Rating curve, extension of rating curve

5.4 Estimation of peak runoff rate and volume by rational method, Cook's method, SCS method, Curve number method

6.0 HYDROGRAPH:

6.1 Components, base flow separation

6.2 Unit hydrograph theory

6.3 Unit hydrograph of different durations

6.4 Dimensionless unit hydrograph, distribution hydrograph

6.5 Synthetic unit hydrograph

6.6 Uses and limitations of unit hydrograph

7.0 HEAD WATER FLOOD CONTROL:

7.1 Methods, retards and their location

- 7.2 Flood routing - graphical methods of reservoir flood routing
- 8.0 HYDROLOGY OF DRY LAND AREAS:
 - 8.1 Drought and its classification
- 9.0 INTRODUCTION TO WATERSHED MANAGEMENT AND PLANNING:

Text book:

1. Watershed Hydrology by R. Suresh, Standard Publishers Distributers.
2. Engineering Hydrology by K.Subramanya. Tata Mc Grow Hill Publishing Company.
3. Handbook of Applied Hydrology, by V.T.Chow. Mc Grow Hill, New York.
4. Hydrology & Water Resources Engineering, by S.K.Garg, Khanna Publishers Distributors

5 ELECTIVE – II

Name of course: Diploma in Agricultural Engineering Subject: Elective – II
 Course Code: Agr. E Course Duration: 6 semester Subject offered in semester: Sixth
 Subject Code: Question Code: Marks: 100

Teaching Scheme	Examination Scheme
Theory : 4 lecture per week	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz -10
Practical: Nil	End Semester Exam – 70
Credit:- 3	Total Marks - 100

Elective: II – A

LOW TEMPERATURE PRESERVATION OF FOOD PRODUCTS

Name of course: Diploma in Agricultural Engineering Subject: Low Temperature Preservation Of Food Products
 Course Code: Agr. E Course Duration: 6 semester Subject offered in semester: Sixth
 Subject Code: Question Code: Marks: 100

Teaching Scheme	Examination Scheme
Theory : 4 lecture per week	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz -10
Practical: Nil	End Semester Exam – 70
Credit:- 3	Total Marks - 100

Aim:-

This course aims at providing knowledge on low temperature preservation technique and the operation and maintenance of related machines and equipments. The behaviour and characteristic of products stored at low temperature and the optimum condition for storage of different products are also to be studied under this course.

Objective :-

Agricultural products are perishable in nature and many of these require low temperature preservation to check microbial and enzymatic spoilage. Fruits vegetables dairy and animal products in particular require freezing or cold storage for their preservation. Hence, there is a need to study the low temperature preservation technique and the machines require for the same.

Content: Theory (Low Temperature Preservation Of Food Products) 3 hrs/wk

1. Introduction, significance of low temperature preservation
2. Microbiology of food at low temperature
3. Freezing process
4. Commercial cooling and freezing methods
5. Freezing equipments
6. Low temperature preservation of
7. Meat and meat products
8. Poultry products
9. Fisheries products
10. Dairy products
11. Fruits and juices
12. Vegetables
13. Bakery products

Text book:

1. ASHRAE Handbook: Refrigeration System and Applications. ASHRAE Inc. Atlanta Koelet, PC (1992).
2. Industrial Refrigeration: Principles, Design and applications. The MacMillan Press Ltd., London.

Elective: II – B

FOOD SCIENCE

Name of course: Diploma in Agricultural Engineering
Course Code: Agr. E Course Duration: 6 semester
Subject Code: Question Code:

Subject: Food Science
Subject offered in semester: Sixth
Marks: 100

Teaching Scheme	Examination Scheme
Theory : 4 lecture per week	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz -10
Practical: Nil	End Semester Exam – 70
Credit:- 3	Total Marks - 100

Content: Theory (Low Temperature Preservation Of Food Products) 3 hrs/wk

1. Introduction: Food Science As A Discipline
Preparation For A Career In Food Science, Activities Of Food Scientists, Reference.
2. Characteristics Of The Food Industries
Components Of The Food Industries, Allied Industries, International Activities, Responsiveness To Change, Interrelated Operations, References.
3. Constituents Of Foods: Properties And Significance
Carbohydrates, Proteins, Fats And Oils, Additional Food Constituents, References.
4. Nutritive Aspects Of Food Constituents
Food And Energy, Additional Role Of Carbohydrates, Proteins, And Fats In Nutrition, Protein Quality, Bioavailability Of Nutrients, Vitamins, Minerals, Fiber, Water, Stability Of Nutrients, Diet And Chronic Disease, References.
5. Food Deterioration And Its Control
Shelf Life And Dating Of Food, Major Causes Of Food Deterioration, Some Principles Of Food Preservation, Control Of Microorganisms, Control Of Enzymes And Other Factors, Referenes.
6. Meat, Poultry, And Eggs
Meat And Meat Products, Poultry, Eggs, References.
7. Seafood
Fish Procurement, Marine Fish, Shellfish, Fish By-Products, Contaminants Of Fish, Newer Products From Sea Foods, References.
8. Fats, Oils And Related Products
Effects Of Composition On Fats Properties, Sources Of Fats And Oils, Functional Properties Of Fats, Production And Processing Methods, Products Made From Fats And Oils, Fat Substitutes, Tests On Fats And Oils, References.
9. Confectionery And Chocolate Products
Sugar-Based Confections, Ingredients, Chocolate And Cocoa Products, Confectionery Manufacturing Practices.
10. Food Safety, Risks, And Hazards
Safety, Hazards, And Risks, Food Related Hazards, Microbiological Consideration In Food Safety, Effects Of Processing And Storage On Microbial Safety, Microbiological Methodology, Haccp As A Method To Prevent Food-Borne Illness
11. Governmental Regulations Of Food And Nutrition Labeling
Introduction, Federal Food, Drug, And Cosmetic Act, Additional Food Laws, Legal Categories Of Food Substances, Testing For Safety, Food Labeling, Nutrition Labeling, International Food Standards And Codex Alimentarius.
12. Hunger, Technology, And World Food Needs
Background, Nature Of Nutritional Problems, Some Dimensions Of The Problems, Approaches To Combat World Hunger, Roles Of Technology, Conclusions.

Elective: II – C

FARM POWER & MACHINERY MANAGEMENT

Name of course: Diploma in Agricultural Engineering
Course Code: Agr. E Course Duration: 6 semester
Subject Code: Question Code:

Subject: Farm Power & Machinery Management
Subject offered in semester: Sixth
Marks: 100

Teaching Scheme	Examination Scheme
Theory : 4 lecture per week	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz -10
Practical: Nil	End Semester Exam – 70
Credit:- 3	Total Marks - 100

Aim:

It aims to educate the students for proper selection of agricultural machinery, their replacement, and their minimum economic use. It also gives knowledge for calculation of hiring charges as required in agro-services.

Objective:

The proper knowledge for management of agricultural machinery is very important in view of their economic and efficient use. Selection of optimum size of agricultural machinery has a major role in economic farming. The cost analysis for unit use of machinery is important to fix the hiring charge of an individual machine and knowledge of all above is very important to an agricultural engineers.

Content: Theory (Farm Power & Machinery Management) 3 hrs/wk

1. The role of mechanization and its relationship to productivity, employment, social and technological change;
2. Performance and Power analysis
3. Cost analysis of machinery: fixed cost and variable costs, effect of inflation on cost
4. Selection of optimum size of agricultural machinery
5. Replacement criteria of Agricultural machineries
6. Break-even analysis
7. Reliability and cash flow problem
8. Mechanization planning; case studies of agricultural mechanization in India

Text book:

1. Donnel Hunt; Farm Power and Machinery Management. The Iowa State University Press, USA
2. Kepner R.A., Bainer Roy, & Barger E.L. Principles of Farm Machinery. The AVI Publishing Company, INC
3. J.Sahay; Elements of Agricultural Engineering; Agro Book Agency, New Chitragupta Nagar, Patna – 20

6 HANDLING, PACKAGING & STORAGE LAB.

Name of course: Diploma in Agricultural Engineering
Course Code: Agr. E Course Duration: 6 semester
Subject Code: Question Code:

Subject: Handling, Packaging & Storage Lab.
Subject offered in semester: Sixth
Marks: 50

Teaching Scheme	Examination Scheme
Theory : Nil	Term work (TW) – 25
Tutorial: 3 periods/wk	Practical (PR) - 25
Practical: 12	Total marks - 50
Credit:- 2	

Aim:-

The aim of this course is to provide sound technical knowledge on various materials handling equipments, packaging systems and machineries, and storage systems & structures.

Objective :-

Knowledge of various types of handling, packaging, and storage systems is essentially required for processing and preservation of agricultural products. Hence this course is formulated to trend the students with the knowledge of theory, design and operation of various handling equipments, packaging and storage systems.

Content: Practical (Handling, Packaging & Storage Lab.) 3 hrs/wk

1. Evaluation of bucket elevator
2. Evaluation of belt conveyor
3. Evaluation of screw conveyor
4. Evaluation of pneumatic conveyor
5. Evaluation of chain conveyor
6. Experiments on vacuum packaging of fruits.
7. Experiment on vacuum packaging of vegetables.
8. Quality analysis of vacuum packed products on storage.
9. Determination of tensile strength and percent elongation of packaging materials.
10. Determination of bursting strength and impact strength of packaging materials.
11. Evaluation of quality of products stored in packaging films and glass bottles.
12. Estimation of storage loss by pest in the storage.
13. Evaluation of insect traps at lab scale.
14. Experiment on controlled atmospheric storage of fruits and vegetables.
15. Experiment on modified atmospheric storage of grains.
16. Experiment on storage of powdered materials and oils.
17. Practical examination

7 RENEWABLE ENERGY SOURCES LAB.

Name of course: Diploma in Agricultural Engineering
Course Code: Agr. E Course Duration: 6 semester
Subject Code: Question Code:

Subject: Renewable Energy Sources Lab.
Subject offered in semester: Sixth
Marks: 50

Teaching Scheme	Examination Scheme
Theory : Nil	Term work (TW) – 25
Tutorial: 3 periods/wk	Practical (PR) - 25
Practical: 12	Total marks - 50
Credit:- 2	

Aim:-

The aim of the subject is to develop basic concepts of different sources of non- conventional energy, their principles and application for human development.

Objective :-

The subject emphasizes different aspects of non-conventional energy sources like solar, wind, bio-gas, bio-fuel, etc. The study also includes various methods and devices used to transform the energy in accordance to the human need.

Content: Practical (Renewable Energy Sources Lab.) 3 hrs/wk

1. Demonstration of instruments and measurement of different type of radiation.
2. Study of solar radiation characterization,
3. Study and performance evaluation of a Box type solar cooker, Green house technology
4. Visit to domestic biogas plants
5. Visit to community biogas plant
6. Design of float type biogas plants for individual family/community.
7. Design of fixed dome type biogas plants for individual family/community.
8. Study of biogas characterization.
9. Study of design details of different types of gasifiers and their testing with agricultural residues as source of energy.
10. Constructional features of different types of windmills, their operations and maintenance.
11. Visit to community biogas plants, industrial application centers of solar energy, wind forms etc.
12. Design of wood chip based gassifiers.

8 FARM MACHINERY & EQUIPMENT LAB.

Name of course: Diploma in Agricultural Engineering
Course Code: Agr. E Course Duration: 6 semester
Subject Code: Question Code:

Subject: Farm Machinery & Equipment Lab.
Subject offered in semester: Sixth
Marks: 50

Teaching Scheme	Examination Scheme
Theory : Nil	Term work (TW) – 25
Tutorial: 3 periods/wk	Practical (PR) - 25
Practical: 13	Total marks - 50
Credit:- 2	

Aim:-

The aim of the subject is to develop the basic knowledge regarding use of agricultural machineries principle of operation, adjustment and maintenance of different agricultural machinery used at various stage of crop production.

Objective :-

This subject deals with the basic knowledge of agricultural machineries, their working principles and techniques for performance evaluation. The selection of suitable machineries for various uses in crop production is also dealt in this subject. The cost estimation for various uses of agricultural machineries is also taken care under this subject.

Content: Practical (Farm Machinery & Equipment Lab.) 3 hrs/wk

1. Determination of draft of agricultural implements
2. Familiarization with farm machines and equipment
3. Study of constructional features of M.B. and disc ploughs and their adjustments
4. Study of different seed cum fertilizer drills and planters, their calibration and adjustments
5. Study of construction and operation of sprayers and dusters: their calibration and adjustments
6. Study of cultivators and weeders
7. Study of constructional details and adjustments of mowers and reapers
8. Study of constructional details, operation and adjustments of threshers, and their performance
9. Study of puddlers and cage wheels for rice cultivation
10. Study of nursery raising and paddy translators
11. Study of special machines for potato and groundnut sowing and harvesting
12. Study of sugarcane equipment
13. Calculations on field capacities, field efficiencies and application rates of seed fertilizer and chemicals

9 PROJECT WORK

Name of course: Diploma in Agricultural Engineering
Course Code: Agr. E Course Duration: 6 semester
Subject Code: Question Code:

Subject: Project Work
Subject offered in semester: Sixth
Marks: 100

Teaching Scheme	Examination Scheme
Theory : Nil	Term work (TW) – 50
Tutorial: 6 periods/wk	Practical (PR) - 50
Practical: 2	Total marks - 100
Credit:- 1	

Content: Practical (Project Work) 3 hrs/wk

Project-I

The students will select an engineering problem related to any one specialized branch of agricultural engineering in consultation with the teaching departments of the college involving design, fabrication, experimentation, data collection and analysis. They will work in a group of 2 - 4, under the guidance of a teacher. The students will survey the literature, work on material and methods, initiate work of layouts, data collection, experimentation, testing, etc. They will individually present the work done to a group of staff and students associated with the project works.

Project-II

The work on project-I will be continued. The students will complete the work and analyze the data. They will submit a report of the entire work done under Project-I and Project-II. They will make oral presentation of the work to a group of students and staff associated with the Project Works.

10 SEMINAR

Name of course: Diploma in Agricultural Engineering Subject: Seminar
Course Code: Agr. E Course Duration: 6 semester Subject offered in semester: sixth
Subject Code: Question Code: Marks: 50

Teaching Scheme	Examination Scheme
Theory : Nil	Term work (TW) – 25
Tutorial: 3 periods/wk	Practical (PR) - 25
Practical: --	Total marks - 50
Credit:- 1	

Aim:

The students are required to be educated for learning the methods involved in writing the research papers, report and other technical publications. They should also be trained for presenting themselves before the audience his views on particular topics. Priority should be maintained to choose the topics from the profession of the agricultural engineering.

Content: Practical (Seminar) 3 hrs/wk

Any modern related topics on agriculture engineering.
Different topics for each and every students.

11 COMPREHENSIVE VIVA

Name of course: Diploma in Agricultural Engineering Subject: Comprehensive Viva
 Course Code: Agr. E Course Duration: 6 semester Subject offered in semester: sixth
 Subject Code: Question Code: Marks: 100

Teaching Scheme	Examination Scheme
Theory : Nil	Term work (TW) – 50
Tutorial: Nil	Practical (PR) - 50
Practical: --	Total marks - 100
Credit:- 1	

Course content:

The syllabi of all the theoretical and sessional subjects taught in the three years of diploma education.

Examination Scheme:

The Final Viva-Voce Examination shall take place at the end of the Part – III Second Semester. It is to be taken by one External and one Internal Examiner. The **External Examiner** is to be from industry / engineering college / university / government organisation and he / she should give credit out of **50 marks**; whereas, the **Internal Examiner** should normally be the Head of the Department and he / she should give credit of **50 marks**. In the absence of the Head of the Department the senior most lecturer will act as the Internal Examiner