5.1 EMPLOYABILITY SKILLS – I

L	T	P
-	-	2

RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Writing skills (08 hrs)

   i) Official and business correspondence
   ii) Job application - covering letter and resume
   iii) Report writing - key features and kinds

2. Oral Communication Skills (20 hrs)

   i) Giving advice
   ii) Making comparisons
   iii) Agreeing and disagreeing
   iv) Taking turns in conversation
   v) Fixing and cancelling appointments

3. Generic Skills (04 hrs)

   i) Stress management
   ii) Time management
   iii) Negotiations and conflict resolution
   iv) Team work and leadership qualities

5.2 ENVIRONMENTAL EDUCATION

L	T	P
3	-	-

RATIONALE

Education about environment protection is a must for all the citizens. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures. He should also be aware of environmental laws related to the control of pollution.

DETAILED CONTENTS

1. Definition, Scope and Importance of Environmental Education (02 hrs)

2. Basics of ecology, biodiversity, eco system and sustainable development (03 hrs)

3. Sources of pollution - natural and manmade, causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear) and their units of measurement (12 hrs)

4. Solid waste management – Causes, effects and control measures of urban and industrial waste (06 hrs)

5. Mining and deforestation – Causes, effects and control measures (04 hrs)

6. Environmental Legislation - Water (prevention and control of pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board, Environmental Impact Assessment (EIA) (10 hrs)

7. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy) (04 hrs)

8. Current Issues in Environmental Pollution – Global Warming, Green House Effect, Depletion of Ozone Layer, Recycling of Material, Environmental Ethics, Rain Water Harvesting, Maintenance of Groundwater, Acid Rain, Carbon Credits. (07 hrs)

INSTRUCTIONAL STRATEGY

The contents will be covered through lecture cum discussion sessions. In addition, in order to have more appreciation of need for protection of environment, it is suggested that

different activities pertaining to Environmental Education like video films, seminars, environmental awareness camps and expert lectures may also be organized.

RECOMMENDED BOOKS

1. Environmental Engineering and Management by Suresh K Dhameja; SK Kataria and Sons, New Delhi.
2. Environmental Science by Dr. Suresh K Dhameja; SK Kataria and Sons, New Delhi.
3. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
4. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
5. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
7. Environmental Studies by Erach Bharucha; UGC University Press.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures (Periods)	Marks Allotted (%)
1	02	04
2	03	06
3	12	24
4	06	12
5	04	10
6	10	20
7	04	10
8	07	14
Total	**48**	**100**

5.3 FARM MACHINERY AND IMPLEMENTS - II

L	P
5	3

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 Enterprise related with Farm Machinery and employment in Farm Mechanization sectors. In view of its importance and lengthy curriculum this course will be taught partly in two semesters Farm Machinery-I & II

DETAILED CONTENTS

1. Interculturing Tools & Weeding Tools (6 hrs)

   - Functions, working and constructional details of Cultivators(Disc, Rotary & Tine), Wheel Hand Hoe, Paddy weeder, Power weeder/ Brush cutter

2. Fertilizer & Manure Application Equipments (5 hrs)

   - Introduction to different types of machines used for application of fertilizers & manures for different crops.

   - Functions and working of granular fertilizer spreaders & Manure spreader. Adjusting the application rate of fertilizers.

3. Plant Protection Machinery & Equipments (15 hrs)

   - Introduction to different types of machines used for application of insecticides & pesticides such as sprayers, dusters, foggers etc.

   - Sprayers-Different types of sprayers viz. hand sprayers, power sprayers and tractor operated sprayers. Types of spray

   - Operation, working, functions and components of Power & Hydraulic Spraying systems

   - Types of nozzles used on sprayers. Care & maintenance of sprayer

   - Sprayers used for Horticultural crops.

- Dusters- Functions of a duster, different types of dusters (Plunger, Knapsack, Rotary & Power operated), Care & maintenance of dusters

- Precautions for safe use of Insecticides and Pesticides.

4. Harvesting Machinery (10 hrs)

- Methods of harvesting, Introduction to various machines used for harvesting different crops (mowers, reapers, diggers, pickers, pluckers etc.),

- Mower - Different types of mowers, Constructional details and working principle of mower, Alignment & Registration of mower.

- Reaper - Different types of reapers, Constructional details and working principle of Vertical conveyor reaper and Horizontal conveyor reaper

- Diggers - Different types of diggers, Constructional details and working principle of Potato digger elevator and groundnut digger.

5. Threshing Machinery (15 hrs)

- Principle of threshing, Methods of threshing (Manual, Animal & Machine). Introduction to various machines used for threshing different crops (threshers, sheller, dehusker etc.),

- Power thresher – Different types of power threshers, Constructional details and working principle of power thresher. Adjustments of a thresher.

- Paddy thresher - Constructional details and working principle of paddy thresher.

- Different terms related to threshing- Threshing efficiency, cleaning efficiency, Concave clearance etc. Different types of losses during harvesting & threshing and their management.

- Installation of Power thresher, Preventive maintenance and storage of thresher.

- Trouble shooting in power thresher. Safety precautions for using threshers.

- Combine Harvester – Functions of a combine harvester. Introduction to different types of combine harvester. Constructional details and working principle of a Combine harvester. Adjustments of a combine harvester. Advantages & Disadvantages of Combine

6. Land Development & Earthmoving Machinery (8 hrs)

- Objectives & Benefits of land levelling.
- Introduction to various land leveling machines such as Bulldozer, Front blade, Hind blade, Scraper, Hydrodozer, Leveller, Ridger, Bund former etc., their working and specific functions/ adaptability.

- Laser Land Leveller - Constructional details and working principle of Laser Land Leveller

7. Miscellaneous Farm Machines & Equipments (15 hrs)

- Introduction to various machines used for different operations such as Zero till drill, Post Hole digger, Puddlers, Cage wheel, Power tiller, Subsoiler, Straw Reaper, Straw combine, Forage harvester cum straw chopper, Hay rakes, Hay bailers, Hay conditioners

- Introduction to various horticultural tools and machines such as Hedge Trimmers, Pruning shears & secateurs, Tree Pruners, Hedge shears, Loppers, Saws, Axes etc.

8. Cost Economics, selection and testing of Farm Machinery (6 hrs)

- Cost estimation of using farm machinery & selection of farm Machinery.

- Intoduction to the testing of Farm Machinery and organization dealing in testing and standardization of Farm Machinery.

INSTRUCTIONAL STRATEGY

Drawing of various machines may be used to illustrate the constructional details of Machinery & Equipments. Besides this live demonstration of the machines & visits to the local units manufacturing these implements/ machines be arranged so that students are able to understand in a clear and better way.

LIST OF PRACTICALS

1. Study of constructional features and working of Interculturing tools and equipments (Cultivator, Wheel Hand Hoe, spade etc.)
2. Study of constructional features and working of Conveyor Reaper.
3. Study of constructional features and working of Potato digger/ Groundnut digger.
4. Study of constructional features and working of Power thresher
5. Study of constructional features and working of Sprayer(Knapsack/ Power) and Dusters.

6. Study of constructional features and working of Fertiliser distributor.
7. Study of constructional features and working of Cage wheels and Puddlers.
8. Study and use of Horticultural tools.
9. Tractor driving practice.
10. Hitching and de hitching of different implements with the tractor.
11. Preventive/ Routine maintenance of harvesting and threshing machines.

LIST OF BOOKS

1. Elements of Agricultural Engineering by Dr. Jagdishwar Sahay; Standard Publisher Distributors, Nai Sarak, Delhi-110006.
2. Principle of Farm Machinery by R.A.Kepner, Roy Bainer and E.H. Barger,CBS Publishers and Distributors, Delhi.
3. Farm Power Machinery & Surveying by Irshad Ali; Kitab Mahal, Allahabad, Surjit Book Depot P.B.No. 1425,4074-75, Nai Sarak, Delhi.
4. Principle of Agricultural Engineering Volume-I by A.M. Michael &T.P.Ojha; Jain brothers.
5. Farm Machines & Equipments by C.P.Nakra; Dhanpat Rai & Sons ,Nai Sarak New Delhi.
6. Elements Of Agricultural Engineering Part 1 & 2 by Dr. O.P. Singhal and Naresh Chandra Aggarwal; Mumfordganj, Allahabad.
7. Basic Farm Machinery by Shiphen & Ellen; Jain brothers.
8. Farm Machinery and Equipments by Smith , Tata McGraw Hill Publishing Company Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	8
2	5	6
3	15	18
4	10	15
5	15	20
6	8	10
7	15	17
8	6	6
Total	**80**	**100**

5.4 FARM TRACTOR

L	P
4	6

RATIONALE

The tractor is the most important machinery in a farm and the students should be fully familiar with the construction, working, and operation of various tractors, maintenance of tractor and repair and overhauling of the same. The course will equip them to handle the tractors effectively and efficiently and they will be able to run tractor. This course will also help them to run tractor and machinery custom hiring centre.

DETAILED CONTENTS

1. Introduction (7 hrs)

   Sources of farm power and scope of mechanization. Tractor - classification and different type of tractors and systems. Main assemblies of the tractors (Names only). Familiarization with various controls and gauges on tractors and their functions.

2. Power Transmission System of Tractors (12 hrs)

   Functions and various components of power train. Clutch; functions of clutch, type of clutch(single plate, dual plate and multi plate clutch) . Gear box; function and working of gear box, types of gear boxes (sliding, constant mesh and synchromesh gears). Differential and differential lock; function and constructional details. Final drive; reduction gear and rear axle. Power take off shaft and drive to the PTO shaft.

3. Braking System (5 hrs)

   Importance and function of brakes, various types of brakes viz. mechanical and hydraulic and their working.

4. Wheels and Tyres of Tractors (5 hrs)

   Types of wheels rim and tyres used in tractors. Function of tyres. Causes of tyre wear. Need for changing the rear wheel, spacing of wheels and arrangement for the change. Wheel ballasting and methods of ballasting.

5. Hydraulic System (6 hrs)

   Principles and working of hydraulic system. Various components and working of hydraulic system of tractor. Position control, draft control and mix control. Various components of hitching system of tractors viz. 3-point linkage, drawbar

6. Steering System of Tractors (6 hrs)

Functions and components of steering systems. Types of steering gear boxes in different type of steering systems, power steering. Working of different types of steering systems. Familiarity with the concepts of toe-in, toe-out, camber angle, caster angle and king pin inclination.

7. Electrical System of Tractors (5 hrs)

Components of electrical systems viz. battery, starter switch, self starter, motor, dynamo: their construction, functions, operation; maintenance and care of the battery.

8. Periodical Maintenance, Repair and Overhauling of Tractor (8 hrs)

Daily, weekly and monthly maintenance, repair and overhauling of tractor.

9. Selection, Safety, Cost Economics and Testing of Tractor (10 hrs)

- Various factors affecting the right selection of a tractor.
- Safety measures in the operation of tractor.
- Cost analysis of use of tractors.
- Traction - Traction efficiency, coefficient of traction, rolling resistance, slip, rim pull. Tractor testing stations, test conditions, general requirements for testing a tractor. Type of tests. BIS and ISO standards.

LIST OF PRACTICALS

1. Familiarization with different makes, models and availability of tractor, main units and control gauges.
2. Familiarization with various tools used for dismantling and assembling of tractors and implements
3. Pre-starting checks, correct operating techniques & energy saving tips.
4. Clutch - dismantling and study of clutch and its components and assembly.
5. Transmission- study of gear box, differential and final drive.
6. Brake and steering –dismantling and study of their components.
7. Wheel equipment-care and maintenance, fitting of wheels and adjustment of track width.
8. Operation of hydraulics system, draft position and mix control systems.
9. Periodical maintenance and service of tractors
10. Visits to tractor repair workshops/ service centres for the demonstration of repair work and overhaul of tractors and estimating cost of repairs.

INSTRUCTIONAL STRAGEGY

Use of cut-sectional models of various systems, charts and video films should be made as instructional material for the best efficacy of teaching learning process.

RECOMMENDED BOOKS

1. Elements of Agricultural Engineering by Dr. Jagdishwar Sahay; Standard Publisher Distributors, Nai Sarak, Delhi-110006.
2. Farm Power Machinery & Surveying by Irshad Ali; Kitab Mahal, Allahabad, Surjit Book Depot P.B.No. 1425,4074-75, Nai Sarak, Delhi.
3. Principle of Agricultural Engineering Volume-I by A.M. Michael &T.P.Ojha; Jain brothers.
4. Farm Machines & Equipments by C.P.Nakra; Dhanpat Rai & Sons ,Nai Sarak New Delhi.
5. Farm Tractors Maintenance & repairs by S.C. Jain & C.R. Rai; Tata McGraw-hill Publishing Co. Ltd., New Delhi.
6. Elements Of Agricultural Engineering Part 1 & 2 by Dr. O.P. Singhal and Naresh Chandra Aggarwal; Mumfordganj, Allahabad.
7. Basic Farm Machinery by Shiphen & Ellen; Jain brothers.
8. Tractor Mechanics by C.P. Nakra; Dhanpat Rai & Sons ,Nai Sarak New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	7	10
2	12	22
3	5	8
4	5	8
5	6	9
6	6	9
7	5	8
8	8	11
9	10	15
Total	**64**	**100**

5.5 COMPUTER AIDED DRAFTING

L	T	P
-	-	3

RATIONALE

Computer aided drafting these days is extensively being used in the industry. This subject has been added to enable a diploma holder to make drawings using computer software and take prints/plots.

PRACTICE WORK

1. Introduction to AutoCAD : Starting up, practice on – how to create a new drawing file, setting drawing limits & saving a file, drawing lines in different ways using absolute co-ordinates, user co-ordinates, WCS, UCS, drawing circles, drawing arcs, drawing ellipses. Drawing polygons, drawings splines. Drawing polylines, using window, zoom commands.

2. Practice on Edit commands such as erase, copy, mirror, array, offset, rotate, oops, undo, redo, scale, stretch, trim, break, extend, chamfer, fillet, O snap command

3. Practice on Text commands: editing text, text size, text styles, change properties commands.

4. Practice on Layer Commands: creating layer, freeze, layer on/off colour assigning, current layer, load line type, lock & unlock layer, move from one layer to other.

5. Practice on Hatching, Hatch pattern selection.

6. Practice on Dimensioning, linear dimensioning, angular dimensioning radius/.diameter dimensioning O-snap command, aligned dimensioning, editing of dimensioning, tolerances in dimensioning.

7. Practice on print/plot commands. Export/import commands.

8. Practice on making complete drawings of components by doing following exercises:

a) Detail and assembly drawing of the following using AUTOCAD (2D) (4 sheets)

- Plummer Block
- Wall Bracket
- Stepped pulley, V-belt pulley
- Flanged coupling
- Machine tool Holder (Three views)
- Screw jack or knuckle joint

b) Isometric Drawing by CAD using Auto CAD (one sheet)

Drawings of following on computer:

- Cone
- Cylinder
- Isometric view of objects

9. Modelling (02 sheets)

3D modelling, Transformations, scaling, rotation, translation

10. Creating Chamfer and Fillet

Practice on surface modeling, create part file, practice on assembly of parts, creating assembly view, orthographic views, section view (Practice on different views, practice on data transfer)

11. Introduction to Other Softwares;

(Pro Engineer/CATIA / Inventor/Unigraphics/Solid Work: Salient features.

INSTRUCTIONAL STRATEGY

1. Teachers should show model or realia of the component/part whose drawing is to be made.
2. Emphasis should be given on cleanliness, dimensioning, & layout of sheet.
3. Teachers should ensure use of IS codes related to drawing.

RECOMMENDED BOOKS

1. Engineering Drawing with AutoCAD 2000 by T. Jeyapooran; Vikas Publishing House, Delhi.

2. AutoCAD for Engineering Drawing Made Easy by P. Nageswara Rao; Tata McGraw Hill, New Delhi.

3. AutoCAD 2000 for you by Umesh Shettigar and Abdul Khader; Janatha Publishers, Udupi.

4. Auto CAD 2000 by Ajit Singh, TMH, New Delhi.

5.6 AGRO PROCESS ENGINEERING

L	P
5	3

RATIONALE

The agricultural material has to undergo different operations and processes before reaching the consumer as a final product. In this subject, processing techniques of different agricultural products e.g. paddy, wheat, oilseeds, pulses have been covered. These will enable the students to understand the basic principles, operation and maintenance of different processing machinery and also to set up their own processing unit.

DETAILED CONTENTS

1. Seed Processing (18 hrs)

Introduction, principles of seed processing. Steps in processing and flow diagram showing various steps/operations in processing. Machine used in processing of seeds of cereals, pulses and cotton e.g. conveyors and elevators, different types of cleaners and graders viz. air screen cleaner-cum-grader, disc separators, indented cylinders, spiral separators, specific gravity separators, pneumatic separators, magnetic separator, inclined draper and belt type electrostatic separators. Process of mechanical and acid delinting of cotton seeds. Layout and plan of seed processing plant. Seed treaters, calibration of seed treater.

2. Rice Milling (20 hrs)

2.1. Paddy grain structure, paddy cleaning, pre milling treatment. Parboiling ; basic concept and principles. Method of parboiling ; traditional method , single boiling , double boiling method

2.2. Modern methods :- CFTRI , Kisan continuous, pressure parboiling RPEC and sodium chromate method.

2.3. Rice milling process: flow chart of modern rice mill, deshelling operations of paddy. Under runner disc sheller, rubber roller sheller and hullers, whitening, polishing and grading.

2.4. Construction and operation of rubber roll sheller, vertical cone rice whitener, horizontal rice whitener. Utilization of the by-products of rice mill.

3. Pulse Milling (10 hrs)

Important unit operations of pulse milling: cleaning, conditioning, polishing and grading. Pulse milling process: domestic level process, commercial level process.

Pulse milling method : Wet milling and dry milling. Factors affecting pulse milling out turn a). grain parameter b) machine parameter.

4. Wheat Milling (12 hrs)

Introduction to flour milling , steps in wheat milling, receiving ,drying and storage, cleaning, conditioning, milling into flour and by product, packaging and blending. Component, operation and performance of wheat mill.

5. Oil Mills (10 hrs)

Processes of oil milling, unit operations in oil mills. Oil expression and extraction. Mechanical expression devices such as Ghani, hydraulic press and screw press; Their principle of operations. Principle and concepts of solvent extraction.

6. Animal Feed Processing (10 hrs)

Introduction to various animal feeds and sources of raw material. Machines used for grinding, blending, mixing, pelleting of feed ingredients. Lay out of animal feed plant.

LIST OF PRACTICALS

1. Study of operation and adjustments of air screen cleaner-cum-grader.
2. Study of operation and adjustment of specific gravity separator.
3. Study of operation and adjustment of indented cylinder.
4. Visit to a seed processing plant.
5. Study of different materials handling equipments.
6. Visit to rice milling industry for the study of parboiling and rice milling equipment.
7. Visit to a Dall mill and study the operations.
8. Visit to flour mill and study of machinery and processes used in flour milling.
9. Visit to oil-mill and solvent extraction plant.
10. Visit to animal feed plant and study of machines used in feed mill

INSTRUCTIONAL STRAGEGY

Visits to be arranged to various grain milling plants. Video clips of various processing units in operation to be used as teaching aid.

RECOMMENDED BOOKS

1. Rice Processing Technology by Bandhyopadhyaya; Oxford & IBH Publication Co.
2. Post harvest Technology of cereal, Pulses, oil seeds by Chakraverty; Oxford & IBH Publication Co.
3. Food Processing, by Potty & Mulky; Oxford & IBH Publication Co.
4 Seed Industry in India, by Gurdev Singh; Oxford & IBH Publication Co.
5. Unit operation of Agro Processing Engineering by Dr. K.M. Sahay; Vikas Publications.
6. Princple of Agro Process Engineering, by Dr.K.M. Sahay; Vikas Publications.
7. Seed Technology by R.L.Aggarwal; Oxford & IBH Publication Co.
8. Rice Processing Technology by S. Bandyopadhyaya & N.C. Roy; Oxford & IBH Publication Co.
9. Food Processing Industry in India by Desai; Oxford & IBH Publication Co.
10. Fruits & Vegetable Processing by Bhatti Suman; Oxford & IBH Publication Co.
11. Drying & Storage of Grains & oil Seeds by Brooker D.B.; Oxford & IBH Publication Co.
12. Food Process Engineering by Holdman; Oxford & IBH Publication Co.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	18	20
2	20	25
3	10	15
4	12	15
5	10	13
6	10	12
Total	**80**	**100**

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person Interviews; Telephonic Interview; Panel interviews; Group interviews and Video Conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene