01.PROFESSIONAL STUDIES AND ENTERPRENEURSHIP

THEORY

SUBJECT CODE: NO OF PERIOD IN ONE SESSION: 75
FULL MARKS: 100
PERIOD PER WEEK: 03

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

The knowledge about entrepreneurship is essential for a Diploma in Agricultural Engg. Student because entrepreneurship is a purposeful activity of an individual or a group of associated individuals for creating something new, organizing & co-ordinating 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.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Topics</th>
<th>No of periods/Lectures</th>
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<tbody>
<tr>
<td>01.</td>
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<td>02.</td>
<td>Leadership</td>
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<td>03.</td>
<td>Industrial Organisation</td>
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<td>04.</td>
<td>Farm management</td>
<td>42</td>
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<tr>
<td>05.</td>
<td>Agricultural marketing</td>
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<tr>
<td>06.</td>
<td>Personal management</td>
<td>02</td>
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<td>07.</td>
<td>Financial management</td>
<td>02</td>
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<tr>
<td>08.</td>
<td>Entrepreneurship</td>
<td>10</td>
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</tbody>
</table>

COURSE CONTENTS

01. Management 04 periods
01.1 Definition.
01.2 Types of management.
01.3 Principles of management.
01.4 Functions of management.
02. **Leadership**  
02.1 Definition and concept of leadership.  
02.2 Need of leadership.  
02.3 Types of leadership.  
02.4 Qualities of leadership.  

03. **Industrial organization**  
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.  

04. **Farm management**  
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. **Management of capital.**  
04.04.1 Capital requirements of farming.  
04.04.2 Classification of capital.  
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**
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.

06.  **Personal Management**
06.1  Concept and definition of personal management.
06.2  Objectives and functions of personal management.

07.  **Financial management**
07.1  Concept and definition of financial management.
07.2  Functions of financial management.

08.  **Entrepreneurship**
08.1  Concept and definition of entrepreneurship.
08.2  Characteristics of entrepreneurship.
08.3  Meaning of entrepreneurship.
08.4  Kinds of entrepreneurship.
08.5  Characteristics of entrepreneur.
08.6  Importance of entrepreneur.
08.01  **Small Scale Industries.**
08.01.1  Definition of small scale industries.
08.01.2  Categories of small scale industries.
08.01.3  Merits and demerits of small scale industries.
**BOOKS RECOMMENDED**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Title</th>
<th>Author</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>A Hand Book for New Entrepreneurs (with special Technology target group)</td>
<td>--</td>
<td>Entrepreneurship development Institute of India, 83-A; Swastic References to science and Society, Navrangpura, Ahmedabad-380 009.</td>
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<td>6.</td>
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**SCHEME OF EXAMINATION**

**FULL MARKS – 100**

A. Terminal Examination

B. Final Examination

(i) Test of knowledge Discipline (objective questions) -- 20%

(ii) Test of understanding (short answer questions) -- 30%

(iii) Test of Application (long answer questions) -- 50%
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)

02. MECHANICS OF STRUCTRE AND STRENGTH OF MATERIAL

<table>
<thead>
<tr>
<th>SUBJECT CODE</th>
<th>THEORY</th>
<th>Total Period</th>
<th>Period per Full</th>
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<tbody>
<tr>
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<td></td>
<td>in one session</td>
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</table>

RATIONAL: 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

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

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

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.  Stope & Deflection of Beam

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.

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

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

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.

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 RECOMMENDED


Scheme of Examination For Final Examination

Objective type question – 10 marks.

Short answer type question – 15 marks.

Long answer type question – 55 marks.

Total – 80 marks.
RATIONALE :- Agricultural Production to meet the requirement with time cannot be imagined without Irrigation and Drainage Engg. Resources. Diploma holder in Agricultural Engineering have to perform his job not only in the supervision of irrigation sources its development methods command & water management planning but has to give provision for the excess waste from the agricultural field with suitable drainage system. He has to acquaint with from structural parameters to the soil water plant relationship. He has to develop and execute at he efficient system performer in different situation to get the objectives of modern & scientific Agricultural systems.

OBJECTIVES : The present course is designed in such a way so that one can get know how and ability regarding irrigation and drainage Engineering related to farmers need from source of irrigation to the latest development with time so that he can give the actual stress as desired and thus lead our agricultural production with time.

Following Topics can fulfill the objectives:

**Topics Lecture**

01. Introduction 02
02. Ground water 05
03. Source of irrigation 03
04. Storage structure 03
05. Measurement of Irrigation parameters 04
06. Infiltration 02
07. Soil moisture Retention & Movement 06
08. Soil water plant Relationship 08
09. Irrigation Efficiency 02
10. Methods of Irrigation 03
11. Irrigation & Channels 05
12. Silt Theory & Design parameter 03
13. Drainage, Drainage system 05
14. Minor Irrigation 04
15. Tube well Engineering 06
16. Pumps 07
17. Non conventional Energy pump 07

**Total Period:** 75

**COURSE CONTENTS:**

01. Topic : Introduction 02
01.01 Definition of Irrigation necessity and scope of irrigation
01.02 Irrigation potency in India
01.03 Different types of Irrigation
02. Topic: Ground water
02.01 Water bearing formations
02.02 Confined and unconfined aquifers
   02.02.02 Cavity well, shallow & Deep well
02.03 State water level, peizo metric surface
02.04 Pumping water level draw-down
02.05 Area of influence interference
02.06 Predicting well yield in confined and unconfined aquifers

03. Topic: Sources of Irrigation:
03.01 Source of Irrigation
03.02 Type of irrigation sources
03.03 Investigation and survey, Selection of site and determination of capacity of storage
04.01 Storage structures & Head works
   04.01.01 Brief introduction of different types of dams
   04.01.02 Ear than dam, Rack fill dam, hydraulic fall
04.02.01 Different types of spillways & outlets
04.02.02 Cross section of Earthen dam
04.02.03 Courses of failure of storage structures specially the Earthen dam.

05. Topic: Measurement Irrigation Parameters:
05.01 Measurement of volume.
05.02 Measurement of velocity-Area.
05.03 Measurement of discharge
05.04 Weirs & Notches, parallel flumes

06. Topic: Infiltration
06.01 Definition Measurement and factors affecting it.
06.02 Infiltration curve and its characteristics index

07. Topic: Soil moisture Retention & movement:
07.01 Soil moisture and its measurement
07.02 Soil moisture tension, soil moisture characteristics
07.03 Saturation, Field capacity moisture equipment
07.04 Wilting point, temporary & permanent wilting
07.05 Percolation seepage, hydraulic conductivity

08. Topic: Soil- water- plant relationship:
08.01 Measurement of soil water
08.02 Transpiration, Evaporation Evapo-transpiration consumptive use
08.03 Seasonal & Periodic measurement of consumptive use by Lysimer and Field experimental Plant methods
08.04 Command Areas, Gross Command Area, Culturable Command Area.
08.05 Duty of water, Delta, base period, water requirement related numerical problems
08.06 Irrigation scheduling of major corps monga factors

09. Topic: Irrigation Efficiency:
09.01 Irrigation Efficiency its definition and types
09.02 Related Numerical problems
10. **Topic:** Methods of Irrigation:
10.01 Methods of irrigation
10.02 Surface Irrigation system
10.03 Sub. Surface Irrigation system
10.04 Drip Irrigation system
10.05 Sprinklers Irrigation system

11. **Topic:** Irrigation & channels:
11.01 Irrigation channel and its types
11.02 Non erodible channels, Design of open channels, Regulatory works
11.03 Maximum permissible velocity channel slopes, Free board
11.04 Hydraulic sections Economical and Efficient sections

12. **Topic:** Silt theories & Parameter
12.01 Kennedy’s & Lacy’s theory with correction in channel design in brief
12.02 Their comparisons
12.03 Lining of open and underground channel

13. **Topic:** Drainage & Drainage system
13.01 Definition of Drainage its necessity
13.02 Water logging condition its demerits and control of water logging
13.03 Inter relationship of drainage with irrigation
13.04 Drainage co efficient, types surfaces and sub surface
13.05 Design & layout of drainage systems for agricultural purposes and related numerical problems
13.06 Special method of drainage, vertical model drainage.

14. **Topic:** Minor Irrigation:
14.01 Land survey for Leveling for minor irrigation works duty of well
14.02 Planning layout & Installation of minor irrigation channels and equipments in plain and hill areas
e.g. swinging basket moth, rahat, charasa, dhekuli, Persian screw
14.03 Low head lift pump, chain pumps, wind mill, development of well and aquifer connection of well

15. **Topic:** Tube well Engineering
15.01 Selection of site for tube well
15.02 Rigs, Types of rotary and percussion tools used for drilling
15.03 Tube well construction, installation & working
15.04 Drilling of tube wells and construction of open wells
15.05 Preparation of well-log, types of strainers and its advantages
15.06 Cavity tube well and bamboo tube well

16. **Topic:** Pumps
16.01 Reciprocating pumps, Principle and operation
16.02 Centrifugal pump, Principle and operation
16.03 Types of impellors, installation of horizontal/ Centrifugal pump
16.04 Pumps characteristics, performance curves, effect of speed and impellors diameter on pump performance
16.05 Operation, maintenance trouble shooting and remedies
16.06 Turbine pumps deep well submersible jet pumps
16.07 Lift pumps, single acting and double acting, criteria and procedure for selection of irrigation pumps
17. Topic: Non conventional Energy pump:
17.01 Wind mill pumping unit in 12 PU 500
17.02 Different types of pumping unit in wind mill different models
17.03 Solar photo voltaic water pumping unit.

BOOKS:
4. Tube well and Pumps A.M. Michel, Water Technology center IART, New Delhi.

SCHEME OF EXAMINATION
There will be theory paper of 100 marks (including terminal’s 20 marks). Final written examination will be three hours duration in one sitting. The questions will be descriptive as well as numerical nature and about 60:40 ratio based on the main topics of the subject with matter of importance.

THEORY

Full Marks: 100
(A) Terminal Examination 20
(B) Final Examination 80
   (i) Test of Knowledge Discipline (Objective Questions ) 10%
   (ii) Test of Understanding (Short Answer Questions) 30%
   (iii) Test of Applications (Long Answer Questions) 60%
04 FARM TRACTORS AND NON CONVENTIONAL ENERGY

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<th>Period per</th>
<th>Full Marks</th>
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**SUBJECT CODE** :-

**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 06
- 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:
6. I.C. Engines by Mathur & Sharma.
7. Automotive Handbook by BOSCH.

SCHEME OF EXAMINATION:

Full Marks: 100
(A) Terminal Examination 20
(B) Final Examination 80
   (i) Test of Knowledge Discipline (Objective Questions) 10%
   (ii) Test of Understanding (Short Answer Questions) 30%
   (iii) Test of Applications (Long Answer Questions) 60%
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)

05. FARM AND LAND DEVELOPMENT MACHINERY

<table>
<thead>
<tr>
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<th>Topic</th>
<th>Lectures/periods</th>
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<tr>
<td>1</td>
<td>Tillage</td>
<td>03</td>
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<tr>
<td>2</td>
<td>Primary Tillage equipments</td>
<td>06</td>
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<tr>
<td>3</td>
<td>Secondary Tillage Equipments</td>
<td>05</td>
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<td>4</td>
<td>Sowing &amp; Planning Equipments</td>
<td>05</td>
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<tr>
<td>5</td>
<td>Cultivator &amp; weed control Equipments</td>
<td>04</td>
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<td>6</td>
<td>Fertilizer Equipments</td>
<td>03</td>
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<tr>
<td>7</td>
<td>Harvesting equipments</td>
<td>04</td>
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<tr>
<td>8</td>
<td>Threshing Equipments</td>
<td>06</td>
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<td>9</td>
<td>Processing Equipments</td>
<td>03</td>
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<tr>
<td>10</td>
<td>Land Development Equipments</td>
<td>05</td>
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<tr>
<td>11</td>
<td>Economic Equipments</td>
<td>04</td>
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**RATIONALITY**: To adopt the modern and scientific Agriculture a farm engineer has to know about complete idea of new concept based land development for successful operation is essential. **OBJECTIVES**: The present curriculum is designed to give complete concept of modern and scientific system and its necessity as well as familiarization of Land development and farm machinery from its constructional detail to the working for objectives. Following course contents can build the ability in Diploma holder to fulfill the objective.

**COURSE CONTENTS**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Topic</th>
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<tbody>
<tr>
<td>01.</td>
<td>Tillage</td>
<td>03</td>
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<tr>
<td>01.01</td>
<td>Definition and function id Tillage</td>
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<tr>
<td>01.02</td>
<td>Tillage system, types of tillage</td>
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<td>01.03</td>
<td>Tillage implements</td>
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<tr>
<td>02.</td>
<td>Primary Tillage Equipments</td>
<td>08</td>
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<tr>
<td>02.01.1</td>
<td>Mould Board Plough. Type of mould board.</td>
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<td>02.01.2</td>
<td>Construction, Types of share mould board</td>
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<td>02.01.3</td>
<td>Material of construction.</td>
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<td>02.01.4</td>
<td>Concept of suction, plough size, Hitch</td>
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<tr>
<td>02.02.1</td>
<td>Draft, Side draft, unit draft, factors</td>
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<td>02.02.2</td>
<td>Force acting on plough (introduction only).</td>
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<td>02.03.1</td>
<td>Disc plough, purpose, principles types</td>
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<td>02.03.2</td>
<td>type and constructions and adjustment.</td>
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<td>02.04.1</td>
<td>Ploughing, concept of tools related</td>
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<td>02.04.2</td>
<td>with ploughing methods of ploughing.</td>
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<td>02.04.3</td>
<td>Coulter plough, chisel, subsurface, rotary</td>
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<td>02.04.4</td>
<td>plough.</td>
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</tbody>
</table>
03. Secondary Tillage Equipments:
03.01.1 Harrow, its type construction.
03.01.2 Adjustment of Animal and Tractor driven harrow.
03.02.1 Land rollers packers & pulveriser.
03.02.2 Its type, construction and operation.

04. Sowing & Planting Equipments:
04.01.1 Seed drill. Functions, types and constructional detail.
04.01.2 Size and material devices, Burrow opener, sand covering devices.
04.01.3 Calibration of seed drill and related numerical problems.
04.02.1 Planters, Function, Types.
04.02.2 Its motoring devices, methods of planting.

05. Cultivator and weed control Equipments:
05.01.1 Cultivators and its types.
05.01.2 Constructions and its adjustments.
05.02.1 Rotary hoe, its construction and working.
05.03.1 Flame weed control, its construction and working.
05.03.2 Sprayer & dusters, its types.
05.03.2 Their construction and working.

06. Fertilizer Equipments:
06.01.1 Manure spreaders, its construction and working.
06.02.1 Fertilizer distributors, its construction and working.
06.02.2 Liquid fertilizer application.

07. Harvesting Equipments:
07.01.1 Mower and Reaper principle of culling.
07.01.2 Types, construction, working, adjustments, trouble and reasons.
07.02.1 Field forage Harvester, its types and working advantage.
07.03.1 Potato digger, its construction and working.
07.03.2 Potato digger shaker its construction and working.

08. Threshing Equipments:
08.01.1 Olpad Thresher, its construction and working.
08.02.1 Power wheat thresher, terminology connected with power thresher.
08.02.2 Its function, constructional detail and working.
08.02.3 Paddy power thresher manual and power operated, its construction and working details.
08.02.4 Multi crops thresher, its construction and working.
08.02.5 Trouble shooting and adjustment in wheat, paddy and multi crop thresher.
08.02.6 Combine its types functions, principle units and their construction and working.

09. Processing Equipments:
09.01.1 Chaff cutter, in silage cutter their construction, working and capacity.
09.02.1 Sugarcane crusher, types construction and working.
09.03.1 Corn Sheller, construction and working.
09.04.1 Winower, types construction and working.
10. **Land Development Equipments:**
10.01.1 Dozer, its adjustment of blade operation and output.
10.01.2 Concept of land leveling, cutting and filling.
10.02.1 Scraper, construction and output.
10.03.1 Excavating Equipments, construction and working.
10.03.2 Power Shovel, drag outs and draft line and its working.

11. **Economic and Management of Farm Equipments:**
11.01.1 Matching equipments to farm needs.
11.02.1 Calculation of cost of operation of machines.
11.03.1 Field Capacity and Field efficiency.
11.04.1 Repairing and maintenance of farm machinery.
11.05.1 Customer use of farm equipments, advantages and disadvantages.

**SCHEME OF EXAMINATION**
There will be theory paper of 100 marks (including terminal’s 20 marks). Final written examination will be three hours duration in one sitting. The questions will be descriptive as well as numerical nature and about 60:40 ratio based on the main topics of the subject with matter of importance.
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)
06. FARM STRUCTURE AND ESTIMATION

<table>
<thead>
<tr>
<th>SUBJECT CODE</th>
<th>THEORY</th>
<th>Total Period</th>
<th>Period per</th>
<th>Full</th>
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<td>Marks</td>
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<td></td>
<td>50</td>
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RATIONALE: One of the Basic responsibilities of an Agricultural Engineer is to construct the structures needed by farmer, which are mostly made of local available materials, well furnished building structures of various use. Thus know-how of details of structures and its estimation concept is must.

Objectives: The present curriculum is designed in such a way so that idea of different types completely known. Calculations of the detailed quantities of materials and working out their costs as a estimation or execution can be done.

CONTENTS: (A ) STRUCTURE
Topic: 01  Rural Building 05
01.01 Poultry house, grains bins and godowns, silos, Bunker (in brief)
01.02 Their constructional details, capacity & functional requirements.

Topic: 02.  Rural Sanitation 03
02.01 Septic Tank, soak pit, PRAI Channels
02.02 Bore hole, latrines, trench latrine, PRAI Latrine

Topic: 03.  Agricultural Workshop 03
03.01 Brief idea of machine foundation.
03.02 Installation of machine on platform.
03.03 Pump house
03.04 Threshing floor
03.05 Implement sheds

Topic: 04.  Farm Road 03
04.01 Kachacha Road, W.B.M. Road and Pukka Road

Topic: 05.  Rural Drainage 03
05.01 Specification as per B.I.S. Standards and detail estimation of different components of structures.

Topic: 06.  Gobar Gas Plants 04
06.01 Type of Gobar Gas Plant, Movable dome, Fixed dome.
06.02 Janta Bio Gas Plant and its specification.

(B) ESTIMATION

Topic: 07.  Building Construction 03
07.01 Foundation, construction details of spread footing
07.02 Different types of soils and its bearing capacity
07.03 Estimation of material in spread footing, Earth work and layout of centre to centre line of building.

Topic: 08.  Stone and Brick Masonry 02
08.01 Study of various types of bricks with special emphasis on English bond, L, T and + junctions.

08.02 Estimation of bricks for brick wall and masonry.

**Topic: 09. Damp proof Course**

09.01 Methods of providing DPC materials used and its estimation.

**Topic: 10. Doors and Windows**

10.01 Doors and windows, types and used sections.
10.02 Windows and lights as ventilators
10.03 Their position on building sizes and estimation of materials for this and deduction in building for it.

**Topic: 11. Plastering and Pointing.**

11.01 Plastering and pointing, methods of doing.
11.02 Estimation of plastering and pointing.

**Topic: 12. Preparation**

12.01 Laying
12.02 Compaction and curing of concrete.
12.03 Use of local materials for farm work.
12.04 Application of type of cement.

**Topic: 13. Lintels and Arches**

13.01 Classification of lintels by materials
13.02 Materials of constructions
13.03 Methods of arch construction.

**Topic: 14. Floor**

14.01 Types of flooring
14.02 Drainage and cleaning of floors.

**Topic: 15. Roof.**

15.01 Type of roof
15.02 Pitched roof
15.03 Lean to roof
15.04 King post truss
15.05 Queen post trusses

**Topic: 16. Item Estimation**

16.01 Abstract and details estimate
16.02 Earth work for pitch cum bund
16.03 Estimate of a masonry well
16.04 Estimate of earth work in irrigation channels
16.05 Estimate of septic tank
16.06 Estimate of two room residential building

**Topic: 17. Application of computer programming**

17.01 Application of computer programming on a simple estimate.
BOOKS RECOMMENDED

2. Estimating and Costing – by G.S. Birdi
4. Soil Mechanics and Foundation – by B.C. Punamia
5. Farm Building Design – by Now powr L.W. & Walker H.B.
6. Treasures of R.C.C. Design – by Sushil Kumar
7. Planning Farm Building – by Wooly
8. Farm Structures – by Barrey & Sommet
10. A Text Book of Estimating Costing
    Publisher: Standard Publisher Distributors.

**Scheme of Examination:** There will be a theory Exam. of 100 marks including Internal.

- Objective type question - 10%
- Short Type question 15%
- Long Type (Descriptive / Numerical ) 75%

Duration of Final Exam. will be of Three hours
07. FARM STRUCTURAL DRAWING

THEORY

Full Marks: 100
No. of period in one session: 75
No. of period in a week: 03

RATIONALE: As we know that drawing is the language of technician. Hence in order to make a technician per e
effect he should have the concept of the drawing of farm structure. He should be able to prepare detailed drawing of structures. Through these drawing he will come across during service.

Objective :- The course is designed in such a way so that a Diploma holder can develop the idea of farm structure drawing. He can read, under stand and execute the correct Structure drawing.

Sl.No. Topics
1. Foundation
2. Buildings.
3. Door and window.
4. Stair & Stair Case
5. Roof & Roof truss.
6. Irrigation Structure
7. Plants Drawing
8. Contents.

01. Topic: Foundation
01.01 Plan and section of the following foundations.
1. Strip Foundation 03
2. Under-reamed pile foundation
3. Isolated foundation.

02. Buildings
02.01 Plan, elevation and section of single stons building with flat roof 05
02.02 Plan elevation and section of a godown with inclined roof over truss.
(span 10 meter)
02.03 Plan elevation and section of a cattle barn (Starvhan or loone housing for 50 cows)
02.04 Plan elevation and section of pouiltry farm deep litter system 03
02.05 Plan elevation and section of sewage system of the following U-Shaped surface drain, V-Shaped surface drain & Septic tank.

03. Topic: Door and Window
Plan-elevation and section of the following
03.01 Battened and ledged door & window.
03.02 Framed and paneled door & window.
03.03 Glazed or Sash door & window.
03.04 Dormer window

04. Stair & Stair Case
04.01 Plan and cross section of Dog legged or newel half turn stair.
04.02 Plan and cross section of newel quarter turn stair.
04.03 Plan and cross section of Bifurcated stair.
05. **Roof & Roof Truss**
05.01 Section and elevation of lean to roof.
05.02 Section and elevation of cable roof.
05.03 Section and elevation of king post roof.
05.04 Section and elevation of queen post.
05.05 Steel roof truss.

06. **Irrigation Structure**
06.01 Sectional plan, half elevation and half cross section of cross drainage worn of siphon aqueduct.
06.02 Sectional plan half elevation of half cross section of sarda type fall.
06.03 Section plan, half elevation and half cross section of single span R.C.C. slab, culvert.

07. **Plant Drawings**
07.01 Drawing of gobar gas plant, fixed dome as per KVIC specification.
07.02 Drawing of rain water harvesting plant.

08. **Distribution of marks**
08.01 Farm building: (a) Plan 25 marks  
(b) Section 20 marks  
(c) Elevation 15 marks  
Irrigation Structure: (a) Half foundation plan  
(b) Half cross section & half elevation – 30

(2) Any of the following  
1. Door & Window.  
2. Stair  
3. Roof Truss.  
4. Gobar Gas plant & Rain water harvestiy plant.

**BOOKS:**
1. Civil Engineering Drawing. By Sah and Kale  
5. I. S. Code 696 & 062  
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)

08. POST HARVEST TECHNOLOGY

<table>
<thead>
<tr>
<th>Subject Code</th>
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<th>Total Period (in one session)</th>
<th>Period per week</th>
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**RATIONALITY:** 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**

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<td>Introduction</td>
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<td>03.</td>
<td>Cleaning and grading</td>
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<td>Seed treatment</td>
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<td>05.</td>
<td>Material Handling</td>
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<td>06.</td>
<td>Bagging</td>
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<td>Storage</td>
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<td>08.</td>
<td>Milling and threshing</td>
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<td>09.</td>
<td>Rice milling</td>
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<td>10.</td>
<td>Cane Crushing</td>
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<td>11.</td>
<td>Fruit preservation</td>
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<td>12.</td>
<td>Dairy Engineering Process Equipments</td>
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<tr>
<td></td>
<td>Introduction and importance of seed processing principles of Agricultural processing</td>
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<td>01.02</td>
<td>Sequences of operations, flow diagram service offered by processor to farmers, wheat, maize, paddy and soybean processing.</td>
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<tr>
<td>01.03</td>
<td>Different steps involved in seed processing.</td>
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<tr>
<td>02.</td>
<td>Drying</td>
<td>06</td>
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<tr>
<td>02.01</td>
<td>Importance of seed and grain moisture and drying.</td>
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<tr>
<td>02.02</td>
<td>Estimation of moisture by direct and indirect method.</td>
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<tr>
<td>02.03</td>
<td>Equilibrium moisture contents.</td>
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<tr>
<td>02.04</td>
<td>Principles of drying, drying process.</td>
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<tr>
<td>02.05</td>
<td>Constant ratio period and falling rate period.</td>
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<tr>
<td>02.06</td>
<td>Drying kinds, thin and thick bed drying.</td>
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<tr>
<td>02.07.1</td>
<td>Temperature and air flow requirement.</td>
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</tbody>
</table>
02.07.2 Natural air and heated air drying.
02.08 Solar drying. Direct and indirect dryer, their efficiency and economy.

03. **Cleaning and grading**
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.

04. **Seed Treatment**
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.

05. **Material Handling Equipments**
05.01 Screw conveyers, belt conveyers.
05.02 Bucket elevator.
05.03 Pneumatic conveyers.
05.04 Construction of different types of conveyers and maintenance.

06. **Bagging**
06.01 Manual bagging.
06.02 Semi automatic bagging machine.
06.03 Automatic bagging machine.

07. **Storage**
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.

08. **Milling and Threshing**
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.

09. **Rice milling**
09.01 Elementary study and operation of modern rice milling with line flow diagram, quality control.
09.02 Chura mill and makhana processing unit.
10. **Cane crushing and juice extraction.**
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.

11. **Fruit Preservation**
11.01 Importance of fruit preservation.
11.02 Quality of preservation.
11.03 Fruit processing, preparation of squash, jam, jelly marbled, pickles and other products.

12. **Dairy Engineering**
12.01 Different dairy processes of milk receiving equipments.
12.01.1 Milking machine – principles and operations.
12.01.2 Pasteurization – its definition and types.
12.02.1 Its merits and demerits.
12.02.2 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.

2. Principles of agricultural Engineering Vol II by A.M. Michel & T.P. Ojha, Jain Brothers
3. Dugdh Vigyan by Bhati and Lavaniya
4. Diary Process Engineering by J.S. Warner

SCHEME OF EXAMINATION

There will be theory paper of 100 marks (including terminal’s 20 marks). Final written examination will be three hours duration in one sitting. The questions will be descriptive as well as numerical nature and about 60:40 ratio based on the main topics of the subject with matter of importance.
SUBJECT CODE : -

RATIONALE: A Diploma holder is a first line supervisor. He/she has to plan soil and water conservation engineering project as well as have to execute the plan mainly at field, so that objective of the project can be fulfill. He/she has the skill to adopt and can execute the actual plan of the soil and water conservation measures. Technical know how is must for the successful implementation.

OBJECTIVES: Present curriculum is designed to develop the know how from hydrology and different runoff characteristics like estimation, measurement to the surface hazard due to it and its controlling measures. Successful, modern and scientific agricultural practices can be adopted only when our land with its existence and fertility can be maintained with time. Following contents can fulfill the objectives:

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<tr>
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<tr>
<td>01.</td>
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<td>02.</td>
<td>Recurrence Interval</td>
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<tr>
<td>03.</td>
<td>Estimation of Runoff</td>
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<tr>
<td>04.</td>
<td>Measurement of Runoff</td>
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<td>05.</td>
<td>Pollution and Control</td>
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<td>06.</td>
<td>Soil Erosion</td>
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<td>07.</td>
<td>Soil and Water Conservation</td>
<td>04</td>
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<td>08.</td>
<td>Land Capability classification</td>
<td>05</td>
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<tr>
<td>09.</td>
<td>Bunding and Terracing</td>
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<td>10.</td>
<td>Temporary Structures</td>
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<td>11.</td>
<td>Permanent Structures</td>
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<td>12.</td>
<td>Gully erosion control</td>
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<td>13.</td>
<td>River control works</td>
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<td>14.</td>
<td>Ravine Reclamation</td>
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<td>15.</td>
<td>Wind Erosion and Control</td>
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CONTENTS

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<tr>
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<td>Hydrologic cycles.</td>
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<tr>
<td>01.02</td>
<td>Water Budget of India.</td>
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<td>01.03</td>
<td>Rainfall, variation of rainfall.</td>
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<td>01.04</td>
<td>Characteristics of rainfall in India.</td>
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<td>01.05</td>
<td>Rainfall intensity and rain gauges.</td>
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<tr>
<td>01.06</td>
<td>The average rainfall methods of computation.</td>
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</table>
01.03.5 The Arithmetic rainfall, the Theisson’s polygon method, Isohytal method of computation of mean annual rainfall.

01.03.6 Storm pattern.

01.04.1 Humidity, measurement of humidity.

01.04.2 Temperature and its pattern.

02. Recurrence Interval

02.01.1 Probability of Occurrence of Rain.

02.01.2 Analysis of precipitation data.

02.01.3 Rainfall Map of India for different return period.

02.01.4 Type of Rainfall, intensity and storm duration.

03. Estimation of Runoff.

03.01.1 Estimation of Runoff by infiltration method.

03.01.2 Rational method of Runoff estimation.

03.01.3 Cook’s Method.

03.01.4 Hydrological Soil group method.

03.01.5 Estimation of flood discharge.

03.02.1 Runoff hydrograph.

03.02.2 Unit hydrograph and calculation of runoff.

04. Measurement of Runoff

04.01.1 Measurement of Runoff from small agricultural watershed.

04.01.2 Installation and maintenance of runoff measuring devices.

04.01.3 Use of stage recorders.

04.01.4 Stream gauging.

05. Pollution Control:

05.01.1 Pollution and its types.

05.01.2 Air Pollution, its causes and controlling measures.

05.01.3 Water Pollution, its causes and controlling measures.

05.01.4 Land Pollution, its causes and controlling measures.

05.01.5 Radio Active Pollution and its control.

06. Soil Erosion:

06.01.1 Erosion, types and causes of erosion and extent of erosion by various agencies.

06.01.2 Factors affecting erosion.

06.01.3 Process of soil detachment, transportation, sampling.

06.01.4 Installation of silt, sediment measurement devices.

07. Soil Water Conservation:

07.01.1 Necessity of soil conservation.

07.01.2 Changing concept of erosion.

07.01.3 Damage caused by erosion and its estimation.

07.01.4 Rates of erosion and runoff, factor affecting them.

08. Land Capability Classification:

08.01.1 Land capability classification.

08.01.2 Healthy soil and problem soil with its remedy.

08.01.3 Agronomical soil conservation practices in alluvial tract and hills.

08.01.4 Crop rotation from soil conservation point of view. Strip cropping pattern.

08.02.1 Vegetative control of gullies, vegetated waterways.

08.02.2 Green manuring mulching.
08.02.3 Posture grassland management, use of posture land with control grazing arrangement.
08.02.4 Control use of shrubs, vanes and other plants forestry in soil and water conservation.
08.02.5 Tree planting management, wind break and shelter belts.

**09. Bunding and Terracing:**
09.01.1 Bunding and terracing, its types.
09.01.2 Broad base and narrow base bund, contour and graded bunds and terraces.
09.01.3 Bench terraces its types design planning by direct methods.
09.01.4 Countouring field layout construction and cost estimation of bunding terracing system outlet.

**10. Temporary Structures:**
10.01.1 Temporary structures, Earthen check dam.
10.01.2 Drop spillway, chute spillway and drop inlet spillway
10.01.3 Their different types of inter conduit and inlet & outlet suitability.
10.01.4 Hydrological hydraulic and structural design of their different structures to suit various drop and discharge.

**12. Cully control:**
12.01.1 Gully and its types
12.01.2 Stages of gully and its stabilization by vegetation and mechanical measures

**13. River control works:**
13.01.1 River control works
13.01.2 Stages of gully and its stabilization by vegetation and mechanical measures
13.01.3 River straightening.

**14. Ravine Reclamation:**
14.01.1 Ravine Reclamation classification of ravines
14.01.3 Measure for Ravines reclamation
14.01.4 River straightening.

**15. Wind Erosion & control:**
15.01.1 Wind characteristics
15.01.2 Wind pattern in India & wind erosion
15.01.3 Wind erosion causes factors affecting & control
REF. BOOKS:
2. Soil Water Conservation Engineering By R. Suresh, Publisher: Standard Publishers Distributors New Delhi
4. Land and water management By V.V.N. Mruty, Kalyani, Publisher.

SCHEME OF EXAMINATION:
There will be a theory paper of 80 marks and 20 marks of terminal Exam. Of 3 hours duration & one hour respectively Descriptive as well as numerical problems will be there about 60:40 ratio based on the main topics of the subject with matter of importance. One sessional paper related to this subject is also there for 50 full marks under which student have to go through the various practical aspect of the subject as it is in the objective. Under project work some topic related to this can be assigned for successful execution of site of work.

THEORY

| (A) Terminal Examination | Full Marks: 100 |
| (B) Final Examination | |
| (i) Test of Knowledge Discipline | 20 |
| (Objective Questions) | 10% |
| (ii) Test of Understanding | 80 |
| (Short Answer Questions) | 30% |
| (iii) Test of Applications | |
| (Long Answer Questions) | 60% |
10(01). WATER RESOURCE DEVELOPMENT & MANAGEMENT

<table>
<thead>
<tr>
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<th>Period per week</th>
<th>Full Marks</th>
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<td>75</td>
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**SUBJECT CODE :** - 01310

**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 acquire with the up to date technological advancement the present effective curriculum is made to fulfill the objectives.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Topics</th>
<th>Lecture</th>
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<tbody>
<tr>
<td>01.</td>
<td>Soil water plant relationship</td>
<td>09</td>
</tr>
<tr>
<td>02.</td>
<td>Irrigation</td>
<td>03</td>
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<tr>
<td>03.</td>
<td>Irrigation methods</td>
<td>10</td>
</tr>
<tr>
<td>04.</td>
<td>Water resources Development</td>
<td>08</td>
</tr>
<tr>
<td>05.</td>
<td>Wells and tube wells</td>
<td>10</td>
</tr>
<tr>
<td>06.</td>
<td>Irrigation pumps</td>
<td>10</td>
</tr>
</tbody>
</table>

01: **Topic: Irrigation**

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

02: **Topic: Soil water plant relation**

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
03: **Topic: Irrigation methods**

03.01.01. Method of irrigation introduction
03.01.02. Surface, sub surface, sprinkler irrigation
03.02.01. Flooding furrow method and contour farming.
03.02.02 Details of sub-surface irrigation.
03.02.03 Details of sprinkler irrigation.
03.02.04 Limitation of the method.
03.03.01 Types of sprinkler systems.
03.03.02 Perforated pipe system.
03.03.03 Based on portability.
   a. Semi portable.
   b. Semi permanent system.
   c. Solid set system.
   d. Permanent system.
03.03.04 Components of sprinkler system.
03.03.05 Classification of rotating head sprinkler system and their characteristics and adoptability.
03.04.01 Details of the system and its components.

04. **Topic: Water Resources Development**

04.01 Water resources and their development.
04.02 Different resources of water surface and sub-surface.
04.03 Hydrologic cycles.
04.04.01 Resources of water.
04.04.02 Ground water in filtration in rain water.
04.04.03 Porosity.
04.04.04 Water bearing stratum.
04.04.05 Ground water flow, Darcy Law and permeability.
04.04.06 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.

05. **Topic: Wells and Tube wells**

05.01 Irrigation wells.
05.02 Different types of wells. Introduction of different types and classification.
05.03 Method of construction of tube well.
05.03.01 Boring method.
05.03.02 Hand boring and water jet boring method.
05.03.03 Percussion method or cable tool method.
05.03.04 Hydraulic rotary method.
05.03.05 Rivers rotary method.
05.04.01 Well assembly.
05.04.02 Development of well.
05.04.03 Sequence of operation.
05.04.04 Discharge equation of wells from unconfined strata.
05.04.05 Discharge equation of wells from confined strata.
05.05.01 Cavity wells. Introduction and method of construction.
05.05.02 Causes of failure of cavity wells and their probable remedy.
06. **Topic : Irrigation Pumps**

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 impeller 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.

**SCHEME OF EXAMINATION**

This is one of the elective subjects, if selected, there will be 100 marks including 20 marks of the terminal exam. Three hours examination will be held for this theory subject.
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)
10 (2) NON CONVENTIONAL ENERGY

<table>
<thead>
<tr>
<th>SUBJECT CODE</th>
<th>-01310</th>
<th>THEORY</th>
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<tr>
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</table>

**RATIONALE:** Energy in 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**

**Topic:- 01. An introduction to Non Conventional Energy Sources.**

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.

**Topic: 02. Solar Energy**

02.01 Solar constant
02.02 Solar Radiation concept
02.03 Solar Radiation Geometry
02.04 Solar Radiation measurements

**Topic: 03. Solar Energy Collectors.**

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.
**Topic: 04. Solar Energy Storage**

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.

**Topic: 05. Application of Solar Energy**

05.01 Introduction
05.02 Solar photo – voltaics 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.**

06.01 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**

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**

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.
6. Gobar Gas Plant – by Khadi village commission
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.

SCHEME OF EXAMINATION
1. Terminal – 20 marks.
2. Board Examination – 80 marks.
   Question should be objective, subjective & Numerical on Important topics.
10 (05) POLLUTION AND ENVIRONMENTAL ENGINEERING (Elective)

<table>
<thead>
<tr>
<th>THEORY</th>
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<th>Period per week</th>
<th>Full Marks</th>
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</table>

SUBJECT CODE :-

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 a 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:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Topics</th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Pollution</td>
</tr>
<tr>
<td>01.01</td>
<td>Introduction of pollution &amp; Definition.</td>
</tr>
<tr>
<td>01.02</td>
<td>Types of pollution</td>
</tr>
<tr>
<td>02.</td>
<td><strong>Topic: Air Pollution</strong></td>
</tr>
<tr>
<td>02.01</td>
<td>Introduction and Definition of pollution &amp; pollutions.</td>
</tr>
<tr>
<td>02.02</td>
<td>Type of Air pollution, sources of Air pollution, measurement of Air pollutes.</td>
</tr>
<tr>
<td>02.03</td>
<td>Effect of pollution on man, animals, plants and properly global effect.</td>
</tr>
<tr>
<td>02.04</td>
<td>Mycological factors effecting air pollution criteria of Air pollution maximum permissible concentration ground level concentration different method of abaliment and control of pollution.</td>
</tr>
<tr>
<td>02.05</td>
<td>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.</td>
</tr>
<tr>
<td>02.06</td>
<td>Removal of gassers pollutions adsorption, absorption and incorruption.</td>
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<tr>
<td>02.07</td>
<td>Smoke sources, effecting measurement and control Air pollution standard historical cases and pleads, elements of air conditioning.</td>
</tr>
<tr>
<td>03.</td>
<td><strong>Topic: Water polluation</strong></td>
</tr>
<tr>
<td>03.01</td>
<td>Introduction, Definition, Properties of healthy water.</td>
</tr>
<tr>
<td>03.02</td>
<td>Types of water impurities, source of water pollutant its effect of water pollution.</td>
</tr>
<tr>
<td>03.03</td>
<td>Water pollution control</td>
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</table>

Total 50
04. **Topic: Radio Active pollution:**
   04.01 Introduction, Radio Active pollution.
   04.02 Radio active radiation, man made radiation & its effects.

05. **Topic: Land pollution:**
   05.01 Introduction, Definition.
   05.02 Soil erosion, soil conservation.

06. **Topic: Noise pollution:**
   06.01 Introduction, Definition.
   06.02 Noise pollution control.

07. **Topic: Water supply and treatment**
   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 de chlorination, pre and past chlorination.
   07.02.4 Water softening & removal process of temporary and permanent hardness.

08. **Topic: Safe sewage disposal & treatment**
   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 Ocafard.
5. Fundamental of Air pollution by Stermelat.
8. Waste water treatment by
SCHEME OF EXAMINATION
This is the critical paper has full marks 100 out of which 20 marks will be for terminal examination and there will be a theoretical paper of written examination of 80 marks for three hours. Most of the questions will be descriptive (subjective) in nature covering the important topics.

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<tr>
<td><strong>THEORY</strong></td>
<td><strong>FULL MARKS – 100</strong></td>
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<tr>
<td>A. Terminal Examination</td>
<td>-- 20</td>
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<tr>
<td>B. Final Examination</td>
<td>-- 80</td>
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</tr>
<tr>
<td>(i) Test of knowledge Discipline (objective questions)</td>
<td>-- 20%</td>
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<tr>
<td>(ii) Test of understanding (short answer questions)</td>
<td>-- 30%</td>
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</tr>
<tr>
<td>(iii) Test of Application (long answer questions)</td>
<td>-- 50%</td>
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</table>
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)
11. IRRIGATION AND DRAINAGE ENGINEERING

<table>
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RATIONALE: A diploma in Agriculture Engineer adequate facilities to provide adequate facilities to the farmers field so that modern and scientific to the farmers field so that modern and scientific methods of agriculture can he adopted. Irrigation and drainage is the must importance aspect of and agricultural field and thus being how to solve the each phase of technical problem regarding irrigation and drainage.

Objectives: The present curriculum of practical is fabricated in such a way so that one can get the clear conception of as well as practical aspect of the subject theoretical.

The following topics are covering the practical perfect ness and make expert to the students.

01. Study and sketch of spill ways and out lets.
02. Study of different type of methods of irrigation adopted for different crops at farmers fields.
03. Study and sketch of infiltration and actual determination of infiltration a rate of said in the field.
04. Study and sketch of different works notches orifices and flumes and flow measurement in channel.
05. Determination of discharge of a channel by (a) float method (b) current meter methods.
06. Study sketch of tensiometer and its use in determination of soil moisture.
07. To measure pressure head in saturated soil by pizo meter.
08. To determine permeability of soil by constant head permeometer.
09. To determine permeability of soil by variable head permeometer.
10. Land leveling for irrigation determination of cuts and field.
11. Layout of water carriage and field drains.
12. Study of different types of control structures like gates value in irrigation channels.
13. Practices of irrigation from planning and its layout in the field.
14. Preparation of drainage plans and its layout in the field.

Scheme of Examination:
The Subject has 50 marks as full for practical, 20 for in internal 30 for external. The pattern of examination will be same as usually in practice examination by external and internal exam. is 25 out of the 50 marks.

A. Internal assessment 20 marks
   - Regularity 10%
   - Discipline 10%
   - Viva-voce 20%
   - Class work 60%

B. External assessment 30 marks
   - Assessment by Internal Committee 50%
   - Assessment by External Committee 50%

Books: same as given for theory subject.
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)

12. FARM TRACTORS AND NON CONVENTIONAL ENERGY

<table>
<thead>
<tr>
<th>PRACTICAL</th>
<th>Total Period</th>
<th>Period per Week</th>
<th>Full Marks</th>
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SUBJECT CODE :-

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.
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.

**PRACTICAL**

<table>
<thead>
<tr>
<th>Internal Examination</th>
<th>20 = 15 (Job) + (Viva-voce)</th>
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<tr>
<td>External Examination</td>
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AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)

13. FARM AND LAND DEVELOPMENT MACHINERY:

**SUBJECT CODE:** PRACTICAL

<table>
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<th>Total Period</th>
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<td>50</td>
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**RATIONALE:** An agricultural Engineering Diploma holder has to implement the modern and scientific agricultural method as per the time demand for the above purpose he has to prepare utilized idea of construction its working principles and its purposed by utilizing it.

**Objectives:** The present practical curriculum is designed in such a way so that there should not be more gap between theory & Practical. To make him more confident and more perfect in his job.

**Following contents are covered.**

**CONTENTS**

*Minimum ten experiments have to do by the students.*

Dismantling, assembly and attachments of bullock drawn and tractors draw Equipment of the following:

01. Mould board plough.
02. Disc plough
03. Harrow
04. Cultivator
05. Study of rotary tillers.
06. Field operation of above implements.
07. Study of various type of seed drill their metering devices and operation in the field.
08. Seed drill calibration.
09. Study of planters and Trans planters.
10. Study of manure spreader and fertilizer applicator.
11. Study of sprayers and dusters their field operation demonstration of sprayers by various types of nozzles.
12. Study of mowers and reapers.
13. Study of thresher and winnower, various adjustments.
15. Study of chaff cutters & sugar cane crushers and adjustments.
17. Study of power harrow.
Scheme of Examination:
The Subject has 50 marks as full for practical, 20 for in internal 30 for external. The pattern of examination will be same as usually in practice examination by external and internal exam. is 25 out of the 50 marks.

A. Internal assessment 20 marks
   Regularity 10%
   Discipline 10%
   Viva-Voce 20%
   Class work 60%

B. External assessment 30 marks
   Assessment by Internal Committee 50%
   Assessment by External Committee 50%

BOOKS:
Same as given in theory curriculum.
14. PROFESSIONAL STUDIES & ENTREPRENEURSHIP
   SESSIONAL

SUBJECT CODE: NO. OF PERIODS IN ONE SESSION: 50
   FULL MARKS: 50
   PERIOD PER WEEK: 02

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.

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

BOOKS RECOMMENDED

1. Farm Management – An Introduction to Economic Analysis by S.P. Dhondyal; Achal Prakashan Mandir, Parmat, Kanpur.
3. Entrepreneurship by M.K. Jain; Deepak Prakashan, Delhi, Chennai, Kanpur, Bhopal.
## SCHEME OF EXAMINATION
### SESSIONAL

<table>
<thead>
<tr>
<th>A. Internal assessment</th>
<th>20 Marks</th>
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<tbody>
<tr>
<td>Regularity</td>
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<tr>
<td>Discipline</td>
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<tr>
<td>Viva-voca</td>
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<td>Class work</td>
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<th>B. External assessment</th>
<th>30 Marks</th>
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<tr>
<td>Assessment by Internal Committee</td>
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<tr>
<td>Assessment by External Committee</td>
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FULL MARKS: 50
15. FARM STRUCTURAL DRAWING.

**SESSIONAL**

<table>
<thead>
<tr>
<th>Full Marks: 50</th>
</tr>
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<tbody>
<tr>
<td>No. of period in one session: 50</td>
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<tr>
<td>No. of period in a week: 02</td>
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</table>

**RATIONALE:** To understand the proper drawing practical aspects is must. As we know the drawing is the language of engineer and one can learn the language through theory as well as practical aspects.

**Objectives:** The theoretical class can be kept for the sessional classes. The present curriculum is designed to develop more confidence in drawing.

**Minimum ten plates have to do in the session.**

**Sl.No.** | **Topics**
---|---
01. | Plan, elevation and section of a single storey residential building having Bedrooms, Kitchen, Bath, Verandah etc with its foundation detail – one plate
02. | Plan elevation and sectional drawing dairy farm for 50 cows – one plate
03. | Plan elevation and section of a poultry farm for 400 birds – one plate
04. | Plan elevation and section of a godown with inclined roof over truss (span 10m)- one plate
05. | Plan elevation and section of septic tank, and open surface drain – one plate
06. | Plan and detail information regarding Agricultural workshop in 80 hectare land. – one plate
07. | Plan, half elevation and half section of single span R.C.C. slab culvert
08. | Plan, elevation and section of fully paneled and glazed door and window. – one plate
09. | Plan, half elevation and cross section of a siphon Aqueduct – one plate.
10. | Section elevation of (a) King post truss, (b) Queen post truss and steel truss – one plate
11. | Plan, elevation and section of a gobar gas plant.
12. | Plan, elevation and section of a rain water harvesting plant.

**BOOKS :-** Same as given in theory.
AGRICULTURAL ENGG. PART-III (REVISED SYLLABUS)

16. POST HARVEST TECHNOLOGY

<table>
<thead>
<tr>
<th>SESSIONAL</th>
<th>Total Period in one session</th>
<th>Period per week</th>
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SUBJECT CODE : -

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

Objectives: The present sessional curriculum is framed in such a way so that student become expert in this professional. 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 plaint.
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.
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.

Scheme of examination:
This sessional paper has marks out of which 20 marks for the internal examination and 30 marks for the external examination from the external examination allotted 30 marks 25 marks will be for sessional journals/records/sheets evaluation and 05 marks will be for viva-voce. The pattern of examination will be the same as usual external and internal evaluation systems.

BOOKS:
Same as given for theory.
SCHEME OF EXAMINATION

SESSIONAL

FULL MARKS: 100

A. Internal assessment 40 Marks
   Regularity 10%
   Discipline 10%
   Viva-voce 20%
   Class work 60%

B. External assessment 60 Marks
   Assessment by Internal Committee 50%
   Assessment by External Committee 50%

PRACTICAL

Internal Examination 20 = 15 (Job) + (Viva-voce)
External Examination 80
17. **IN PLANT TRAINING AND VISIT TO WORK.**

(SESSIONAL)

No of periods in one session: one month continuously, preferably in vacation.
Full Marks: 100
a. In Plant Training: 60
b. Project Studies (Visit to Work): 40

A. **IN PLANT TRAINING.** The training of the students should be in any organization which is involved in

- Farms production
- Landscape & gardening
- Dairy Technology
- Soil and water conservation Engineering.
- Irrigation and Drainage Engineering.
- Land Development Machinery.
- Post harvest technology.
- Seed production.
- Any other which is relevant to Agricultural Engineering.

B. **PROJECT STUDIES (VISIT TO WORK):** Submission of report of any one of the following

01. An Agricultural College or Krishi Vigyan Kendra.
   - Study of Agricultural farm.
   - Package practices of crops.
   - Modern technology related to crop production.

02. A developed dairy.
   - Live stock keeping.
   - Maintenance of live stock.
   - Milk preservation, processing, pasteurization and its packaging.
   - Utility of milk and its product.

03. A Dam / Barrages.
   - Study of different elements of Dam/Barrages.
   - Silt excluder.
   - Divide wall.
   - Sluice gate.
   - Intake of main canal.
   - Cross drainage work, etc.
   - Treated soil conservation watershed.

04. Any Agricultural Equipment manufacturing unit.
   - Study of manufacturing unit like Thresher, Cultivator, Harrow, Fertilizer cum Seed drill etc.

05. Any seed production unit.
   - Study to seed production unit.
   - Techniques related to seed production.
- Types of seeds.
- Grading, processing and its packaging.

06. Any place which is relevant to Agricultural Engineering as suggested by respective guide/guides.

**Report writing:** The report shall include sketches wherever necessary of all works studied with relevant data.

**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.

**SCHEME OF EXAMINATION**

**SESSIONAL**

FULL MARKS: 100

1. **Internal Assessment**
   Marks : 40
   (Project Studies – Visit to Work)
   a. Regularity 10%
   b. Discipline 10%
   c. Works on Project – Visit to Work 60%
   d. Viva – Voce 20%

2. **External Assessment**
   Marks : 60
   (Inplant Training)
   a. Assessment by Internal Committee 50%
   b. Assessment by External Committee, at the place where In Plant Training will be imparted 50%
18. PROJECT WORK AND ITS PRESENTATION IN SEMINAR
(SESSIONAL)

Subject Code:  
No of periods in one session: 50
Period per week: 02
Full Marks: 100

RATIONALE & OBJECTIVES
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.

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<th>Topics</th>
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<td>Project planning and preparation of report.</td>
<td>06</td>
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<td>02</td>
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<tr>
<td>03</td>
<td>Presentation of project work before a seminar</td>
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</table>

COURSE CONTENTS

01. **Topic: Project planning and preparation of report** 06
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** 24
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 20

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.

SCHEME OF EXAMINATION

SESSIONAL

FULL MARKS: 100

A. Internal assessment 40 Marks
   Regularity 10%
   Discipline 10%
   Viva-voca 20%
   Class work 60%

B. External assessment 60 Marks
   Assessment by Internal Committee 50%
   Assessment by External Committee 50%
### THEORY

<table>
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* Elective
1. Water Resources Management
2. Non-Conventional Energy
3. Packaging Technology
4. Computer Aided Design & Drawing
5. Pollution and Environmental Engineering

### PRACTICAL

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<td>17</td>
<td>** In Plant Training &amp; Visit to Work</td>
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** (1) In Plant Training Should be imparted in the concerned Firm / Training Center preferably in Vacation.
(2) External committee should be from the place of In Plant Training imparted.
(3) Internal Committee should be from the Institution level including Faculty member.

* Preferably for four week

**Total Period Per Week**

| Total marks | 1500 |