6.1 POST HARVEST TECHNOLOGY

L T P
4 -- 2

RATIONALE

Agricultural produce e.g. cereal, pulses and oil seeds are not consumed as such. They are processed before consumption. Knowledge of unit operation such as drying, storage and processing of fruits and vegetables including grading, waxing and packing is of great importance for value addition of these food products.

DETAILED CONTENTS

1. Introduction (10 Periods)

   Introduction to post harvest technology of agricultural produce, its need, scope and importance .Brief description and introduction to various post harvest operation such as cleaning, grading, sorting, drying, storage, milling, size reduction, expelling, extraction, blending, heat treatment, separation, material handling (transportation, conveying, elevating), washing; their functions and use in the post harvest processing

2. Engineering Properties of Agricultural Materials (14 Periods)

   Introduction to the engineering properties of agricultural materials affecting post harvest operations. Physical properties such as shape, size, density and specific gravity . Aero and hydro dynamic properties such as drag coefficient and terminal velocity. Frictional properties e.g. static friction, kinetic friction, rolling resistance, elasticity and angle of repose. Mechanical properties such as hardness, compressive strength, impact and shear resistance and thermal properties like specific heat, thermal conductivity and thermal diffusivity etc.

3. Drying of Cereals and Pulses (16 Periods)

   3.1. Introduction, importance of drying, principles of drying and factors affecting drying, types of drying methods i.e. sun drying & artificial drying by mechanical means. Moisture content representation, equilibrium moisture content, determination of moisture content by direct and indirect methods.

   3.2. Introduction to various grain drying systems - solar drying system, batch drying system, continuous flow drying system. Safe temperatures during drying.

   3.3 Principles of operation of different types of dryers viz. Deep bed dryers, flat bed dryers, continues flow dryers, L.S.U. dryers, fluidized bed dryers, rotary dryers tray and tunnel dryers .

4. Shelf life (8Periods)

   Factors effecting shelf life, EMC ,determination of MC, principles of storage and changes during storage.

5. Storage (8Periods)

Need and importance, general principles of storage, temperature and moisture changes during storage i.e. influence of moisture content, relative humidity, temperature, fungi etc. on stored product.

6. Seep processing (8Periods)

Introduction, principles, safe storage and related equipments

LIST OF PRACTICALS

1. Determination of physical properties of agricultural materials e.g. size, shape, density and angle of repose.
2. Determination of moisture content of grains by direct/oven method and by moisture meter.
3. Study of different types of dryers.
4. Study of domestic grain storage structures.
5. Visit to warehouses (bag storage and bulk storage structures).

LIST OF BOOKS

1. Unit operation of Agro Processing Engineering by Dr.K.M. Sahay& K.K Singh; Vikas Publications.
3. Post Harvest Technology of fruits & Vegetables by Thompson; CBS Publishers and Distributors, 485 Jain Bhavan, Shandara Delhi-110032.
4. Post Harvest (Introduction Physiology Handling fruits & Vegetables by Wills R.B.H. etal; Oxford & IBH Publication Co.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	15
2	14	20
3	16	20
4	8	15
5	8	15
6	8	15
Total	**64**	**100**

6.2 PRINCIPLES OF SOIL AND WATER CONSERVATION

L	T	P
4	-	2

RATIONALE

A diploma holder in Agricultural Engineering needs to learn about the soil erosion, the factors affecting the erosion besides the soil erosion control practices. A course on soil conservation shall equip the students with the knowledge of the physical and chemical properties of soil, various agents of erosion and various methods of erosion control. Hence this subject.

DETAILED CONTENTS

1. Soil and Water Conservation (4 Periods)
   Definition and aims of soil and water conservation in Agriculture

2. Soil Erosion (6Periods)
   Mechanics, types and causes of erosion, factors affecting erosion, damages caused by soil erosion.

3. Agronomic Measures for Soil and Water Conservation (4 Periods)
   Mulching, strip cropping, cover cropping, mixed cropping, conservation by crop rotation, monoculture, role of grasses in soil conservation

4. Engineering Practices of Erosion Control (12 Periods)
   Elementary idea of basin listing, sub-soiling, field bunding, Contour bunding graded bunding, ridge and channel terraces. Cost of narrow base broad base bund as earthwork and sadding cost

5. Conservation Measures for Hill Slopes (8 Periods)
   Contour trenching, specification of trenching, alignment and construction of trenches, bench terracing – types, construction and maintenance elementary idea of stone terracing and its specification

6. Gully Erosion Control and Reclamation (6 Periods)
   Classification of gullies, principles of prevention and control of gullies by vegetative and mechanical measures, contour and peripheral bunding, ditches gully plugging. Temporary and permanent structures: Earthen check dams, woven wire check dams, brush dams, loose rock dams, log and plank dams, straight drop spillway. Reclamation of gullies for cultivation

7. Forestry Management in Soil Conservation (6 Periods)
   Effects of forests on soil and water conservation and climate, classification of forests, elementary idea of farm and social forestry, taungya system and forest protection, selection, development , tillage, irrigation protection and management

of nurseries

8. Grassed Waterways (4 Periods)
Use, design of waterways, grasses for waterways, construction of water ways, establishment of grasses on waterways, maintenance of waterways

9. Wind Erosion Control (6 Periods)
Principles, Mechanics of wind erosion, forms of wind erosion, wind erosion control- vegetative and mechanical particles

11. Land Use capability classification (4 Periods)

12. Ravine Reclamation (4 Periods)
Classification of ravines and various measures for ravine reclamation

LIST OF PRACTICALS

1. Demonstration of various types of soil erosion
2. Preparation of land use capability map for a given area
3. Survey and planning of soil conservation measures in a given area
4. Design and Cost estimation of bunding
5. Design of grassed waterways
6. Cost estimation of levelling of a field with slope either lengthwise or breadthwise
7. Study of layout and management of forest nurseries
8. Visit to various area of soil-water conservation and land reclamation activities and structures

RECOMMENDED BOOKS

1. Principles of Agricultural Engineering-II by AM Michael and TP Ojha
2. Soil and Water Conservation Engineering by Ervert Schwab
3. Land and Water Management Engineering by VVN Murthy
4. Soil Conservation by Norman Hudson
5. Introduction to Soil and Water Conservation Engineering by BC Mal

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	05
2	6	10
3	4	05
4	8	15
5	8	15
6	6	10
7	6	10
8	4	05
9	4	05
10	6	10
11	4	05
12	4	05
Total	**64**	**100**

6.3 TRACTOR POWER

L	T	P
4	-	2

RATIONALE

The tractor is an important source of power on the farm and is used to perform various agricultural operations. The students need to be fully familiar with the various components, sub-assemblies, their operations, their location on the tractor and their importance to the tractor. The subject will equip the students with complete understanding of the tractor and enable them to handle these effectively and efficiently. This subject will also help the students to run the tractor and machinery system whether state owned or as a part of custom- hiring centre.

DETAILED CONTENTS

1. Introduction (2 Periods)
   Classification and types of tractors for farm operations such as orchards row crops etc., two and four wheel drives

2. I.C. Engines (20 Periods)
   Principle:

   2.1 Classification of I.C. engines, principle of two and four stroke engines. Difference between two and four stroke engine, diesel and petrol engine, parts of I.C engines, their materials of construction and function.Terminology and numericals related with I.C. Engine. Performance of engine.

   2.2 Valve system: Types of valve, function of different parts of valve system, effects of incorrect valve timing, valve clearance and it's adjustment.Scavenging system ratio and efficiency.

   2.3 Fuel supply system: System of fuel supply in petrol and diesel engines, and their components ,construction and working of simple compensating and Zenith carburetor, adjustments in carburetor, specific fuel consumption.

   2.4 Fuel injection: Method of injection, construction and working of fuel injection pump, injector, atomizer, type of nozzles

   2.5 Air cleaner: Importance of clean air in engine, characteristics of air cleaner, type of air cleaner, their construction and working, maintenance of air cleaner

   2.6 Ignition system: Ignition method, electric spark ignition, battery and magnet ignition system, spark plug, combustion in I.C. engine, firing order.

2.7 Governing system: Governing hit and miss system, throttle system, centrifugal and pneumatic governor, governor hunting and governor regulations

2.8 Lubricating system: Importance, function and quality of lubricant. Types of lubricants used in engine, sources of lubricants, selection of lubricants, splash system internal forced feed and splash system, oil filter

2.9 Cooling system: Importance and method of cooling system and function of thermostat valve .

3. Power Transmission System of Tractors (10 Periods)

Functions and various components of power train. Clutch; functions of clutch, type of clutch(single plate, dual plate and multi disc 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.

4. Braking System (4 Periods)

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

5. Wheels and Tyres of Tractors (3 Periods)

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

6. Hydraulic System (6 Periods)

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

7. Steering System of Tractors (6 Periods)

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.

8. Electrical System of Tractors (03 Periods)

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

9. Economics, Selection and Safety of Tractors (5 hrs)

Various factors affecting the right selection of a tractor. Safety measures in the operation of tractor, cost analysis of use of tractors.

Tractor Testing

10. Traction, Terms related to 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. (5hrs)

LIST OF PRACTICALS

1. Familiarization with different gauges and controls of tractors and pre starting checks
2. Study of components and working of engine: two and four stroke cycle engines
3. Study of valve arrangement, valve tuning and firing order, valve grinding and setting of valve timing
4. Study of diesel fuel supply systems, air bleeding
5. Study of battery, periodic battery care, ignition system and spark plug adjustment
6. Study of cooling system in tractors and stationary engines
7. Study and servicing of lubrication system
8. Study of carburetion
9. Clutch - dismantling and study of clutch and its components and assembly.
10. Transmission- study of gear box, differential and final drive.
11. Brake and steering –dismantling and study of their components.
12. Wheel equipment-care and maintenance, fitting of wheels and adjustment of track width.
13. Operation of hydraulics system, draft position and mix control systems.
14. Periodical maintenance and service of tractors
15. Determination of indicated/brake power and specific fuel consumption
16. Testing of diesel engine for pollution
17. Preparing of cost estimate for repair work.

LIST OF BOOKS

1. Farm Tractors by SC Jain and Rai; Tata Oxford Company
2. I.C. Engine by SS Thethi; Tata Oxford Company

3. I.C. Engine by AS Sarao; Tata Oxford Company
4. Tractors and Automobiles by Rodichev; Mir Publications
5. Automobile Engineering I & II by Dr. Kirpal Singh
6. I.C. Engines by Keswani
7. Elements of Agricultural Engineering by Dr. Jagdishwar Sahay; Standard Publisher Distributors, Nai Sarak, Delhi-110006.
8. Farm Power Machinery & Surveying by Irshad Ali; Kitab Mahal, Allahabad, Surjit Book Depot P.B.No. 1425,4074-75, Nai Sarak, Delhi.
9. Principle of Agricultural Engineering Volume-I by A.M. Michael &T.P.Ojha; Jain brothers.
10. Farm Machines & Equipments by C.P.Nakra; Dhanpat Rai & Sons , Nai Sarak New Delhi.
11. Farm Tractors Maintenance & repairs by S.C. Jain & C.R. Rai; Tata McGraw-hill Publishing Co. Ltd., New Delhi.
12. Elements Of Agricultural Engineering Part 1 & 2 by Dr. O.P. Singhal and Naresh Chandra Aggarwal; Mumfordganj, Allahabad.
13. Basic Farm Machinery by Shiphen & Ellen; Jain brothers.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	2	05
2	20	25
3	10	15
4	4	05
5	3	05
6	6	10
7	6	10
8	3	05
9	5	10
10	5	10
Total	**64**	**100**

6.4 FARM STRUCTURES

L	T	P
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RATIONALE

The knowledge of this subject will help the learner to design and construct the most comfortable, attractive and safe far buildings. It is more economical to store and protect the animal fodder, implements and machines by means of simple types of storage structures then to let them be exposed to the weather.

DETAILED CONTENTS

1. Planning of Farm Shed and Farm Residence (25 Periods)

   1.1 Introduction - location of farm shed, size and arrangement of the farm shed.
   Planning and layout of farm shed , physiological reaction of livestock to solar radiation and other environmental factors, livestock production facilities ,BIS standardization for dairies, piggery, poultry and other farm structures

   1.2 Planning of farm residence – farm house design

   1.3 System of sanitation – Design and construction of septic tank, disposal of septic tank sludge, sewage disposal system, sewage farming.

   1.4 Waste supply –Importance and necessity of farm shed water supply, sources of farm shed water supply, quality of water for irrigation and drinking purpose.

   1.5 Farm fencing – Different types of farm fencing, farm gates, fencing posts.

2. Animal Shelters (15 Periods)

   2.1 Dairy barn – types of dairy barn, stanchion barn, layout and design

   2.2 Barn equipment – loose housing barn, milking parlour, pen barn, community barn

   2.3 Poultry house – housing requirements, types of poultry house, brooder houses, poultry equipment

   2.4 Sheep housing – space requirement

3. Storage Structures (12 Periods)

   3.1 Farm silos – silo, pit silos, trench silos

   3.2 Feed storage

4. Farm Machinery Storage (12 Periods)

   4.1 Farm machinery storage structures

   4.2 Farm workshop

RECOMMENDED BOOKS

1. Principles of Agricultural Engineering by TP Ojha and AM Michael; Jain Brothers, New Delhi
2. Farm Structures by JH Barre and LL Sammet, John Willey and Sons, New York
3. ASHRAE Guide, Handbook of Fundamentals, 1974
4. Agricultural Eneineers Hanbook by CB Richey, et.al., McGraw Hill Book Company
5. Environmental Control for Agricultural Buildings by ML Esmay and JE Dixon, AVI Publishing Company, Connecticut, 1986.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	25	35
2	15	25
3	12	20
4	12	20
Total	**64**	**100**

6.5 Hill Agriculture and Small Farm Mechanization

L	T	P
4	-	2

DETAILED CONTENTS

1. **Introduction:** Different hill eco-systems in the country Geography, climate, soil and water resources, cropping systems, crop production and productivity, category of farms and constraints in mechanization. (4hrs)

2. Unit operations in crop production energy requirement in hill production agriculture traditional tools and implements in different hill zones, their design, functions and limitations conservation tillage practices, equipment for terrace modifications, improved tools and implements for various farm operations such as tillage, seedbed preparation, sowing, interculture and weeding, sprays harvesting and threshing, equipment for collection and utilization of crop and forest residue, organic farming in hill agriculture. (15hrs)

3. Farm power sources and power availability is hills, animate power, draft animals and draftabilty, yokes and harnesses, hitching system, adjustments for comfort and safety. Power tiller, their make and models, size, function, operations, matching equipment for tillage, sowing, weeding, harvesting etc.Small horse power(less than 20 hp) tractors, make, models and their utility in production agriculture.(15hrs)

4. Small engines utility on self-propelled machines, power transmission systems to working element, modular system of gadgets and their application on farm machines. Multipurpose tool carriers and their utility. (10hrs)

5. Women farmers is hills and small farms, drudgery reductions, ergonomics is agriculture, capability ad limitation of workers, ergonomically designed tools and implements for woman, their capacity and availability, safety gadgets for hand, head, foot, eye protection etc. (5hrs)

6. Mode of transport of agricultural products, load carrying modes for water, fodder, fuel wood etc., Improved gadgets/back pack for transport. (5hrs)

7. Specialized machines i.e. Cob sheller, decorticator, seed extractor, multi crop threshers for wheat, paddy & pulses, transplanters. (5hrs)

8. Strategy for promotion of mechanization in hills, extension services, village saturation programme and other government schemes. (5hrs)

Lab/Practicals

1. Study of animal drawn matching equipment.

2. Study of different types of yokes, harnesses and their hitching

3. Study of different types of power tillers.
4. Study of matching equipment with power tillers.
5. Study of different types of traditional and improved and tools and implements related to crop production.
6. Study of different types of gadgets for handling and utilization of crop and forest based residues.
7. Study of different equipment and gadgets for preparation and utilization of compost and vermin-compost.
8. Study of specialized tools and equipment for shelling/dehusking/decortication/seed extraction.
9. Visit to small scale manufactures, Agricultural university, research institutions, NGOs and progressive farmers.

List of references

1. Uttaranchal : Constraints in Agricultural practices and its future prospects. Bulletrn. Vol. 1, (2005), Published by central Environment Association, Nainital.
2. Agriculture in uttarakhand hills Eds. B.S. Bisht and D.P. Sing Published by Directorate of Experiment Station, GBPUA&T, Pantnagar (2009). Page 319.
3. Sustainable Production from Agricultural watershed in North-west Himalayas. Eds. H.S. Gupta, A.K.Srivastava and J.C.Bhatt VPKAS, Almora (2006), PP 615
4. Woman friendly Improved Farm Tools and equipments by S.P.Singh, L.P. Gite, N. Agarwal and J. Majundar. CIAE Bhopal. Technical Bulletin No. CIAE/2007/128, PP55

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	12
2	15	22
3	15	16
4	10	16
5	5	8
6	5	8
7	5	18
8	5	
Total	**64**	**100**

6.6 RENEWABLE ENERGY SOURCES

L T P
4 -- 2

RATIONALE

Conventional energy sources are depleting day by day. Before we face the alarming deterioration, renewable energy sources should be harnessed. Non-conventional energy sources like solar, wind, bio- gas etc. should be used to the maximum extent possible. A diploma holder in Agricultural Engineering must know various types of renewable energy sources based gadgets and their use and maintenance.

DETAILED CONTENTS

1. Introduction to Non-Conventional/renewable energy Sources (3 Periods)

   Conventional and Non-conventional sources of energy. Need, importance and scope of non-conventional and alternate energy resources.

2. Biogas Technology (25 Periods)

   2.1 Bio-gas: Importance of bio- gas. Principles of biogas generation. Feedstock, types and design of biogas plants including their comparison. Main parts of biogas plants: Digester, gas holder, pressure gauge, gas controlling cocks and meter. Selection of biogas plant model and size. Site selection of biogas plants.

   2.2 Operation, trouble shooting and maintenance of biogas plant. Appliances and installation for use of biogas - burner, heating plate, lamps etc. Use of biogas plant in I.C engines.

3. Wind Energy Technology (6 Periods)

   3.1. Introduction, scope and significance of wind mill.

   3.2. Type and constructional details of windmill - vertical and horizontal axis type wind mill. Site selection for installation of windmill. Care and maintenance of windmill.

4. Solar Energy Technology (12 Periods)

   Introduction, significance of solar energy, solar spectral and green house effect. Principles of thermal collection and storage. Comparison of flat type collector and concentration or focussing type collectors. Introduction to SPV module, its principle and applications.

5. Solar Thermal Systems (6 Periods)

Operation, constructional details and maintenance of solar cooker, solar water heater, solar still, solar water pump, SPV system, solar crop dryer etc.

6. Energy Conservation (6 Periods)

6.1. Principles of energy conservation. Familiarization with different energy conservation appliances and practices, improved cooking stoves, benefits of improved cooking stoves over traditional cooking stoves.

6.2. Scope of energy conservation in the domestic, commercial and agricultural sectors.

Visits

Visits should be made to following places:

- Solar energy appliances manufacturing units.
- Energy parks/ Schools of energy at Agricultural Universities.
- Community/ Institutional biogas plants.

LIST OF PRACTICALS

1. Demonstration/study of solar cooker
2. Demonstration/study of solar water distillation
3. Demonstration/study of solar water heater
4. Demonstration/study of solar photovoltic lighting system
5. Demonstration/study of water pumping system
6. Visit to biogas plants, domestic community/institution for study and demonstration of biogas plants
7. Demonstration/study of the working of a windmill
8. Study of energy saving appliances and their applications

RECOMMENDED BOOKS

1. Advance in Biogas Technology by O.P.Chawla; Publications & Information Div. 1 CAR, New Delhi.
2. Solar Energy by S.P.Sukhatme; Tata McGraw-hill Publishing Co. Ltd., New Delhi.
3. Solar Energy Utilization by G.D.Rai; Khanna Publishers, New Delhi.
4. Bio Gas Technology by K.C.Khandelwal & S.S. Mahdi; Tata McGraw- hill Publishing Co. Ltd., New Delhi.
5. Biomass Energy by OECD; Oxford & IBH Publication Co.
6. Wind Energy For water Pumping by Srivastava; Oxford & IBH Publication Co.
7. Cook Stoves For Masses by N.S.Grewal; PAU Ludhiana.
8. Energy in Agricultural Engineering by ISAE; Jain Brothers, Delhi.
9. Non Conventional Energy Sources by G.D.Rai; Khanna Publishers,New Delhi.
10. Renewable & Conventional Energy by S. Rao.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	5	10
2	25	30
3	6	10
4	12	20
5	8	15
6	8	15
Total	**64**	**100**

6.7 MAJOR PROJECT

L T P
- - 6

Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given for a group. The students should identify or given project assignment at least two to three months in advance. The project work identified in collaboration with industry may be preferred.

Each teacher is expected to guide the project work of 4-5 students.

A suggestive criteria for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	**Max. marks**	**Rating Scale**				
			Excellent	**Very good**	**Good**	**Fair**	**Poor**
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
Total marks		**100**	**100**	**80**	**60**	**40**	**20**

*****

The overall grading of the practical training shall be made as per following table

	Range of maximum marks	**Overall grade**
i)	More than 80	Excellent
ii)	79 <> 65	Very good
iii)	64 <> 50	Good
iv)	49 <> 40	Fair
v)	Less than 40	Poor

Topics Related to Major Projects:

1. Drip irrigation
2. Sprinkler irrigation
3. Agriculture sprayers
4. Mechanical and hydraulic gating system
5. Cold Storages
6. Poly houses
7. Mushroom culture
8. Different Planters driven by tractors
9. Two and three point hitch system mounted on tractors
10. Grass cutting machines
11. Seed treatment plant
12. Milk chilling plant

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance of undergoing 8 -10 weeks of project work/ oriented professional training in the same industry and re-evaluated before being disqualified and declared "not eligible to receive diploma ". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

Important Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.

2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.

3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.

4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.

6.8 EMPLOYABLE SKILLS

	L	T	P
Periods per week	-	-	4

RATIONALE

Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workshop. This subject is included to develop employability skills amongst the students

DETAILED CONTENTS

1. Industrial Scenario Engineering Education and expectations of competences from an engineer by employer (04 period)

2. Personality types, characteristic and features for a successful engineer (04 period)

3. Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment (04 period)

4. Managing project (16 period)
   - Leadership
   - Motivation
   - Time management
   - Resource management
   - Computer Software
   - Interpersonal relationship
   - Engineer economics and fundamentals

5. Effective Communication (08 period)
   - Listening
   - Speaking
   - Writing
   - Presentation Technique/Seminar
   - Group discussion

6. Preparing for Employment (08 period)
   - Searching for job/job hunting
   - Resume Writing
   - Interview technique in personal interview telephonic interview, panel interview, group interview, video conference

7. Managing Self (06 period)
   - Managers body, mind, emotion and spirit
   - Stress Management
   - Conflict resolution

8. Continuing professional development (04 period)
   - Organising learning and knowledge
   - Use of computer for organising knowledge resource

9. Creativity, Innovation and Intellectual property right (06 period)

- Concept and need in present time for an engineer

10. Basic rules, laws and norms to be adhered by engineers during their working (04 period)