

**Scheme of Teaching and Examination for  
VI Semester DIPLOMA in AGRICULTURAL ENGINEERING**

**THEORY**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1.	Professional Studies & Entrepreneurship	11601	06	60	03	20	80	100	26	36
2.	Mechanics of Structure	11602	06	60	03	20	80	100	26	36
3.	Farm tractor & Non-Conventional Energy	11603	06	60	03	20	80	100	26	36
4.	Post Harvest Technology	11604	04	50	03	20	80	100	26	36
5.	Elective*		06	60	03	20	80	100	26	36
	Water Resources Management	11605A								
	Non-Conventional Energy	11605B								
	Computer Aided Design & Drawing	11605C								
	Pollution and Environmental Engg.	11605D								
<b>Total</b>			<b>28</b>					<b>500</b>		

**PRACTICAL**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6.	Farm Tractor & Non-Conventional Energy Lab	11606	06	50	06	10	40	50	16	21
<b>Total</b>			<b>06</b>					<b>50</b>		

**SESSIONAL**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME			
			Periods per Week	Periods in One Session (Year)	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
7.	Professional Studies & Entrepreneurship	00607	04	50	20	30	50	25
8.	Post Harvest Technology	11607	04	50	20	30	50	25
9.	Project Work & Its Presentation in Seminar	11608	Two Week Continuously		40	60	100	50
<b>Total</b>			<b>08</b>				<b>200</b>	
<b>Total Periods per Week</b>			<b>42</b>	<b>Total Marks = 750</b>				

# PROFESSIONAL STUDIES & ENTREPRENEURSHIP

<b>Subject Code</b> <b>11601</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**RETIONALE:** A diploma in Agricultural Engineering. Student, who is to be trained to become a professional, is required to be fully conversant with his duties and responsibilities in any organization. He/she is expected to know about meaning of Farm management, characteristics of farming as a business, basic of Farm production decisions, application of Farm management principles, basic tools of Farm business analysis, important farm inputs such as land, labor, machinery, building etc, about problems concerning different farm resources and management principles to solve these individual resources – use problems.

The knowledge about entrepreneurship is essential for a Diploma in Agricultural Engineering. Student because entrepreneurship is a purposeful activity of an individual or a group of associated individuals for creating something new, organizing & co-coordinating and undertaking risk and handling economic uncertainty for setting up as enterprises.

**OBJECTIVES:** The course is designed with following objectives:-

- To develop decision making ability.
- To know about economic principles applied to farm management.
- To be aware with demand and supply.
- To develop knowledge about Farm Planning and Budgeting.
- To develop knowledge about Agricultural marketing.
- To develop knowledge about Entrepreneurship.
- To bring attitudinal change for making him/her an honest professional.

Sl.No.	Topics	No of periods/Lectures
01.	Management	04
02.	Leadership	05
03.	Industrial Organisation	05
04.	Farm management	28
05.	Agricultural marketing	06
06.	Entrepreneurship	10
07.	Small scale Industries	02

## COURSE CONTENTS

<b>01.</b>	<b>Management</b>	04
01.1	Definition.	
01.2	Types of management.	
01.3	Principles of management.	
01.4	Functions of management.	
<b>02.</b>	<b>Leadership</b>	05
02.1	Definition and concept of leadership.	
02.2	Need of leadership.	
02.3	Types of leadership.	
02.4	Qualities of leadership.	
<b>03.</b>	<b>Industrial organization</b>	05
03.1	Definition.	
03.2	Principles of industrial organization.	
03.3	Types of organization.	
03.3.1	Structure of line organization: Advantages and disadvantages of line organization.	
03.3.2	Structure of line and staff organization and its advantages and disadvantages.	
<b>04.</b>	<b>Farm management</b>	28
04.1	Introduction.	
04.2	Farm management and its objectives.	
04.3	Typical management decision.	

- 04.01. **Economic principles applied to Farm management.**
- 04.01.1 The law of diminishing returns.
- 04.01.2 The law of substitution.
- 04.01.3 The law of comparative advantage.
- 04.01.4 The law of Equi-Marginal returns.
- 04.01.5 The law of opportunity cost.
- 04.01.6 The principles of combining enterprises.
- 04.01.7 Cost theory.
- 04.02. **Management of Land.**
- 04.02.1 Land use programme at the Farm management level.
- 04.02.2 Soil fertility – ways for maintaining and improving the levels of soil fertility.
- 04.02.3 Cropping intensity and cropping scheme.
- 04.02.4 Management of pasture land.
- 04.03. **Management of Labour.**
- 04.03.1 Definition of different types of labour.
- 04.03.2 Farm labour classification.
- 04.04.3 Farm ways and methods of increasing labour efficiency.
- 04.04. **Management of capital.**
- 04.04.1 Capital requirements of farming.
- 04.04.2 Classification of capital.
- 04.04.3 Purity of seeds, National Seeds Corporation. Seed Acts, 1966.
- 04.04.4 Depreciation of capital equipment.
- 04.04.5 Working capital.
- 04.05. **Management performance and organizing the farm business.**
- 04.05.1 Functions of management performance.
- 04.05.2 Selection of Enterprises.
- 04.05.3 Classification of Farming.
  - (a) Types of Farming.
  - (b) System of Farming.
- 04.05.4 Specialized and diversified farm – its advantages and disadvantages.
- 04.05.5 Mix Farming, Ranching and Dry farming.
- 04.05.6 Co-operative farming, collective farming, capitalist farming, state farming and peasant farming
- 04.06. **Farm planning and budgeting.**
- 04.06.1 Annual planning, long range planning.
- 04.06.2 Basic information needed in farm planning.
- 04.06.3 Steps in farm planning.
- 04.06.4 Advantages of farming planning.
- 04.06.5 Farm budgeting, partial budgeting, total farm budgeting.
- 04.06.6 Steps in farm budgeting.
- 04.06.7 Advantages of farm budgeting.
- 04.07. **Farm credit.**
- 04.07.1 Farm credit, basic of credit.
- 04.07.2 Classification of farm credit – short term credit, medium term credit, long term credit.
- 04.07.3 The Three R's of credit.
- 04.07.4 The Three C's of credit.
- 04.07.5 Types of loans according to liquidity.
- 04.07.6 Source of farm credit.
- 04.07.7 The co-operatives, State Bank of India, small farmer's development agency, commercial Banks, Lead Bank, Gramin Bank.

**05. Agricultural Marketing**

06

- 05.1 Definition of agricultural marketing.
- 05.2 Classification of agricultural markets.
- 05.3 Marketing services.
- 05.4 Marketing channels.
- 05.5 Problems in marketing of agricultural produces in India.
- 05.6 Lines of improvement of agricultural marketing.

<b>06.</b>	<b>Entrepreneurship</b>	10
06.1	Concept and definition of entrepreneurship.	
06.2	Characteristics of entrepreneurship.	
06.3	Meaning of entrepreneurship.	
06.4	Kinds of entrepreneurship.	
06.5	Characteristics of entrepreneur.	
06.6	Importance of entrepreneur.	
<b>07</b>	<b>Small Scale Industries.</b>	02
07.1	Definition of small scale industries.	
06.2	Categories of small scale industries.	
06.3	Merits and demerits of small scale industries.	

### **BOOKS RECOMMENDED**

<b>Sl No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1.	Farm Management - An Introduction to Economic Analysis.	S. P. Dhondyal	Achal Prakashan Mandir, Kanpur.
2.	Hand Book of Agricultural Science.	S. S. Singh	Kalyani Publishers, New Delhi.
3.	Fundamentals of Farm Business Management.	S. S. Johl & T. R. Kapur	Kalyani Publishers, New Delhi.
4.	Entrepreneurship	M. K. Jain	Deepak Prakashan, Delhi, Chennai, Kanpur, Bhopal.
5.	A Hand Book for New Entrepreneurs (with special References to science and Technology target group)	--	Entrepreneurship development Institute of India, 83-A; Swastic Society, Navrangpura, Ahmedabad-380 009.
6.	प्रक्षेत्र प्रबन्धन तथा उसके तथा उसके सिद्धान्त	जगन्नाथ सिंह	नन्द किशोर एण्ड सन्स, पोस्ट बाक्स नं-1017, चौक, वाराणसी, उ० प्र०
7.	Entrepreneurship: New Venture Creation; Holt,		Prentice Hall of India, New Delhi.

# MECHANICS OF STRUCTURE

<b>Subject Code 11602</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE:** This subject form an important part of Mechanical Engineering as well as other engineering branches live Agricultural Engineering and deals with the basic concept of the behavior of material used in machine past and in practice in different structures. The student will be able take up design job and understand the various properties of materials and behavior under different types of load. In fact the subject may be considered as the key of the engineering subjects dealing materials.

**Objectives:** The student will be able to

1. Understand the various problem of materials used machine.
2. Understand and analysis of various forces acting on the component of machine and the resistance offered by these components.
3. Judge the suitability of a particular material in the design.

**Topic: 01. Principal Stress and Strain**

**05**

- 01.01 Normal and tangential stress on oblique planes, resultant stress.
- 01.02 Principal planes and principal stresses & strain (analytical and graphical solution) simple problems.
- 01.03 Theory of elastic failure.
- 01.04 Simple problems.

**Topic: 02. Centre of Gravity & Moment of Inertia**

**05**

- 02.01 Centre of gravity, centroid and moment of Inertia as T.I. and angle & channel section.
- 02.02 Definition of moment of Inertia and radius of gyration Basic theorem of parallel and perpendicular axes.
- 02.03 Moment of inertia of Rectangular, circular, section about centroidal axis.
- 02.04 Simple problems.

**Topic: 03. Bending Stress in Beam**

**07**

- 03.01 Theory of simple bending, position of neutral axis. Moment of resistance, Distribution of bending stress across the section. Bending stress in symmetrical and unsymmetrical section, section modulus, flexural strength of a section.
- 03.02 Shearing stress at a section in a loaded Beam. Distribution of shear stress over rectangular, Triangular, circular, I and T Sections.

**Topic: 04. Combined Direct and Bending Stresses**

- 04.01 Concept of Direct and Eccentric Load.
- 04.02 Symmetrical Column (Rectangular and Circular) with eccentric loading about one axis. Stress distribution at base, Maximum & minimum stress at base.
- 04.03 The middle third Rule.
- 04.04 Column & Chimney subjected to horizontal wind pressure.
- 04.05 Simple problems.

**Topic: 05. Slope & Deflection of Beam**

**07**

- 05.01 Relation between slope, deflection & radius of curvature.
- 05.02 Slope and deflection calculation for cantilever and simply supported beams subjected to concentrated and uniformly distributed load by double integration and moment area method. Mohr's Theorem.
- 05.03 Macaulay's method and its application to find deflection at a particular section for beams subjected to point (concentrated) load as well as uniformly distributed load.
- 05.04 Simple problems.

**Topic: 06. Columns & Struts.****05**

- 06.01 Concept of columns mode of failure, classification and end conditions.
- 06.02 Buckling load, crushing load, slenderness Ratio, factors affecting strength of columns.
- 06.03 Euler's Theory of long column. Determination of buckling and safe loads. Assumptions and limitations of Euler's Theory. Rankine's formula for column. Indian standard code of column (No derivation)
- 06.04 Simple problems.

**Topic: 07. Torsion of Shaft****06**

- 07.01 Theory of pure torsion. Moment of resistance Torsional equation. Assumption in the theory of pure torsion, Strength of solid and hollow shaft. Polar modulus.
- 07.02 power transmitted by shaft, stresses in Bolt and key of shaft coupling, shear and torsional resilience
- 07.03 Simple problems.

**Topic: 08. Spring****05**

- 08.01 Closed coil helical springs, determination of deflection, angle of twist and stiffness under axial loading and Twisting.
- 08.02 Carriage spring, determination of central deflection, Number of leaves and Radius of curvature of semi-elliptical and elliptical section of spring. Simple Problems.

**Topic: 09. Thin Cylinders and Spheres.****05**

- 09.01 Failure of a cylindrical shell due to an internal pressure, circumferential and longitudinal stress.
- 09.02 Change in dimensions, change in volume due to internal pressure of thin cylinder & Thin spherical shell. Simple Problems.

**BOOKS RECOMMENTDED**

- |    |                                   |   |                      |
|----|-----------------------------------|---|----------------------|
| 1. | Strength of Material              | – | by Surender Singh    |
| 2. | Strength of Material              | – | by Ramarutham.       |
| 3. | Strength of Material              | – | by R.S. Khurmi.      |
| 4. | Strength of Material              | – | by R.K. Rajput.      |
| 5. | Strength of Material              | – | by D.S. Bedi.        |
| 6. | Mechanics of Strength of Material | – | by Malhotra & Gupta. |

# FARM TRACTORS AND NON CONVENTIONAL ENERGY

<b>Subject Code 11603</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE:** A diploma in Agricultural Engineering has to perform his role in farmer's field for modern & scientific agriculture with present farm. Tractors and other non conventional energy source thus for performing these operations. The know how is must.

**Objectives:** The present course is designed to develop the ability to perform the farm Tractors & their different systems. The limited conventional energy source will not serve the purpose in time course is designed for non conventional energy source and its utilization. Following are the contents to fulfill the objectives.

**01. Tractors**

- 01.01 Introduction
- 01.02 Classification of Tractors and its adoptability
- 01.03 Selection of tractors, Tractors specifications and specialty
- 01.04 Tractor loading system

**02. Tractors Clutches**

- 02.01 Types of clutches, construction and their working.
- 02.02 Clutch trouble and its remedies.

**03. Tractors Transmission system**

- 03.01 Types of transmission systems and their working.
- 03.02 Differential, construction and working
- 03.03 Final Drive
- 03.04 Power take- off, belt pulley, angle power drive, universal coupling.
- 03.05 Hydraulic operated internally and externally machinery utilization.

**04. Steering systems**

- 04.01 Conventional type and power steering systems.
- 04.02 Maintenance of steering

**05. Brake Systems**

- 05.01 Mechanical, Hydraulic, Air and power brake

**06. Hitching systems**

- 06.01 Principles of vertical and horizontal hitching.
- 06.02 Hitching adjustment
- 06.03 Draw Bar and Draw Bar horse power calculations

**07. Traction and Traction Aids**

- 07.01 Traction, Tractive effort, slip
- 07.02 Dead load ballast, Liquid ballast
- 07.03 Chain and Griddles
- 07.04 I and L type strake
- 07.05 Rolling Resistance and Traction efficiency.

**08. Automotive Technology (Theory)**

- 08.01 Past, present & future trends in Automotive Technology – Diesel & Gasoline.
  - 08.01.1 Engines, classification of different engines & adaptability.
  - 08.01.2 IC Engines, Combustion chamber design, Types & application.
  - 08.01.3 Automotive exhaust emission – constituents (Diesel & Gasoline).
  - 08.01.4 Emission norms under MV ACE, Euro Norms & Bharat Stage Norms.
  - 08.01.5 Diagnostics & Test equipments – Engine Analysis, Emission Analyzer, ECU Scan tool, compression tester.

- 08.02 Diesel & Gasoline Technology.
  - 08.02.1 Introduction, Diesel fuel layout & Components, Gasoline fuel layout & components.
  - 08.02.2 Diesel fuel components – function, working principle, testing, calibration, timing, construction, components & trouble shooting, add on modules.
  - 08.02.3 Gasoline fuel components – function, working principles, testing, calibration, construction, components & trouble shooting.
  - 08.02.4 Diagnostics & Test equipments – Diesel fuel injection pump test bench. Injector tester (Diesel), Nozzle cleaner, Petrol injector cleaner cum tester. Test specification.
  - 08.03. Energy Systems.
  - 08.03.1 Introduction, coverage, trends.
  - 08.03.2 Starter – function, construction, working principle, components, types, output, testing & trouble shooting.
  - 08.03.3 Alternator – function, construction, working principle, components, types, output, testing & trouble shooting.
  - 08.03.4 Energy storage (batteries) – function, construction, working principal, types, JIS/DIN code Specifications, charging instructions.
  - 08.03.5 Diagnosis & Test equipments – Alternator & starter performance test benches, battery tester, Battery charger, growler, regulator tester, test specifications.
- 09. Non-conventional energy source.**
- 09.01 Utilization of wind, solar and other non-conventional energy source in agricultural different processes.

**REFERENCE BOOKS:**

1. Solar Energy Utilization by G.D. Rai, Khanna Publishers.
2. Solar Energy by S.P. Sukhtme Tata McGraw Hill
3. Farm Gas Engine and Tractors by Johns Fred R. Tata McGraw Hill.
4. Tractors and Their power Units by Ligidial & J.E. Coketem. John Willy & Sons.
5. Tractor Engine Maintenance and Repair by H.C. Jain & C.R. Rai, Standard Publisher Distributors New Delhi.
6. I.C. Engines by Mathur & Sharma.
7. Automotive Handbook by BOSCH.



# POST HARVEST TECHNOLOGY

<b>Subject Code 11604</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE:** An Agricultural Engineering Diploma holder has to involve in processing works after the harvest of the farm product to the final shape; acceptable to the consumer with the help of different processing machines. In the light of modern and scientific agricultural methods of cultivation, modern and mechanized machine operations are essential. Thus, to get the know how of related processing machines, its working and handling is must for quality product. This course is designed to fulfill the objective of maintaining the qualitative and quantitative requirement with the time.

**OBJECTIVE:** To bring the farm product in acceptable and nutritative form with the help of post harvest technology economically and efficiently.

## COURSE CONTENTS

Sl No.	Topic	Lectures/Periods
01.	Introduction	03
02.	Drying.	06
03.	Cleaning and grading	05
04.	Seed treatment	04
05.	Material Handling	04
06.	Bagging	03
07.	Storage	04
08.	Milling and threshing	04
09.	Rice milling	04
10.	Cane Crushing	03
11.	Fruit preservation	04
12.	Dairy Engineering Process Equipments	06
<b>01.</b>	<b>Introduction</b>	<b>03</b>
01.01	Introduction and importance of seed processing principles of Agricultural processing	
01.02	Sequences of operations, flow diagram service offered by processor to farmers, wheat, maize, paddy and soybean processing.	
01.03	Different steps involved in seed processing.	
<b>02.</b>	<b>Drying</b>	<b>06</b>
02.01	Importance of seed and grain moisture and drying.	
02.02	Estimation of moisture by direct and indirect method.	
02.03	Equilibrium moisture contents.	
02.04	Principles of drying, drying process.	
02.05	Constant ratio period and falling rate period.	
02.06	Drying kinds, thin and thick bed drying.	
02.07.1	Temperature and air flow requirement.	
02.07.2	Natural air and heated air drying.	
02.08	Solar drying. Direct and indirect dryer, their efficiency and economy.	
<b>03.</b>	<b>Cleaning and grading</b>	<b>05</b>
03.01	Importance and grade factor.	
03.02	Elementary study of related machines, their operations and maintenance of air screen Machine.	
03.03	Seed and grain cleaning and grading equipments.	
03.04	Scalper, Grader and cleaner.	
03.05	Width and roundness, shape and weight based separator, horizontal separator, disk separator, gravity separator, rotary cleaner their principles of operations and working.	
<b>04.</b>	<b>Seed Treatment</b>	<b>04</b>
04.01	Seed treatment and its important and kinds of seed treatment.	
04.02	Methods, advantages of treatment.	
04.03	Elementary study of seed treating equipments and powdered, slurry seed treater.	

<b>05.</b>	<b>Material Handling Equipments</b>	<b>04</b>
05.01	Screw conveyers, belt conveyers.	
05.02	Bucket elevator.	
05.03	Pneumatic conveyers.	
05.04	Construction of different types of conveyers and maintenance.	
<b>06.</b>	<b>Bagging</b>	<b>03</b>
06.01	Manual bagging.	
06.02	Semi automatic bagging machine.	
06.03	Automatic bagging machine.	
<b>07.</b>	<b>Storage</b>	<b>04</b>
07.01	Traditional storage system.	
07.02	Storage of seeds and grains.	
07.03	Grain respiration and factor effecting it.	
07.04	Changes in stored product during store from germination and seed viability.	
07.05	Design of storage system and equipments, ISI code of practice.	
07.06	Storage of fresh fruits vegetables and diary and other farm products.	
<b>08.</b>	<b>Milling and Threshing</b>	<b>04</b>
08.01	Principles of operation of Dal mills.	
08.02	Requirements for optimum milling.	
08.03	Milling of animal feeds.	
08.04	Treatment for animal feed.	
08.05	Milling equipments. Burr grinder and hammer mill.	
08.06	Kath Kolhu and power ghani.	
08.07	Oil extracting equipment, expeller – horizontal type.	
08.08	Chaff cutter and ensilage cutter.	
08.09	Threshing equipment, its principles, clearance, adjustment and control.	
<b>09.</b>	<b>Rice milling</b>	<b>04</b>
09.01	Elementary study and operation of modern rice milling with line flow diagram, quality control.	
09.02	Chura mill and makhana processing unit.	
<b>10.</b>	<b>Cane crushing and juice extraction.</b>	<b>03</b>
10.01	Cane crushers, manual, animal and power operated.	
10.02	Soybean processing.	
10.03	Juice extraction principles and juice extractor, manual and power operated.	
<b>11.</b>	<b>Fruit Preservation</b>	<b>04</b>
11.01	Importance of fruit preservation.	
11.02	Quality of preservation.	
11.03	Fruit processing. preparation of squash, jam, jelly marmled, pickles and other products.	
<b>12.</b>	<b>Dairy Engineering</b>	<b>06</b>
12.01.1	Different dairy processes of milk receiving equipments.	
12.01.2	Milking machine – principles and operations.	
12.02.1	Pasteurization – its definition and types.	
12.02.2	Its merits and demerits.	
12.02.3	Different pasteurization milk flow line diagram.	
12.03.1	Homogenization – definition and types.	
12.03.2	Operation of homogenizer.	
12.04.1	Cream separation principles.	
12.04.2	Hand operated, power operated cream separator – its working & maintenance.	
12.05.1	Butter churns principles.	
12.05.2	Type of butter churns – its construction, working and maintenance.	
12.05.3	Ice cream preparation -- types and ingredients mild dryer.	
12.06.1	Principle s and types of milk dryer.	
12.06.2	Cleaning and sterilizing equipments.	
12.06.3	Adulteration test in milk and milk products.	
12.06.4	Mixing in Vitamin A in milk.	

#### **BOOKS RECOMMENDED.**

- 1 Agricultural process engineering by S.M. Handerson & R.L. Perry, John Willey & Sons.
2. Principles of agricultural Engineesring Vol II by A.M. Michel & T.P. Ojha, Jain Brothers
3. Dugdth Vigyan by Bhati and Lavaniya
4. Diary Process Engineering by J.S. Warner

# WATER RESOURCE DEVELOPMENT & MANAGEMENT

<b>Subject Code</b> <b>11605A</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE** – A Diploma in Agricultural Engineering has an opportunity to make himself specialized in water resource development field for up to date & complete know-how regarding the most burning problem of Indian Agriculture.

**Objective :** To make perfect and acquit with the up to date technological advancement the present effective curriculum is made to fulfill the objectives.

Sl.No.	Topics	Lecture
01.	Soil water plant relationship	09
02.	Irrigation	06
03.	Irrigation methods	12
04.	Water resources Development	09
05.	Wells and tube wells	12
06.	Irrigation pumps	12
<b>01:</b>	<b>Topic: Irrigation</b>	<b>09</b>
01.01.	Irrigation, definition & types	
01.02.	Importance of Irrigation in raising crops	
01.03.	Benefits of Irrigation	
01.04.	Water requirements of crops	
01.05.	Quality of irrigation water	
<b>02.</b>	<b>Topic: Soil water plant relation</b>	<b>06</b>
02.01.	Types of agricultural soils	
02.02.	Classes and availability of soil water consumptive use of water	
02.03.	Duty irrigation water, delta and base period	
02.04.	Relation between duty and delta	
02.05.1.	Classification of terms like	
02.05.2.	Gross command area.	
02.05.3.	Culturable commanded area.	
02.05.4.	Culturable cultivated area	
02.05.5.	Cultivable & in cultivatable area.	
02.05.6.	Intensity of irrigation	
02.06.1.	Major crops of India (at list of Bihar)	
02.06.2.	Water requirements of major crops	
02.06.3.	Consumptive use of water.	
02.06.4.	Harmful effect of excessive use of water	
<b>03:</b>	<b>Topic: Irrigation methods</b>	<b>12</b>
03.01.01.	Method of irrigation introduction	
03.01.02.	Surface, sub surface, sprinkler irrigation	
03.02.01.	Flooding furrow method and contour farming.	
03.02.2	Details of sub-surface irrigation.	
03.02.3	Details of sprinkler irrigation.	
03.02.4	Limitation of the method.	
03.03.1	Types of sprinkler systems.	
03.03.2	Perforated pipe system.	
03.03.3	Based on portability.	
	a. Semi portable.	
	b. Semi permanent system.	
	c. Solid set system.	
	d. Permanent system.	
03.03.4	Components of sprinkler system.	
03.03.5	Classification of rotating head sprinkler system and their characteristics and adoptability.	
03.04.1	Details of the system and its components.	

<b>04. Topic:</b>	<b>Water Resources Development</b>	<b>09</b>
04.01	Water resources and their development.	
04.02	Different resources of water surface and sub-surface.	
04.03	Hydrologic cycles.	
04.04.1	Resources of water.	
04.04.2	Ground water in filtration in rain water.	
04.04.3	Porosity.	
04.04.4	Water bearing stratum.	
04.04.5	Ground water flow, Darcy Law and permeability.	
04.04.6	Different source of tapping the ground water such as springs, infiltration gallery, porous pipe gallery, wells, tube wells, collectors well a brief introduction of each.	
<b>05.</b>	<b>Topic: Wells and Tube wells</b>	<b>12</b>
05.01	Irrigation wells.	
05.02	Different types of wells. Introduction of different types and classification.	
05.03	Method of construction of tube well.	
05.03.1	Boring method.	
05.03.2	Hand boring and water jet boring method.	
05.03.3	Percussion method or cable tool method.	
05.03.4	Hydraulic rotary method.	
05.03.5	Rivers rotary method.	
05.04.1	Well assembly.	
05.04.2	Development of well.	
05.04.3	Sequence of operation.	
05.04.4	Discharge equation of wells from unconfined strata.	
05.04.5	Discharge equation of wells from confined strata.	
05.05.1	Cavity wells. Introduction and method of construction.	
05.05.2	Causes of failure of cavity wells and their probable remedy.	
<b>06.</b>	<b>Topic : Irrigation Pumps</b>	<b>12</b>
06.01	Irrigation Pump.	
06.02	Low head lift pump.	
06.03	Medium head lift pump.	
06.04	High head water lift.	
06.05	Wind power and water power lift pump.	
06.05.1	Wind mill.	
06.05.2	Hydraulic rain.	
06.05.3	Positive displacement pump.	
06.06.1	Animal powered reciprocating type pump.	
06.06.2	Variable displacement pump.	
	(i) Specific speed.	
	(ii) Pump characteristics.	
	(iii) Terminology.	
	(iv) Effect of speed and impellor diameter on pump.	
06.07	Centrifugal and its classification.	
06.08	Priming.	
06.09.1	Centrifugal pump horizontal type.	
06.09.2	Vertical type, end closed coupled or unibuilt.	
06.10	Medium lift submersible centrifugal pump with hydraulic drive.	
06.10.1	Installation of horizontal centrifugal pump.	
06.10.2	Electrical connection of pumps.	
06.10.3	Maintenance operation and trouble shooting of centrifugal pump.	
06.11.1	Vertical turbine pump and its construction.	
06.11.2	Pump drives, direct drives, belt drive, right angled gear drive.	
06.11.3	Installation of vertical turbine pumps.	
06.11.4	Operation maintenance and trouble shooting of the vertical turbine pumps.	
06.12.1	Submersible pumps and its construction and operation.	
06.12.2	Installation and maintenance of submersible pumps.	

# NON CONVENTIONAL ENERGY

<b>Subject Code 11605B</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE:** Energy is an important input in all sectors of any country's economy. The standard of living of a given country can be directly related to per capita energy consumption. The population of the world has increased rapidly and standard of living of human being has increased hence Energy crisis occurs. If present trend continues, the world in the year 2000 A.D will be more crowded than that of today. The conventional source of energy are depleting and may be exhausted by the end of the century or beginning of the next century. Nuclear energy requires skilled technicians and poses the safety as regards to radioactive waste disposal. Solar energy and other non-conventional energy sources are the sources, those are to be utilize in future.

**Objectives:** The objective of the course content is to provide knowledge of different types of conventional & non – conventional sources of energy

The Student will be able to

- \* Understand the importance of non – conventional energy in domestic Agriculture as well as industrial sector.
- \* Understand the conversion of these energy in to useful work.
- \* Understand the conservation of energy in different field by using improved equipments.

## CONTENTS

<b><u>Topic:- 01. An introduction to Non Conventional Energy Sources.</u></b>		<b>09</b>
01.01	Classification of Energy Sources (Conventional & Non Conventional)	
01.02	Availability, Comparison and limitations	
01.03	World Energy futures	
01.04	Renewable energy Sources – Solar energy, wind energy, Biomass energy, Tidal Geothermal energy, OTEC, MHD Power, Mini & Micro Hydro Plant. Its prospects in India	
<b><u>Topic: 02. Solar Energy</u></b>		<b>05</b>
01.01	Solar constant	
01.02	Solar Radiation concept	
01.03	Solar Radiation Geometry	
01.04	Solar Radiation measurements	
<b><u>Topic: 03. Solar Energy Collectors.</u></b>		<b>06</b>
03.01	Principles of the conversion of solar radiation in to Heat.	
03.02	Flat-Plate Collectors & its efficiency.	
03.03	Concentrating Collector (Focusing Type)	
03.04	Advantages and Disadvantages of concentrating collector over flat- plate collectors.	
<b><u>Topic: 04. Solar Energy Storage</u></b>		<b>06</b>
04.01	Introduction to solar energy storage system.	
04.02	Solar pond- its principle of operation & extraction of thermal energy.	
04.03	Application of solar ponds.	
<b><u>Topic: 05. Application of Solar Energy</u></b>		<b>06</b>
05.01	Introduction	
05.02	Solar photo – voltaic system	
05.03	Solar Cell & its principle	
05.04	Solar cell Modules	
05.05	Solar cell connecting arrangements	
05.06	Application of solar Photovoltaic system (Agricultural & Industrial)	
05.07	Advantages and Disadvantages of Photovoltaic solar Energy conversion.	
05.08	Solar distillation, Solar pumping, Solar furnace, Solar cooking, solar green house & its types.	

**Topic: 06. Wind Energy.****06**

- 06.01 Wind map of India & potentials of wind power in India
- 06.02 Wind speed, wind power, wind vanes.
- 06.03 Site selection considerations.
- 06.04 Basic components of WECS (Wind Energy Conversion System)
- 06.05 Classification of WECS system.
- 06.06 Advantages & Disadvantages of WECS
- 06.07 Types of wind – machine (Wind Energy Collectors)
- 06.08 Application of wind energy

**Topic: 07 Energy from Biomass****12**

- 07.01 Introduction
- 07.02 Biogas conversion Technologies (Thermo chemical Conversion & Fermentation)
- 07.03 Biogas Generation
- 07.04 Factors affecting Bio-digestion or Generation of gas.
- 07.05 Classification of Biogas plants.
- 07.06 Types of Biogas plants.
- 07.07 Commonly used Biogas plants in India.
- 07.08 Community Bio gas plants
- 07.09 Materials used for Bio gas Generation.
- 07.10 Selection of sites for a Bio gas plants.
- 07.11 Problems related to Bio gas plants.

**Topic: 08. Energy Conservation****10**

- 08.01 An economic Concept of Energy.
- 08.02 Principles and need of conservation of energy.
- 08.03 Energy demand Management.
- 08.04 Energy Accounting & Auditing

**BOOKS RECOMMENDED**

1. Non – Conventional Energy Sources by G.D. Rai, Khanna Publisher.
2. पारम्परिक उर्जा स्रोत, द्वारा ए० एन० माथूर और एन० एल० राठौर, हिमॉशू प्रकाशक।
3. Ref Book – Solar Engineering & Thermal Process by John A duffie & William A Backman, Willey Inter Science (New York)
4. Solar Energy by G.D. Rai, Khanna Publisher.
5. Manual of Wind Mill – Institute of Engg. And Rural Technology, Allahabad.
6. Gobar Gas Plant – by Khadi village commission
7. Bio gas technology (A practical hand book) by K.C. Khandewall
8. Advances in Biogas Technology by O.P. Chwela.
9. Solar energy utilization by B.P. Sukhtma T.M.H.
10. Different Publication of Tata Energy Research Institute N. Delhi.

# COMPUTER AIDED DESIGN AND DRAWING

<b>Subject Code 11605C</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE & OBJECTIVES:** Today, all the workplace and living environment are being computerized. Every nook and corner computer the requirement of the computer knows how is must. In order to prepare Diploma Engineers to work in those environments, it is essential that they are exposed to various aspects of graphics package such as understanding the concept of CAD and its drafting application particularly in Engineering Diploma courses. Operating a computer with good working knowledge in computer aided design and its application form the broad competency profile of Diploma holders. This exposure will definitely enable the student to enter the world with confidence, live in these environments in harmonious way and contribute to the productivity.

## COURSE CONTENTS

Sl.No.	TOPIC	PERIODS
01.	Introduction to Designing and draughting Package	03
02.	Understanding AUTOCAD and its commands	04
03.	Basic Drawing Techniques	06
04.	Accuracy and Speed	02
05.	Advanced Drawing Commands	02
06.	Isometric Drawings	02
07.	Pseudo – 3D Drawings	04
08.	Text and Units	02
09.	Editing Techniques	02
10.	Working with Layers	03
11.	Block and Xrefs.	03
12.	Dimensioning	03
13.	3D- Drawing	03
14.	Wire frame Construction	03
15.	3D Faces	02
16.	Working with Paper Space	02
17.	Plan and Elevation of Buildings- Single Story	04

## CONTENTS

### 01 INTRODUCTION TO DESIGN AND DRAUGHTING PACKAGE

Traditional Draughting Techniques.

Auto Cad Draughting techniques.

Starting and finishing AUTOCAD.

Startup Dialogue Box.

The Drawing Units

The Electronic Paper Size

Drawing Screen

Menu and Toolbars.

### 02 UNDERSTANDING AUTOCAD AND ITS COMMANDS.

Starting command, Toolbar icon, flyout Toolbar, Menu command- Pull down, Keyboard,

Command Prompt – Working through line, circle, Area, erase, zoom, break etc.

Editing commands- Fillet, donut, Offset, Extending, Trimming, Move, Text, Dim, Hatch, Drag, Copy, Paste, Trim, etc.

### **03 BASIC DRAWING TECHNIQUES**

Drawing a Line.  
Drawing a Circle.  
Moving an Object.  
Using Grid and Snap.  
Drafting setting – Snap & Grid.  
Snapping to objects- the Toolbar.  
Running Objects – the Toolbar.  
Running Object Snap Tools.

### **04 ACCURACY AND SPEED**

Opening and existing drawing.  
Using Co-ordinate input  
Using the Zoom Toolbar.  
Aerial View.  
The Purge Command.  
Grips – the little blue boxes.  
System Variables.

### **05 ADVANCED DRAWING COMMAND.**

Ray- Construction Line or Xline.  
Polylines – Polyline shapes.  
Rectangles  
3D Polylines and Rectangles  
Donuts, Splines, Ellipses, Arcs,  
How to Draw a Door Arc.  
Multilines- editing, creating multiline styles, Modify Multiline Properties.  
Polygons.

### **06 ISOMETRIC DRAWING**

Isometric Drawing – setting up Isometric Mode, An Isometric Shape.  
Drawing an Isocircle.  
Isometric Drawings and Viewports.  
Saving/Restoring Tiled Viewports.  
Text on Isometric Drawings.

### **07 PSEUDO -3D DRAWING**

Not really 2D Drawing.  
Thickness – the Z dimension.  
Using Hide- the Drawing/Editing Commands.  
Elevation & Thickness, Thickness limitations.

### **08 TEXT AND UNITS.**

Single Line Text, Paragraph Text.  
Multiline Text Editor, the Spell Checker.  
Editing Text- Text size and Plotting/ Printing.  
Controlling the Drawing Units.

### **09 EDITING TECHNIQUES**

Offset, Rotate, Stretch, Lengthen, Trim, Extend, Chamfer.

### **10 WORKING WITH LAYERS**

Layers – setting up a new layer.  
Assigning a colour to a layer.  
Making a layer current, visible or invisible.  
Line types- load a line type, By Layer, By Object.  
Moving Objects to different Layers.  
Scaling Line types- Lt Scale.

### **11 BLOCKS AND XREFS.**

Blocks and Layers – Making, Inserting, Using in any Drawing.  
External References – Xrefs.  
Application and Values of Xrefs.



## **12 DIMENSIONING**

The Dimension.

The Dimensioning Toolbar.

Linear Dimensioning- Object, Snap & Dimensioning

Aligned Dimensioning.

Radius & Diameter.

Baseline, Angular Dimensioning.

Editing a Dimension – DIMEDIT Command.

## **13 3D DRAWING.**

The 3D Drawing – The coordinate Plane, WCS Icon.

The UCSICON command – Orientation of the UCS.

The X-Y Plane and Origin.

The UCS- moving up to Z axis, Naming a UCS, Rotating the UCS around X axis & Y axis, Looking at a UCS from behind – using View ports.

Editing Objects on a UCS – using 3 Points to define a UCS, The UCS command.

## **14 WIREFRAME CONSTRUCTION**

Laying the base- using layers.

Placing Text on a Plane- using Vports.

## **15 3D FACES**

3D Faces – placing 3D faces on the wire frame.

Visible 3D Face Edges, Invisible Edges.

Drawing a Window, making edges visible/invisible.

## **16 WORKING WITH PAPER SPACE**

Use of Paper space- default layout, the default layout page anatomy.

Scaling the drawing – method 1, method 2.

Working with paper space view ports – deleting & creating, freezing individual viewports.

## **17 LAN AND ELEVATION OF BUILDINGS – SINGLE STORY AND MULTISTORY**

## **BOOKS RECOMMENDED**

1. AUTOCAD by George Omura & B. Robert Callori. BPB Publication.
2. AUTOCAD by Whelan, Dreamtech Publication.
3. Principle of CAD/CAM by Rooney & Philip. Sybex Publication.

# POLLUTION AND ENVIRONMENTAL ENGINEERING

<b>Subject Code 11605D</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>		
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>100</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>80</b>
					<b>20</b>	

**RATIONALE:** With the increasing population the cost of our natural resources are being polluted day by day our existence depends upon the natural (resources) with time the general awareness is necessary.

Objectives: With the view to control the pollution to reduce the pollution of natural resources the present course contents is structure for fulfillment of objective used on scientific technological concepts:

Sl.No.	Topics	Lecture
01.	Pollution	02
02.	Air pollution	15
03.	Water pollution	04
04.	Radio active pollution	04
05.	Land pollution	04
06.	Noise pollution	04
07.	Water supply and treatment	12
08.	Safe sewage disposal & treatment	15
	<b>Total</b>	<b>60</b>

<b>01.</b>	<b>Topic: Pollution</b>	<b>02</b>
01.01	Introduction of pollution & Definition.	
01.02	Types of pollution	
<b>02.</b>	<b>Topic: Air Pollution</b>	<b>15</b>
02.01	Introduction and Definition of pollution.	
02.02	Type of Air pollution, sources of Air pollution, measurement of Air pollutes.	
02.03	Effect of pollution on man, animals, plants and properly global effect.	
02.04	Mycological factors effecting air pollution criteria of Air pollution maximum permissible concentration ground level concentration different method of abaliment and control of pollution.	
02.05	Air pollution control, zoning dilution in plant modification of process and rand material. Removal of plummets and disposal particular matter setting chamber cyclones. Scrubbers bog falter, electrostatic precipitators.	
02.06	Removal of gassers pollutions adsorption, absorption and incorruption.	
02.07	Smoke sources, effecting measurement and control Air pollution standard historical cases and pleads, elements of air conditioning.	
<b>03.</b>	<b>Topic: Water pollution</b>	<b>04</b>
03.01	Introduction, Definition, Properties of healthy water.	
03.02	Types of water impurities, source of water pollutant its effect of water pollution.	
03.03	Water pollution control	
<b>04.</b>	<b>Topic: Radio Active pollution:</b>	<b>04</b>
04.01	Introduction, Radio Active pollution.	
04.02	Radio active radiation, man made radiation & its effects.	
<b>05.</b>	<b>Topic: Land pollution:</b>	<b>04</b>
05.01	Introduction, Definition.	
05.02	Soil erosion, soil conservation.	
<b>06.</b>	<b>Topic: Noise pollution:</b>	<b>04</b>
06.01	Introduction, Definition.	
06.02	Noise pollution control.	
<b>07.</b>	<b>Topic: Water supply and treatment</b>	<b>12</b>
07.01.1	Importance of water quality and its purpose of treatment.	
07.01.2	Basic principle of water and waste water treatment unit General aspects of treatment typical flow diagrams.	
07.02.1	Purpose and different units of treatment, types of screen sedimentation, the array of sedimentation plan and coagulated.	
07.02.2	Coagulation principles and coagulants, filtration theory slow, Rapid and presser filters, filter trouble.	
07.02.3	By chlorination, detention method effect of chlorination, super chlorination and dechlorination, pre and past chlorination.	
07.02.4	Water softening & removal process of temporary and permanent hardness.	

**08. Topic: Safe sewage disposal & treatment**

**15**

- 08.01.1 Sewage, disposal, general aspect of sewage handling pollutional effect.
- 08.02.2 Methods of disposal, detention method conditions favorable for dilution methods effects on stream.
- 08.02.3 Self purification stream oxygen balance lend suitability of land treatment sewage forming sewage sickness periods.
- 08.03.1 Sewage treatment and its objectives.
- 08.03.2 Preliminary treatment.
- 08.03.3 Primary treatment.
- 08.03.4 Secondary treatment.
- 08.03.5 Final treatment for reuse typical flow diagrams sewage treatment plant layout.

**BOOKS:**

1. Air pollution by Pirkernen.
2. Air pollution by Theings.
3. Air pollution by Ocaford.
4. Air pollution hand book by Hokden & Audaly.
5. Fundamental of Air pollution by Stermelat.
6. Water supply by Rub-Academic Press.
7. Sanitary supply by S.K. Garg.
8. Waste water treatment by
9. Water supply and sanitary Engg. By G.S. Praise die.

# FARM TRACTORS AND NON CONVENTIONAL ENERGY LAB

<b>Subject Code</b> <b>11606</b>	<b>Practical</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**RATIONALE:** An agricultural Engineering Diploma holder has to operate the different machines and machinery by different power sources. The tractor is the most suitable power source for multipurpose operation of field or farm machinery. To perform the job with Quality and with good efficiency. The theoretical as well as practical know-how is must with time meeting the limited source of conventional energy its alternate energy non conventional energy source with latest technology and its know how is also very essential for these students.

**Minimum ten experiments are to be completed by the students.**

01. Familiarization of different controls on tractors and indicators and its operation.
02. Tractors driving practice, first without implements and after that with secondary tillage reversing in turnings.
03. Tractor driving practice with primary tillage implements.
04. Notching of trailer and trolley reversing in turning.
05. Trouble shooting remedies, adjustments, maintenance and repair of tractor systems clutch, gear box, brake, electrical system, steering system, hydraulic system.
06. Servicing the tractor in the job.
07. Identification of all the engine and tractor parts.
08. Identification of all the tools and instruments needs for service and repair work.
09. Estimation of per hour running cost of tractor without and with load.
10. Servicing of the hydraulic system of the tractor.
11. Study of the fabrication, quality controls, installation of a wind mill pumping unit after the suitability of its site selection.
12. Study of the fabrication, quality control, installation of a solar street light system.
13. Study of KVIC Bio gas plant system from fabrication, installation and working & maintenance.
14. Dismantling, assembling of 5 HP diesel engine pump set.
15. Operation of tractor for multipurpose activities like use of PTO or pulleys or use external hydraulic system in different activities.
16. Study of tractor travel reduction traction, efficiency, coefficient of traction, rolling resistance, pull drawbar, efficiency and traction aids and their use in tractor in different condition.
17. Operation of seed drill by the tractor.
18. Automotive Technology.
- 18.1 Dismantling & assembling if fuel injection pump.
- 18.2 Dismantling & assembling of injections.
- 18.3 Testing of fuel injection pump on the test bench.
- 18.4 Clean test & reset injector opening presence of diesel fuel injector.
- 18.5 Identification of all the components of FIP & injector.
- 18.6 Dismantling & assembling of Alternator.
- 18.7 Dismantling & assembling of starter motor.
- 18.8 Identification of all the parts of Alternator and starter motor.
- 18.9 Testing of Alternator & starter motor on the Auto Electrical test bench.
- 18.10 Testing of all A E components.
- 18.11 Adaptability & testing of Battery & alternator on a tractor.
- 18.12 Setting of special timing of fuel injection pump fitted in a tractor.
- 18.13 Measure the pollutants in exhaust emission of a tractor under idling condition.
- 18.14 Check the engine for serviceability using a compression tester.
- 18.15 Cleaning & testing of petrol injector on a petrol injector cleaner & tester.

# PROFESSIONAL STUDIES & ENTREPRENEURSHIP

<b>Subject Code</b> <b>00607</b>	<b>Sessional</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>-</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

## **RATIONALE AND OBJECTIVES:**

**RATIONALE:** Entrepreneurship is a process of action for developing composite skill and ability among individuals to discover an investment opportunity and to organize an enterprise, thereby contributing to real economic growth. It involves taking of risks and making the necessary investments under conditions of agriculture, business, industry etc. It is one of the catalytic activities fostering initiative, promoting and maintaining economic activities for the productions and distributions of wealth.

A diploma in Agricultural Engineering student should behave himself as an entrepreneur, can able to setup their own new small enterprises for economic gain, so that he/she can be self employed.

**OBJECTIVE:** The course is designed with following objectives:

- To develop skill about setting up their own new small business as enterprises for economic gains.
- To develop skill about to manage the enterprises and makes his/her business profitable by his/her intelligence.

## **COURSE CONTENTS:**

At least four sessional topics should be completed.

<b><u>Serial No.</u></b>	<b><u>Topics</u></b>
1.	Study of Small Scale Industries -- its growth and significance.
2.	Study of planning and preparation of project report.
3.	Study about costs and returns on a 10 hectare Mix farm -- its illustration through suitable example.
4.	Study of about 20 hectare Dairy farm -- its illustration through suitable example.
5.	Study of grain farming programme on a 4 hectare farm – its illustration through suitable example.
6.	Study about costs and returns (A 20 year planning span) on mango plantation – its illustration through suitable example.

## **BOOKS RECOMMENDED**

1. Farm Management – An Introduction to Economic Analysis by S.P. Dhondyal; Achal Prakashan Mandir, Parmat, Kanpur.
2. Industrial Management & Entrepreneurship Development by S. Bhatnagar and C. Jain; New Bharat Prakashan, Meerut – 250 001.
3. Entrepreneurship by M.K. Jain; Deepak Prakashan, Delhi, Chennai, Kanpur, Bhopal.

# POST HARVEST TECHNOLOGY

<b>Subject Code</b> <b>11607</b>	<b>Sessional</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>-</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**RATIONALE:** Farm products are generally not in acceptable for the consumer until they are processed up to the acceptable form. They are available in season only but their availability have to maintain through out the year in different preserved farms as well choiced farm. For these various techniques, machines are involved. An agricultural Engineering diploma student has to be become more perfect through practical sessional aspect so that he can be able to perform the job more confidently through different organistin/Agentier.

**Objectives:** The present sessional curriculum is framed in such a way so that student becomes expert in this profession. The following contents are covered for fulfill meant of objectives.

At least ten exercises are to be done.

01. Study and operation of Air screen cleaner and other cleaning Equipments.
02. Study and operation of Heated Air dryers.
03. Study and operation of screw conveyors, bucket elevators and belt conveyors.
04. Study and operation of slurry seed theaters and power mixtures.
05. Study of dal milling Equipment.
06. Study of modern rice mill.
07. Study of storage. (Cold storage)
08. Study of dairy plant.
09. Study of processing and storage plant.
10. Manufacture of butter and ghee.
11. Manufacture of ice cream.
12. Determination of specific gravity of milk.
13. Determination of fat percentage of milk.
14. Manufacture of orange squash and tomato ketchup.
15. Manufacture of Jam, Jelley & pickle technique of presentation
16. Study of makhana processing.
17. Study of chura processing mill.
18. Study of tea processing.

### **BOOKS RECOMMENDED.**

- 1 Agricultural process engineering by S.M. Handerson & R.L. Perry, John Willey & Sons.
2. Principles of agricultural Engineesring Vol II by A.M. Michel & T.P. Ojha, Jain Brothers
3. Dugd h Vigyan by Bhati and Lavaniya
4. Diary Process Engineering by J.S. Warner

# PROJECT WORK AND ITS PRESENTATION IN SEMINAR

<b>Subject Code</b> <b>11608</b>	<b>Sessional</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>-</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**RATIONALE:** Projects are intended to provide students of Agricultural Engg. Diploma with and ability to tackle new problem with inquisitiveness. The project work is included in the course to develop skill to plan, organize, survey, investigation, collect relevant data, analysis of data and take appropriate decision in the students.

**OBJECTIVES:** The course is designed with following objectives.

- Plan
- Organise
- Survey
- Investigation
- Collect relevant data
- Analysis of problem and data
- Taking decision
- Preparation of project or technical report
- Present the report before seminar.

**Serial No Topics**

01. Project planning and preparation of report.
- 02 Project work
- 03 Presentation of project work before a seminar

**COURSE CONTENTS**

**01. Topic: Project planning and preparation of report**

- 01.1 Selection of project.
  - 01.1.1 Objective of project report.
  - 01.1.2 Need of preliminary project report
- 01.2 Scheduling the Activities involved in project selection.
- 01.3 Model format of project report
- 01.4 Preparation of action plan for implementation.
- 01.5 Preparation of project Report.

**02. Topic: Project Work**

**At least two project work should be completed by the students.**

- 02.1 Innovative technology based landscape and gardening project in a big infrastructure company.
- 02.2 Innovative technology need analysis based community development project.
- 02.3 New technology based design and construction of machinery project on post harvest technology.
- 02.4 New technology based design and construction of machinery project on farm and land development.
- 02.5 Innovative technology based irrigation project (Dam project, canal project/ tube well project etc).
- 02.6 Preparation of design plan based on the soil and water conservation measures project with economic analysis.
- 02.7 Farm power and non-conventional energy based innovative projects.
- 02.8 Topic based on innovative technique, assigned project as given by respective guide/guides.

**03. Topic: Presentation of project work before seminar**

**BOOKS RECOMMENDED**

1. Entrepreneurship by M.K. Jain; Deepak Prakashan, Delhi, Chennai, Kanpur, Bhopal.
2. Hand book on project appraisal and follow up by D.P. Sarda.
3. Farm Management by S.P. Dhondyal; Achal Prakashan Mandir, Kanpur.