



**UTTARAKHAND BOARD OF TECHNICAL EDUCATION**  
**JOINT ENTRANCE EXAMINATION AND TRAINING, RESEARCH DEVELOPMENT CELL, DEHRADUN**  
**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME**

**BRANCH NAME: AGRICULTURAL ENGINEERING**

**SEMESTER – III**

Subject Code	Subject	L	T	P	T	O	EVALUATION SCHEME						Total Marks	Credit Point
							Internal			External				
							Theory	Practical	Max Marks	Theory	Practical	Max Marks		
		Period/Weeks												
143006	Applied Mechanics*	4	-	2	6		30	20	80	2.5	30	3.0	160	5
253003	Minor Irrigation & Tubewell Engineering	4	-	3	7		30	20	80	2.5	30	3.0	160	5
253005	Construction Technology & Materials	4	-	3	7		30	20	80	2.5	30	3.0	160	5
253004	Surveying & Levelling	4	-	4	8		30	20	80	2.5	30	3.0	160	5
253001	Crop Production Technology	3	-	4	7		25	20	80	2.5	30	3.0	155	4
253002	Farm & Land Development Machinery	5	-	4	9		30	20	80	2.5	30	3.0	160	4
253052	Industrial Exposure (assessment At Inst. Level) +	-	-	-	-		-	20	-	-	-	-	20	1
013054	General Proficiency #	-	-	4	4		-	25	-	-	-	-	25	1
	<b>Total</b>	<b>24</b>	<b>-</b>	<b>24</b>	<b>48</b>		<b>175</b>	<b>165</b>	<b>480</b>	<b>-</b>	<b>180</b>	<b>-</b>	<b>1000</b>	<b>30</b>

\* Common with other Engineering diploma programmes

# General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities, elementary mathematics, GS & G.K etc.

+ Industrial Exposure compulsory at minimum 1 industry or Department.

**Note:** 1- Each period will be 50 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 12.5 weeks.

**Branch Code - 25**



**THIRD SEMESTER  
AGRICULTURAL ENGINEERING**





L	T	P
4	-	2

**Subject Code : 143006**

## **RATIONALE**

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

## **DETAILED CONTENTS**

### **1. Introduction (08 period)**

- 1.1 Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics.
- 1.2 Definition, basic quantities and derived quantities of basic units and derived units
- 1.3 Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another density, force, pressure, work, power, velocity, acceleration
- 1.4 Concept of rigid body, scalar and vector quantities

### **2. Laws of forces (12 period)**

- 2.1 Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force
- 2.2 Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position
- 2.3 Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces - graphically, analytically, resolution of forces, resolving a force into two rectangular components
- 2.4 Free body diagram
- 2.5 Equilibrant force and its determination
- 2.6 Lami's theorem (concept only)

*[Simple problems on above topics]*

### 3. Moment

(10 period)

- 3.1 Concept of moment
- 3.2 Moment of a force and units of moment
- 3.3 Varignon's theorem (definition only)
- 3.4 Principle of moment and its applications (Levers – simple and compound, steel yard, safety valve, reaction at support)
- 3.5 Parallel forces (like and unlike parallel force), calculating their resultant
- 3.6 Concept of couple, its properties and effects
- 3.7 General conditions of equilibrium of bodies under coplanar forces and beams, fixed support, roller, support, over hanging, Uniformly distributed load, point load, varying load
- 3.8 Position of resultant force by moment  
*[Simple problems on the above topics]*

### 4. Friction

(10 period)

- 4.1 Definition and concept of friction, types of friction, force of friction
- 4.2 Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction
- 4.3 Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane, friction in simple screw jack
- 4.4 Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:  
Acting along the inclined plane Horizontally  
At some angle with the inclined plane  
*[Simple problems on the above topics]*

### 5. Centre of Gravity

(08 period)

- 5.1 Concept, definition of centroid of plain figures and centre of gravity of symmetrical solid bodies
- 5.2 Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion
- 5.3 Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed  
*[Simple problems on the above topics]*

### 6. Moment of Inertia

(06 period)

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common

geometrical sections: rectangle, triangle, circle (without derivations). Second moment of area for L, T and I sections, section modulus.

## 7. Simple Machines

(10 period)

- 7.1 Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines
- 7.2 Simple and compound machine (Examples)
- 7.3 Definition of ideal machine, reversible and self locking machine
- 7.4 Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency
- 7.5 System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency
- 7.6 Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application

*[Simple problems on the above topics]*

### LIST OF PRACTICALS

1. Verification of the following laws:
  - a. Parallelogram law of forces
  - b. Triangle law of forces
  - c. Polygon law of forces
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the Mechanical Advantage, Velocity Ratio and efficiency in case of an inclined plane.
5. To find the Mechanical Advantage, Velocity Ratio and efficiency of a screw jack.
6. To find the Mechanical Advantage, Velocity Ratio and efficiency of worm and worm wheel.
7. To find Mechanical Advantage, Velocity Ratio and efficiency of single purchase crab.
8. To find out center of gravity of regular lamina.
9. To find out center of gravity of irregular lamina.
10. To determine coefficient of friction between three pairs of given surface.

### RECOMMENDED BOOKS

1. A Text Book of Applied Mechanics by S Ramamurtham, Dhanpat Rai Publishing Co. Ltd.

2. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.
3. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi.
4. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi.

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	08
2	12	16
3	10	18
4	10	18
5	08	10
6	06	08
7	10	16
<b>Total</b>	<b>64</b>	<b>100</b>

L	T	P
4	-	3

Subject Code : 253003

## RATIONALE

The knowledge of this subject will enable the learner to know the importance of minor irrigation networks and tube well engineering in increasing the agricultural production. Design of the network and tube wells with optimum efficiency will help generating extra income through cash crops etc. to the farmers.

## DETAILED CONTENTS

### a) Minor Irrigation

#### 1. Introduction (04 periods)

Importance, necessity and advantages of minor irrigation

#### 2. Planning and Layout (05 Periods)

Planning and layout of minor irrigation network

#### 3. Water lifting devices and solar pumps (08 Periods)

indigenous water lifting devices; Wind mills, hydrams, solar water pumps, principles, constructional details and working

#### 4. Sources of Minor Irrigation in plain and hilly terrain (06 Periods)

Shallow and deep wells, water tanks and ponds

### a) Ground Water and Tube Well Engineering

#### 5. Introduction (05 Periods)

Occurrence and movement of ground water, aquifer and its type, classification of wells, steady and transient flow into partially, fully and non-penetrating and open wells, Definition of tube well, need, advantages and disadvantages

#### 6. Selection of Site (04 Periods)

Characteristics of tube well site, factor affecting site selection. Use of resistivity meters



## **7. Drilling Methods**

**(06 Periods)**

Types of drilling methods, advantages of different methods. Types of rigs; rotary and percussion rigs, rock drilling machine, their construction, installation and working. Development of tube wells by high capacity air compressors

## **8. Tube Wells**

**(05 Periods)**

Types of tube well, advantages and disadvantages of each type, selection of tube well for a given site.

## **9. Strainers**

**(02Periods)**

Types, methods of design, comparison of different types of strainers

## **10. Open Wells**

**(03Periods)**

Design and construction of open wells

## **11. Pump and Pumping Equipments**

**(07 Periods)**

Types, main features, working principle, selection of pump and pumping equipment, centrifugal pump, performance, installation, operation and maintenance

## **12. State Tube Wells**

**(04Periods)**

Importance in increasing agriculture production, command area and government policy about tube wells

## **13. Tubewells as Recharging Structure**

**(05Periods)**

Gravity recharging, injection

## **LIST OF PRACTICALS**

- a) Study of single acting and double acting reciprocating pumps and testing,
- b) Study of radial flow and mixed flow centrifugal pumps,
- c) Study of multistage centrifugal pumps, turbine, submersible and propeller pumps,
- d) Installation of centrifugal pump at given location,
- d) Testing of centrifugal pump,
- e) Study about the minor irrigation system in hilly areas
- f) Study of different drilling equipments,

- g) Sieve analysis for gravel and well screens design,
- h) Study about the unconfined and confined aquifer
- i) Testing of well screen in sand tank model in unconfined conditions,
- j) Visits to drilling sites, Measurement of water level and drawdown in pumped wells,
- k) Visit and study about solar pumps – operation and its maintenance

### RECOMMENDED BOOKS

1. Principles of Agriculture Engineering (Vol. II) by A.M. Michael and TPOjha.
2. Land and Water Management Engineering by V.V.N. Murthy.
3. Irrigatin Theory and Practice by A.M. Michael, Vikash Publishing House
4. Irrigation Principles and Practices by OW Israelson
5. Handbook of Farm Irrigation Structures by A.M. Michael, et.al. IARI.
6. Ground water by H.M. Raghunath, Wiley Eastern Limited, New Delhi
7. Land Water Management Principles by R. Suresh, Standard Publishers Distributers, New Delhi

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	6
2	5	8
3	8	10
4	6	10
5	5	10
6	4	6
7	6	8
8	5	7
9	2	5
10	3	5
11	7	12
12	4	7
13	5	6
<b>Total</b>	<b>64</b>	<b>100</b>

L	T	P
4	-	3

Subject Code : 253005

## RATIONAL

Materials play an important role in construction of farm structures . Right selection of materials adds to the life of structures. A diploma holder must be conversant with properties, uses and other aspects of different building materials and construction technologies should be able to estimate the cost of the proposed building /structure.

## DETAILED CONTENTS

### 1. Materials (16 Periods)

- 1.1 Stone: Formation of Rocks, classification of rocks quarrying of stones, characteristics & uses of granite, sand stone, lime stone, marble & slate.
- 1.2 Bricks: Characteristics, classification as per ISI, special types of Bricks, fire bricks, surkhi bricks, ballast, and general idea of tiles
- 1.3 Lime: Slaking of lime, commercial names, its classification, characteristics, storage, precautions handling & uses of lime.
- 1.4 Cement: Natural and artificial cement, characteristics of cement, type of cement, their properties and uses, Method of storage.
- 1.5 Timber: Definition, types of hardwood, softwood, objects of timber seasoning of timber, water seasoning, and kiln seasoning. Preservation of timber, market form of timber, brief study of common Indian timbers-plywood, hardboard and pattern board (only properties and uses).
- 1.6 Types, characteristics & uses of following Building Materials (No manufacture)
  - a) Stones
  - b) Bricks
  - c) Lime
  - d) Cement
  - e) Timber
  - f) Paints & Varnishes
  - g) Hardware
  - h) Plastics

### 2. Engineering Materials (16 Periods)

- 2.1 Ferrous Metals:

## Classification of iron

- a) Cast iron: Types as per BIS their properties and uses
- b) Classification according to carbon contents and as per BIS, properties of various steel and uses
- c) Alloy steel: Effects of various alloying elements. Properties of common steel, alloy steel.

2.2 Paints and Varnishes: Objects of paints and varnishes, types of paints, characteristics, selection of paints, storage of paints. Types of varnishes, characteristics and uses of varnishes

2.3 Plastics: Polymers and various composite materials, classification, properties and uses - linoleum, plastic coated paper, polythene sheets, thermocolel and PVC.

### **3. Construction Methods (16 Periods)**

3.1 Introduction

3.2 Foundation: Constructional details of spread footing (thumb rule only).

3.3 Stone Brick masonry: Study of various types of bricks bonds

3.4 Damp proof course: Materials used.

3.5 Doors and windows: types and uses of doors, windows and ventilators.

3.6 Plastering and Pointing: Types and methods

3.7 Concrete:

d) Lime concrete: Ingredient, specifications, preparation and uses.

e) Cement concrete: Ingredient preparation, laying, compaction curing, and uses of local materials as farm work, application of Ferro cement

3.8 Lintels: Wooden, RCC and RB lintels.

3.9 Floors: Common types, construction, methods, drainage and cleaning of floors

3.10 Roofs: Roofing materials and timber trusses/sheds for cattle and work places.

### **4. Rural Construction (16 Periods)**

4.1 Rural buildings :Cattle shed ,barns ,poultry house ,grain bin and go downs- their construction details ,capacity and functional requirement

4.2 Rural sanitation: Constructional details of septic tank, soakpit, aqua-privy and PRAI latrines.

4.3 Farm Road: kachcha road, tar McAdam and pakka road.

4.4 Rural drainage: Specification as per BIS standard

4.5 Rural water supply: Construction and working of India mark II pump. overhead tank and laying of pipelines .

## LIST OF PRACTICALS

1. Identification of different types of stones.
2. Identification of different types of timber.
3. To conduct field test of cement.
4. To determine normal consistency of cement.
5. To determine setting time of cement (a) Initial setting time (b) Final setting time.
6. To determine water absorption of bricks.
7. To determine compressive strength of bricks.
8. To determine fineness of cement by sieve method.
9. To make brick bonds (English and Flemish bond only).
10. To visit construction sites and write specific report about following activities:  
Earth work in foundation, flooring, plastering, pointing, whitewashing and colour washing. And installation of India mark II pump and laying of water pipe line.

## RECOMMENDED BOOKS

1. Building Materials by Parbin Singh
2. Text Book of Engineering Materials by DS Arora, Kalyani Publications, New Delhi
3. Engineering Materials by SC Rangwala, Charotar Publications, Anand, Gujrat
4. Engineering Materials by Sushil Kumar, Metropolitan Books, Delhi
5. Estimation and costing by B.N Dutta

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	16	25
2	16	25
3	16	25
4	16	25
<b>Total</b>	<b>64</b>	<b>100</b>

L	T	P
4	-	4

Subject Code : 253004

## RATIONALE

The course aims at enabling the students to do land and water survey, prepare maps/plans for simple irrigation works and drainage channels, road alignment. It also enables the students to carry out field levelling and contour maps of the farm and forest etc.

## DETAILED CONTENTS

### 1. Introduction (02Periods)

Definition of surveying and levelling, purpose, linear and angular units of measurement, instruments used for taking these measurements, basic principle of surveying, classification of survey

### 2. Measurement of Distances (05 Periods)

Instruments used, types of chain, chaining of a line, ranging, line ranging, reciprocal ranging, setting out a right angle, optical square, cross staff, offset – single and oblique, errors in chaining by a faulty chain, chaining on sloppy ground

### 3. Chain survey (10 Periods)

Definition of terms, survey, station, base line, til line, check line, running measurement. Triangulation of an area, well conditioned triangle, methods of booking a survey line. Plotting of a survey line, symbols and conventional signs, permissible errors, obstacles in chain survey

### 4. Measurement Area (04 Periods)

Direct measurement of area, on paper by planimeter, Simpson's rule, average ordinate rule, trapezoidal rule, enlargement and valuation of a plan

### 5. Compass Survey (10 Periods)

Purpose, concept of meridians – magnetic true and arbitrary, bearing of a line, types of bearing, systems of bearing, fore bearing and back bearing, diploma and declination, conversion of bearing from one system to other, calculation of included angles and bearings, calculation of bearings when included angles and bearing of some lines is given local attraction, construction, principle and working of prismatic compass and surveyor compass, traversing by compass, closed and open traverse, plotting of a traverse – included angle method and definition angle

method, closing error, graphical method of adjustment of closing error, errors in compass survey, permissible error

## **6. Plane Table Survey**

**(08 Periods)**

Plane table and its accessories, adjustments of a plane table, entering, levelling and orientation method of plane tabling – radiation, intersection, traversing and resection, errors in plane table survey, advantages and disadvantages of plane table survey.

## **7. Levelling**

**(08 Periods)**

Definition of terms, levelling, level and horizontal surface, datum-standards and ordinary reduced level, bench mark, types of benchmarks, methods of levelling, direct and indirect levelling, scope and utility, direct leveling – instruments, hand level clinometer, levelling staves, merit and demerits of different types of staves and their use, levelling field book, fly levelling and check levelling, longitudinal levelling, cross sectional levelling, plotting of profile, methods of drawing longitudinal and cross section of a channel, drainage and road.

## **8. Theodolite**

**(06 Periods)**

Types of theodolite, different parts of a transit theodolite, different axes of a theodolite, relation between them, temporary adjustment of a theodolite, measurement of horizontal and vertical angles by theodolite, methods of reading, bearing by a theodolite

## **9. Contouring**

**(04 Periods)**

Definition of contour line, grade contour, horizontal equivalent, vertical interval, contours of a hill, pond, valley, ridge, vertical valley line, ridge of water shed line, drawing contours – direct and indirect methods of contouring

## **10. Minor Instruments**

**(02 Periods)**

Abney level, clynone ghat tracer, tangent clinometer  
An introduction to all basic operations of surveying

11 work with the help of Total Station.

**(03 Periods)**

## **LIST OF PRACTICALS**

1. To find out distance between two an approachable object
2. Plan of a small area by means of a chain surveying
3. Plan of a small area by means of a compass surveying
4. Plan of a small area by means of a plane table surveying

5. Contour map of an area with at least 3 meter up and down area
6. Plan for land acquisition and checking it with sajra plan .
7. To plot the longitudinal section of a canal showing the ground level for at least one Km length
8. To determine the elevation difference between two points by levelling with at least five shifting of instruments
9. To find out the vertical height of an object by use of angle of elevation and depression (Theodolite)
10. To find out horizontal distance between two points by theodolite
11. To find out the vertical height of an object by theodolite
12. Use of minor instruments .
13. Use of Total Station.

### RECOMMENDED BOOKS

1. Textbook of Surveying by BC Punmia , Standard Book House, New Delhi
2. Fundamentals of Surveying and Levelling by CL Kochhar, Katson Publishing House, Ludhiana
3. Surveying by SK Duggal
4. Surveying by R Agore
5. Surveying and Levelling by TP Kanetkar and SV Kulkarni, AVG Prakashan, Pune

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	2	4
2	5	8
3	10	18
4	4	4
5	10	12
6	8	12
7	10	18
8	6	12
9	4	8
10	2	4
11	3	6
<b>Total</b>	<b>64</b>	<b>100</b>



<b>L</b>	<b>T</b>	<b>P</b>
<b>3</b>	<b>-</b>	<b>4</b>

**Subject Code : 253001**

### **RATIONALE**

Crop production is a basic subject for a diploma holder in agricultural engineering. This subject a learner has already read in high school agricultural course. The revision and an advance knowledge of the subject is necessary for studying agricultural technology subjects.

The course contents of this subject has been developed to inculcate the skill of identification of the crops, common weeds, insecticide, fungicide and fertilizer as well as the skill in preparation of seed beds and seed treatment for different seeds and crops.

### **DETAILED CONTENTS**

1. Introduction to Crop production related to engineering (4periods)
2. Elementary idea of Certain physiological processes, osmosis, photosynthesis, transpiration, evaporation and respiration. Factors affecting these processes (4 periods)
3. Agronomical Sequences-Monoculture, mixed cropping, multiple cropping, relay cropping; their adoptability advantages and disadvantages (5 periods)
4. Classification of crops: Detail study of cereals crops (wheat, paddy and maize) legume crops (soyabean, moong and arhar), cash crops (potato, sugarcane), oil seed crops (sunflower mustard, groundnut) and fruit crops (mango, apple and guava) including their production practices, Elementary exposure pest diseases and their control. (15periods)
5. Identification of weeds and method of weed control for various crops (crops of item 4), Use of weed as fertilizer and composite material fabrication. gree Cropping scheme and crop rotation their importance for different agro climatic condition. (5periods)
6. Plant Propagation : Seed propogation and vegitative propagation, their merits and demerits. (5periods)

7. Mushroom Cultivation : Introduction and requirements, Method of cultivation. (2periods)
8. Preparation of bio-insecticides by the use of Neem leafs, Tobacco, Dhatura and other plants (4periods)
9. Waste Land Development : Concept and uses. (4periods)

### **PRACTICALS**

1. Identification of crops, vegetable seeds & fertilizers.
2. Identification of common weeds, insecticide, fungicide & weedcide.
3. Seed treatment before sowing the crops.
4. Seed bed preparation of sugarcane, potato, maize, Paddey and wheat.
5. Seed bed preparation of vegetables.

### **RECOMMENDED BOOKS**

1. Vegetable Science by Dr. Prabhudayal
2. Complete Agriculture by Dr. P.D. Choudhary

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	4	10
2	4	10
3	5	10
4	15	20
5	5	10
6	5	10
7	2	10
8	4	10
9	4	10
<b>Total</b>	<b>48</b>	<b>100</b>

<b>L</b>	<b>T</b>	<b>P</b>
<b>5</b>	<b>-</b>	<b>4</b>

**Subject Code : 253002**

## **RATIONALE**

The topics covered in the subject will enable the students to understand the basic principles, construction and working of farm machinery for different crops. This will also enable them to select appropriate machinery, use, repair and maintain the same. This knowledge will be highly useful in running an Agro Service Centre for Farm Machinery.

## **DETAILED CONTENTS**

### **1. Introduction (03 Periods)**

Importance of farm mechanization. Classification of machinery & implements used on farm for raising crops.

### **2. Primary Tillage Equipment (05 Periods)**

Introduction to various primary tillage implements, functions, constructional details, adjustments and study of different plough viz. mould board plough, disc plough, rotary tiller/ rotavator and chisel plough.

### **3. Secondary Tillage Implements (07 Periods)**

Introduction to various secondary tillage implements. Study of cultivators & harrows, their types, functions & constructional details, clod crusher & plankers

### **4. Seeding and Planting Equipment (12 Periods)**

Introduction to various seeding and planting machinery for various crops. Study of components & functions of seed drills & planters; Concept of minimum tillage technology including zero till, strip till drill, raised bed planters and other conservation agriculture machinery. Calibration of seed drills and planters.

### **5. Interculture Tools/Weeding Tools (04 Periods)**

Introduction to various tools used for interculture, study of their functions and constructional details

### **6. Fertilizer/Manure Application Equipment (04 Periods)**

Familiarization with the manure spreaders & granular fertilizer spreading equipment, study of their functions and importance.

## **7. Plant Protection and Plant Care**

**(04 Periods)**

Familiarization with various type of dusters and sprayers. Study of their constructional details, function & principle of operation. Study of various types of the nozzles used in the sprayers and calibration of sprayers.

## **8. Harvesting and Threshing Machinery**

**(16 Periods)**

Familiarization with harvesting machines for various crops e. g. hay/forage harvesters, vertical conveyer reapers, cotton pickers, corn harvester, potato diggers, ground nut diggers, sugarcane harvesters Fruits and vegetables harvesting. Flail mowers Constructional details & principles of working. Study of power threshers including axial flow thresher - main components, function and constructional details. Safety requirements in threshing operations. Introduction to combine harvesters and straw combines and study of their operation and power transmission system. Losses during harvesting and threshing operations and their management.

## **9. Land Development Machinery**

**(06 Periods)**

Familiarization with various land development implements e.g. leveler including laser land leveler, land planer, scraper, ridger. Study of their functions and adaptability.

## **10. Miscellaneous Equipment**

**(12 Periods)**

Introduction to different equipment used for special operation e.g. puddlers, cage wheels, straw chopper, sub soiler, stubble shavers, straw field baler and densifiers. Introduction to various horticulture tools, post tool digger, tree pruners etc.

## **11. Economics of Equipment**

**(07 Periods)**

Field capacities, field efficiency, cost analysis and selection of farm machinery, BIS Standards of Farm Machinery and Specifications

## **LIST OF PRACTICALS**

To study the constructional features and different components of the following agricultural implements/ farm machines:

1. Primary tillage implements: Mould board plough /Disc plough/sub soiler.
2. Secondary tillage implements: Harrow/Cultivators, Rotavators.
3. Sowing Machines: Seed Drill/Planter/Transplanter, zero-till, strip-till drill, bed planter, sugarcane planters, potato planter.
4. Interculture equipment/tools : Wheel h and hoe/Cultivators.
5. Harvesting Machines: Vertical Conveyer Reaper/Mower/Potato digger/roundnut Digger, Flail mowers

6. Threshing Machines: Wheat/paddy thresher, axial flow thresher, High capacity multicrop thresher.
7. Different types of sprayers and dusters, nozzles
8. Combine harvester and thresher.

**Note:** Emphasis should be laid on operation, maintenance, repair, safety and trouble shooting of farm machines and calibration of seeding machinery.

### RECOMMENDED BOOKS

1. Element of Farm Machinery by A.C. Srivastava and Raju Primlari; Oxford & IBH Publishing Co. Pvt Ltd, New Delhi
2. Principle of Farm Machinery by R.A. Kepner, Roy Bainer, and E.H. Barger; CBS Publishers and Distributors, Delhi
3. Elements Of Agricultural Engineering Part 1 & 2 by Dr. O.P. Singhal and Naresh Chandra Aggarwal ; Mumfordganj, Allahabad
4. Principle of Agricultural Engineering Volume-Ib y A.M. Michael & T.P. Ojha; Jain brothers.
5. Principle of Agricultural Engineering Volume-II b y A.M. Michael & T.P. Ojha; Jain brothers.
6. Farm Power Machinery Volume-I by ISAE ; Jain brothers
7. Farm Power Machinery & Surveying by Irshad Ali ; Kitab Mahal, Nai Sarak, Delhi
8. Farm Machinery by Smith, HP
9. Tillage System in the Tropics by FAO; Oxford and IBH Publication Co.
10. Farm Machinery by Claude Culpin

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	3	3
2	5	6
3	7	9
4	12	16
5	4	5
6	4	5
7	4	5
8	16	20
9	6	7
10	12	15
11	7	9
<b>Total</b>	<b>80</b>	<b>100</b>





## LEARNING OUT COMES AND MEANS OF ASSESSMENT

### BRANCH NAME – AGRICULTURAL ENGINEERING

### SEMESTER –III

S.No.	Title of Subject/Unit	Learning Outcomes	Means of Assessment
1	Minor Irrigation & Tubewell Engineering	At the end of the course, The knowledge of this subject will enable the learner to know the importance of minor irrigation networks and tube well engineering in increasing the agricultural production. Design of the network and tube wells with optimum efficiency will help generating extra income through cash crops etc. to the farmers	Assignments, Quizzes, Seminars, Class Test, Power Point Presentation, Mid Term Examination & Semester examination. Practical assessment is done through practical test results, practical files and Viva voce.
2	Applied Mechanics	At the end of the course, the student will be able to understand laws of forces, simple machines, moment and its applications, centre of gravity, moment of Inertia and friction.	Assignments, Quizzes, Seminars, Class Test, Power Point Presentation, Mid Term Examination & Semester examination. Practical assessment is done through practical test results, practical files and Viva voce.
3	Surveying & Levelling	At the end of the course, the student will be able to understand uses of different surveying instruments, prepare maps/plans for simple irrigation works and drainage channels, road alignment. It also enables the students to carry out field levelling and contour maps of the farm and forest etc.	Assignments, Quizzes, Seminars, Class Test, Power Point Presentation, Mid Term Examination & Semester examination. Practical assessment is done through field work accuracy, practical files, field book, surveying sheets and Viva voce.
4	Construction Technology and Materials	At the end of the course, the student will be able to understand various building materials of construction, various components of a building and its construction procedure including damp proofing and water proofing.	Assignments, Quizzes, Seminars, Class Test, Power Point Presentation, Mid Term Examination & Semester examination. Practical assessment is done through practical test results, practical files and Viva voce.



5	Crop Production Technology	At the end of the course, the student will be able to identification of the crops, common weeds, insecticide, fungicide and fertilizer as well as the skill in preparation of seed beds and seed treatment for different seeds and crops.	Assignments/ Drawing Sheets, Seminars, Class Test, Power Point Presentation, Field work, Mid Term Examination, Viva voce & Semester examination.
6	Farm & Land Development Machinery	At the end of the course, the student will be able to construction and working of farm machinery for different crops. This will also enable them to select appropriate machinery, use, repair and maintain the same. This knowledge will be highly useful in running an Agro Service Centre for Farm Machinery.	Assignments, Quizzes, Seminars, Class Test, Power Point Presentation, Mid Term Examination & Semester examination. Practical assessment is done through practical test results, practical files and Viva voce.