VOCATIONAL HIGHER SECONDARY

MECHANICAL SERVICING & AGRO MACHINERY

TEACHERS' SOURCEBOOK

Government of Kerala
Department of Education

2006

State Council of Educational Research & Training (SCERT)
Vidyabhavan, Poojappura, Thriuvananthapuram-12, Kerala

***Prepared by* :**

State Council of Educational Research and Training (SCERT)

Vidyabhavan, Poojappura, Thiruvananthapuram - 12, Kerala

2006

Foreword

Dear Teachers,

This Teacher's Sourcebook on **Mechanical Service & Agro Machinery** introduces the teacher to the main principles and practices of the revised pedagogy which is activity-based, process-oriented and learner-centred.

The realisation that learning is not mere storing information in memory and that real learning is construction of knowledge through observation, comparison, classification and analysis has led us to give a new thrust to the teaching-learning process at Vocational Higher Secondary level to make it more meaningful and learner-friendly.

This sourcebook has been developed primarily for the benefit of teachers who teach **Mechanical Service & Agro Machinery** at Vocational Higher Secondary level. The subject matter has been dealt with utmost care, in tune with the revised curriculum and pedagogic principles. It is hoped that this book will enable the teacher to provide suitable learning activities for effective learning.

The success of the approach depends upon the vision and commitment of the teacher. They are expected to make use of this sourcebook at all stages of their teaching process. It is also expected that the teacher would seek help and guidance from other sources like libraries and websites.

Hope that this sourcebook will help the teacher to develop the skills and experience required for effective classroom transaction.

Creative criticism and suggestions for improvement are most welcome.

With regards,

Thiruvananthapuram
July, 2006

Dr E. Valsala Kumar
Director
SCERT, Kerala

Content

1. GENERAL APPRAOCH

SIGNIFICANCE OF VOCATIONAL EDUCATION

The ultimate aim of education is human refinement. Education should enable the learner to formulate a positive outlook towards life and to accept a stand which suits the well being of the society and the individual as well.

The attitude and potential to work has determined the destiny, progress and cultural development of the human race. As we all are aware, the objective of education is to form a society and individuals having a positive work culture. The educational process expected in and outside our formal schools should concentrate upon inculcating concepts, abilities, attitudes and values in tune with these work culture. Hence vocationalised education cannot be isolated from the main stream of education. In another sense, every educational process should be vocationalised. However due to our inability to utilize the resources wisely, scarcity of job opportunities is a severe issue of the present society. For overcoming this deep crisis, emergent techniques have to be sorted out and appropriate researches have to be seriously carried out. It is in this sense that the content and methodology of Vocational Higher Secondary Education have to be approached. The need for meaningful linkages between the world of work and world of education is well recognized. The essence of the recommendations made by various commissions and committees is that the vocationalisation should be the main feature of the future system of education at the higher secondary stage, it can be extended to school level also.

Vocational education is a system of education which intends to prepare students for identified occupations , spanning several areas of activities.

The Vocational Higher Secondary course is envisaged as a part of the National Policy on Education with the noble idea of securing a job along with education. The relevance of vocational education is very great in this age of unemployment. This education system, which ensures a job along with higher education stands aloof from other systems of education.

This education imparts the life skills required by the youth to enter the world of work and assuming the responsibilities of adulthood. As per the expert meeting report (2001) of UNESCO, the life skills are grouped under four categories. They are

1. skills for personal fulfilment
2. skills for living in society
3. skills for dealing with changing economies
4. skills for dealing with changing work patterns.

Vocational Education ensures fulfilment of manpower requirement for national development and social security for the citizens through self-employment. It also helps to reduce the migration of rural youth to urban areas and thus helps in rural development.

The learners of Vocational Education get an opportunity to avail one year apprenticeship training in industries to improve their practical skill. During the course of study, on the job training (OJT) for 10 days in a year is arranged to improve the skill and efficiency of the learner. This education system motivates the attitude towards self –employment through Production/ Service Cum Training Centres. (PTC)

Objectives of Vocational Education

The National policy on education has accorded very high priority to the programme of vocationalisation of education, considering the following objectives.

1. To fulfil national goals of development and the removal of unemployment and poverty.
2. To impart education relevant to increased production and productivity, economic development and individual prosperity.
3. To make available skilled work force at all levels to alleviate the rural unemployment and for the development of nation.
4. To develop environmental awareness to ensure sustainable development.
5. To develop vocational aptitude, work culture, values and attitudes of the learners so as to enrich the productivity of the nation.
6. To develop entrepreneurial competencies and skills of learners for self reliance and to undertake gainful self employment.
7. To facilitate the expansion of higher education and explore future opportunities through innovative guidance and programmes.
8. To develop vocational competencies, creative thinking in the related areas and facilitate training.
9. To create awareness on mental, physical and social health.
10. To acquire awareness about different job areas and to provide backgrounds for acquiring higher level training in subjects concerned.

Learning

Learning is construction of knowledge through a continuous mental process. It is an advancement through adding and correcting in the light of comparing the new issue with the previously learned concepts. It is an intellectual process rather than the mere memorisation of facts. It is a conglomeration of a variety of activities like problem solving, finding out co-relations, prediction, arriving at conclusions, rational as well as critical thinking, finding applications, grouping for other possibilities and extracting the crux. When opportunities are provided

for intellectual processes learning will become effective and intellectual ability will get strengthened.

Theoretical foundations of learning

Education is the best device that can be adopted for creation of a new society. It should be democratic in content and process and should acknowledge the rights of the learner. It should also provide opportunity for better citizenship training. The concept of equality at all areas should get recognition in theory and practice. There should be conscious programme of action to develop nationality, humaness and love against the encroachment of sectarianism of caste and religion. The learner should become cognisent of the implications of privatisation, liberalisation, globalisation etc.

They should develop a discrimination to use the acquired learning as a liberative weapon.

They should be able to view education and life with the perspective of social well being. They should get opportunity to recognise that co-operation is better than competition and that co-operation is the key to social life and culture.

A basic awareness of all the subjects needed for life is essential for all students.

The remnants of perspectives formed in us during the colonial period still influence our educational philosophy. The solution to the present day perplexities of the society which approaches education on the basis of competitions and marketisation is only a comprehensive view of life.

It is high time that education was recognized on the basis of the philosophy of human education. The human approach to education has to reflect in its content, learning process and outlook. The perspective of 'learning to be' and 'learning to live together' as expressed by the UNESCO and the concepts of existential, intrapersonal and interpersonal intelligence.

The basis of new approaches on curriculum and teaching- learning process are derived from the developments tookplace in the east and west of the world.

When we begin to see the learner at the centre of the learning process, the teaching process has to be changed timely. It is the result of the rapid growth and development of Science and Technology and Pedagogy. If we want to undergo the changing process, we have to imbibe the modern hypothesis regarding learner that they have

- Great curiosity
- Good imagination
- Numerous other qualities and interests
- Independent individuality
- Interest in free thinking and working in a fearless atmosphere.
- Interest in enquiring and questioning.

- Ability to reach conclusions after logical thinking.
- Ability for manifest and establish freely the conclusions arrived at.
- Interest for recognition in the society.
- Determination to face the interference of society and make components which is a part of social life.

When we consider the learning system, the domains to be stressed in education according to the modern development becomes relevant.

The *knowledge* domain consists of

- Facts
- Ideas
- Laws
- The temporary conclusions and principles used presently by scientists.

Learning is a process. The continuous procedures we undergo to reach a particular goal is process. The skills which are parts of the process to analyze the collected ideas and proofs and come to a conclusion is called *process skills*. Some important ***process skills*** are

- To observe
- To collect data and record
- To classify
- To measure and prepare charts
- To experiment
- To predict
- To recognize and control the variables
- To raise questions
- To generalize
- To form a hypothesis and check.
- To conclude
- To communicate
- To predict arid infer
- To use tools.

In addition to this, consider the skills related to *creative domain* also, they are skills:

- To visualize
- To connect facts and ideas in new ways.

- To find out new and uncommon uses of objects
- To fantasize
- To dream
- To develop creative isolated thoughts

Again, the following factors consisting in the ***Attitudinal domain*** are also important as;

- Self confidence
- Love for scientific knowledge
- Attitude to know and value history
- Respect human emotions
- Decide with reasonable present problems
- Take logical decisions regarding personal values

As regards the ***application domain*** the important factors are the ability to:

- observe in daily life examples of ideas acquired.
- take the help of scientific process to solve the problems of daily life.
- choose a scientific life style
- connect the ideas acquired with other subjects.
- integrate the subjects with other subjects.

Some basic stands have to be taken on the new scientific knowledge about intelligence learning and teaching. When such basic concepts are accepted changes are required in the following factors.

- The vision, approach, structure and content of the curriculum.
- The vision, approach, structure and content of the textbooks.
- Role of the teacher and the learner.
- Learner atmosphere, learning materials and learning techniques.

Some scientific perspectives accepted by modern world in Educational Psychology are given below.

Constructivism

This approach puts forward the concept that the learner constructs knowledge. New knowledge is constructed when ideas are examined and practiced in new situations relating them with the previously acquired knowledge and experience. That is assimilated into the cognitive structure of one's knowledge. This method which gives priority to critical thinking and problem solving provides opportunity for self motivated learning.

Social Constructivism

Social constructivism is a branch of constructivism. Knowledge is formed, spread and imbibed and it becomes relevant in a social environment. Interactive learning, group learning, co-operative participatory learning, all these are concepts put forward by social constructivism.

The main propounders of constructivism are Piaget, Vygotsky and Bruner.

Discovery learning and interactive learning have prime importance. Learning takes place as a part of the attempt for problem solving. The activities of a learner who confronts cognitive disequilibrium in a learning situation when he tries to overcome it leads to the renewal of cognitive structure. It is through this process construction of new knowledge and the assimilation of them take place. Observation and enquiry are unavoidable factors. The learner advances towards new areas of acquisition of knowledge where he tries to compare his new findings with the existing concepts.

Learning is a live mental process. Rather than the ability for memorization of facts cognitive process has to be given emphasis. The process of problem analysis, elucidation, critical thinking, rational thinking, finding out corelation, prediction, hypothesis formation, application, probing for other possibilities, extracting the crux and other processes are of critical importance in learning.

Constructivism gives greater predominance to co-operative learning. Social and cultural factors influence learning. Sharing of knowledge and experience among learners, collective enquiry, assessment and improvement, group activity and collaborative learning by sharing responsibilities with the objective of public activity, provide opportunity for effective learning.

In learning internal motivation is more important than external motivation. The learner should have interest and initiative in learning. Learning situation should be capable of forming a sense of ownership in the learner regarding the learning process.

Learning is not a linear process. It progresses in a spiralled way advancing deeper and wider.

NEW CONCEPTS OF LEARNING

1. Discovery Learning

The teacher has to create a motivating atmosphere for the learner to discover concepts and facts, instead of listening always. Creating occasion to progress towards discovery is preferred. Instead of telling everything before and compelling to imitate the models, situations are to be created to help the children act models as themselves.

2. Learning by discussion

Discussion leads to learning is Burner's theory. Here discussion is not opposing each other. It is a sharing on the plane of ideas. New ideas are arrived at by seeking explanations, by mutual giving and taking of ideas and by problem solving.

3. Problem solving and learning

Only when the learner feels that some thing is a problem to be solved that he takes the responsibility of learning it. It is an inborn tendency to act to solve a problem that causes cognitive disequilibrium in a particular area. It is also needed to have confidence that one is capable of doing it. The problems are to be presented in consideration of the ability and level of attainment of the learner.

4. Collaborative learning

This is the learning in which the responsibilities are distributed among the members of the group keeping common learning objectives. The common responsibility of the group will be successful only if each member discharges his duties. All the members will reach a stage of sharing the result of learning, equally through the activity with mutual understanding. The teachers who arrange collaborative learning will have to make clear the responsibilities to be discharged. This is possible through the discussion with the learners. Collaborative learning will help to avoid the situations of one person working for the whole group.

5. Co-operative learning

This is the learning in which the learners help one another. Those who have more knowledge, experience and competency, will help others. By this exchange of resources the learners develop a plane of social system in learning also. As there are no high ups and low ones according to status among the learners they can ask the fellow students doubts and for helps without any hesitation or in hesitation. Care should be taken not to lead this seeking of help to mechanical copying. It should be on the basis of actual needs. So even while encouraging this exchange of ideas, among the members of the group cautious acceptance is to be observed as a convention. There should be an understanding that satisfactory responses should come from each member and that the achievement of the group will be assessed on the basis of the achievement of all the members

6. Zone of Proximal Development

Vygotsky observes that there is a stage of achievement where a learner can reach by himself and another higher zone where he can reach with the help of his teachers, peers and elders. Even though some of them can fulfil the learning activity by themselves there is the possibility of a higher excellence. If appropriate help is provided every learner can better himself.

7. Scaffolding

It is natural that the learner may not be able to complete his work if he does not get support at the proper time. The learner may require the help of the teacher in several learning activities. Here helping means to make the learner complete the activity taking responsibility by himself. The teacher has to keep in mind the objective of enabling the learner to take the responsibility and to make it successful.

8. Learning - An active mental process

Learning being a cognitive process, the teacher needs to know cognitive processes to facilitate the creation of learning opportunities. Learning can be made effective by providing learning experiences involving mental processes like

- Retrieves/recollects/retells information
- Readily makes connections to new information based on past experiences and formulates initial ideas /concepts.
- Detects similarities and differences
- Classifies/categorises/organises information appropriately.
- Translates/transfers knowledge or understanding and applies them in a new situation.
- Establishes cause-effect relationships
- Makes connections/relates prior knowledge to new information/applies reasoning and draw inferences
- Communicates knowledge/understanding through different media.
- Imagines/fantasises/designs/predicts based on received information
- Judges /appraises/evaluates the merits or demerits of an idea/develops own solutions to a problem.

9. Intrinsic Motivation

Intrinsic motivation is given more importance than extrinsic motivation. The teacher has to arouse the internal motivation of the learner. A person internally motivated alone can immerse in learning and own its responsibility.

10. Multiple intelligence

The Theory of Multiple Intelligence put forward by Howard Gardener has created a turning point in the field of education. The National curriculum documents has recommended that the curriculum is to be designed taking into consideration of this theory.

Main Factors of the Intellect

1. Verbal/linguistic Intelligence

Ability to read and write, making linguistic creations, ability to lecture, competency to effective communication, all these come under this. This can be developed by engaging in language games and by teaching others.

2. Logical/mathematical Intelligence

Thinking rationally with causes and effect relation and finding out patterns and relations come under this area. Finding out relations, explaining things, sequential and arithmetical calculations etc. are capable of developing this area of intelligence.

3. Visual/spatial Intelligence

In those who are able to visualize models and bringing what is in the imagination into visual form and in philosophers, designers and sculptors this area of intelligence is developed. The activities like modelling using clay and pulp, making of art equipments, sculpture, and giving illustrations to stories can help the development of this ability.

4. Bodily Kinesthetic Intelligence

The activities using body language come under this. This area of intelligence is more developed in dancers and actors who are able to express ideas through body movements and in experts in sports, gymnastics etc.

5. Musical Intelligence

This is an area of intelligence which is highly developed in those who are able to recognise the different elements of music, in musicians and in those who can here and enjoy songs. Playing musical instruments, imitating the songs of musicians, listening silently to the rhythms and activities like this are capable of developing this area of intelligence.

6. Interpersonal Intelligence

Those in whom this area of intelligence is developed show qualities of leadership and behave with others in a noble manner. They are capable of understanding the thought or others and carrying on activities like discussion successfully.

7. Intrapersonal Intelligence

This is the ability to understand oneself. These people can recognise their own abilities and disabilities. Writing diaries truthfully and in an analysing way and assessing the ideas and activities of others will help developing this areas of intelligence

8. Naturalistic Intelligence

A great interest in the flora and fauna of the nature, love towards fellow beings interest in spiritual and natural factors will be capable of developing this area.

9. Existential Intelligence

The ability to see and distinguish ours own existence as a part of the universe, ability to distinguish the meaning and meaninglessness of life, the ability to realise the ultimate nature of mental and physical existences, all these are the peculiarities of this faculty of intelligence.

EMOTIONAL QUOTIENT

The concept of emotional intelligence put forward by Daniel Golman is used in framing the new curriculum. The fact that one's Emotional Quotient (E.Q) is the greatest factor affecting success in life is now widely accepted. The teacher who aims to focus on improving the emotional intelligence of students need to concentrate on the following.

i) Ability to take decisions

Rather than imposing decision on students while planning and executing activities, the students may be allowed to take part in the decision making process. Taking decisions through open discussion in the class, inviting students suggestions on common problems etc. are habits to be cultivated.

ii) Ability to reach consensus

- When different opinions, ideas and positions arise, the students may be given the responsibility to reach a consensus.
- Imagining what would be the course of action in some situtations, allowing to intervene in a healthy way in problems between individuals.

iii) Problem solving

- Developing the idea that there is reason and solution to any problem.
- Training in finding reasons for problems.
- Suggesting solutions through individual or group efforts.
- Discussing social problems.
- Analysing the shortcomings in methods to solve problems.

Whether plastic can be banned within school premises can be given as a problem. Group discussion will provide reasons and solutions. Problems, which can influence classroom learning and for which the learner can actively contribute solution need to be posed

- Self criticism, evaluation
- Ability to face problem-situation in life
- Thinking what one would do if placed in the situation of others, how one would respond to certain experiences of others - All these foster the growth of emotional intelligence.

iv) Life skills

Life skills need to be given a prominent place in education. W.H.O. has listed : skills required for-success in life.

- Self awareness
- Empathy
- Inter personal relations
- Communication
- Critical thinking
- Creative thinking
- Decision making

- Problem solving
- Coping with emotion
- Coping with stress

THE NEW CURRICULUM ADDRESSES THESE AREAS

Knowing the characteristics of the learner, role of the teacher and how to use the teachers handbook help the teacher to plan and effectively implement learning activities.

Role of a Teacher

In the earlier approach the teacher was mainly depending on the lecture method for teaching. But in the new method of education the student centered approach is given more importance than the teacher centered approach. Under this changed **scenario** the teacher has to perform the following roles in the classroom.

The teacher should be

- A facilitator of learning
- A guide to the overall development of the student
- A good observer and motivator
- Able to consider the activities, needs, special features and age group of students at higher secondary level.
- Able to understand the limitations of learner and their learning problems.
- An instructional material developer
- A good communicator
- An innovator
- Able to raise leadership qualities and self confidence of the learner
- An authoritarian in the concerned subject
- Able to arrest and sustain the attention of the learner
- Able to bring out and encourage the inborn talents.
- A resource manager to ensure the optimum utilisation of resources.
- A systematic record keeper
- A controller to issue guidance to the students
- A person with high level of practical competency
- Able to corelate area of study with familiar environmental situations
- A self evaluator and good listener
- Able to create awareness in social problems

- A person with democratic and humanitarian approach
- A professionalist as well as philosopher
- A good evaluator
- A good organisor and a friend.
- A co-learner as well as co-researcher
- Able to give assistance and advice in placement needs and self employment by giving moral and technical support
- Able to keep moral values
- A person equipped with skill for using new techniques of learning
- Optimistic and impartial

Child friendly Class Room Atmosphere

Learning can be effective and enjoyable only when the class atmosphere is according to the new concept of learning and the characteristics of higher secondary teacher.

- Class and seating are arranged in an attractive way
- Democratic nature is upheld
- Always active
- Students interact with teachers without fear
- Opportunity for a variety of activities
- Students allowed to involve interesting group activities
- Learning speed, learning style and different levels of attitudes are considered. Help is extended whenever needed.
- Sufficient instructional materials are available
- There is freedom of expression, students share their ideas and experiences
- Students are given acceptance and encouragement
- Healthy atmosphere
- Needs of each student is given consideration. Happy and energetic atmosphere
- Teachers work considering the rights of students
- Prtoblems handled in a patient way
- Teachers look at all events from the students view point

There will be students of various ability levels in any class because learning style, learning speed, varying exposure to language experiences, physical and psychological problems and varying socio-cultural background.

The learning experiences provided must help to bring the low activities to an expected level and extended the breadth and depth of the skills of the high activities.

By repeating experiences, introducing variations in a learning experience to suit different levels and if needed, formulating additional experiences the problem of varying ability levels can be tackled.

Characteristics of Learner at Vocational Higher Secondary Level

The learner in second year has undergone a learner centered and process oriented learning experience up to first year. The learner at this age is in awakening stage and he is enthusiastic about environment. He needs recognition and encouragement from environment and also recognise as a grown up man. He is adequately competent to select vocational subjects according to his aptitude and interest and to acquire higher education and profession as he wishes. The aspirations about future life is framed in this particular age for seeing national and international job opportunities. Some of the peculiarities of learner at this stage are

- Physical, intellectual and emotional plans have intensive changes during the age and their reflections can be observed
- Ability to enquire discover and establish cause effect relationship between phenomena
- Readiness to undertake challenges
- Capacity to shoulder leadership roles
- Attempt to interpret oneself
- Susceptibility to different pressures
- Doubts, anxieties and eagerness about sex
- Imaging for social recognition

Needs of Learner

- To make acquaintance with a job or self employment through vocational education
- To acquire more knowledge in the concerned area through higher education
- To recognize and encourage the peculiar personality of the later adolescent period
- To enable him to defend against the unfavorable circumstances without any help

Role of learner

- Active participant in the learning process
- Act as a researcher

- Sharer of information
- Sharer of responsibilities
- Collect information
- Takes leadership
- Involves in group work
- Act as a co-participant
- Observes his environment
- Experiments and realises
- Make interpretations and draw inferences
- Mould himself in to an active contributor for the welfare of the society

Evaluation

In vocational higher secondary education, a new approach to education and evaluation should be made. Evaluation must be a systematic and continuous process. As the curriculum is based on vocational stream, capacity building is a most important part and it should be evaluated accordingly. The technical skills, interest in the particular field, communication skill, analysing, organizing and presentation skills etc have to be evaluated. The personal and social qualities also have to be evaluated. Therefore, evaluation should be transparent, continuous and comprehensive.

Supporting System

In learner centered vocational education, a learning methodology has to be organised and a proper learning atmosphere is to be provided. Many organizations can support the learning activity. They are:-

1. School Resource Group (SRG)

Comprising all teachers (vocational and non vocational), instructors, and lab assistants with academic head as the group leader.

2. School Support Group (SSG)

Comprising PTA president, members of local bodies, members of social clubs, subject experts etc who can contribute guidance /technology /infrastructure / financial assistance etc.

3. Parent Teacher Association (PTA)

Can provide adequate funds for field trips, production cum training centers (PTC), exhibition, On the Job training (OJT) etc.

4. Local bodies

Grama Panchayat, District Panchayat and Block Panchayat can provide infrastructure ie, class rooms, laboratory, library, seminar hall, audiovisual equipments etc.

5. Subject club

All vocational teachers handling same vocational subjects should form a subject club at regional level or district level. This will helps to share the knowledge and practical facilities, production and marketing of materials, services etc.

6. Nodal Schools

Based on excellency, district wise nodal schools may be selected to provide facilities like central library, museums, video conferencing etc.

7. Institution Industry Interaction Project (III P)

This should be implemented in every institution to update knowledge . This also helps for OJT , PTC and field visit.

Monitoring system

Education is a sort of journey from darkness to light satisfying the needs and the wants of the individual and the society. The modernization of education through activity oriented system enhances free thinking and working in a fearless atmosphere. It is a qualitative process not a quantitative one. This necessitates a proper monitoring system. The system of monitoring should have the following features.

- It must be transparent.
- It must enrich the ideas of the facilitator through innovative process.
- It must be time bound and rational.
- It must motivate the facilitator to adopt new strategies.
- It must be recordable and ensure effective feedback for the effective monitoring of the system, three levels of the mechanism should be set up.
    1. School level monitoring group.
    2. Regional level monitoring group.
    3. State level monitoring group

Moreover a social auditing system is advisable to achieve the objective effectively.

Features of Learning Process in the New system of Education

In the new system of education the learning process should be modified in such a way as to enable the learner to construct the knowledge of his own through observation, co-operation, problem solving, social interaction etc. The learning process should consider the nature, ability, social setup, inborn talents and subject selected by the learner. Therefore the learning process should be:

- A continuous mental process
- Simple-learner must feel that he is able to undertake the task
- Enable the learner to attain the curriculum objective
- Interesting

- Suitable to the age and attitude of the learner
- Future possibilities
- Enable group activity
- Challenging
- Time bound
- Constructive and curiosity developing
- Possibilities for evaluation
- Capacity to generate independent thinking
- Ability to enquire, discover and establish cause effect relationship between phenomena.

Learning Aids

To make the teaching and learning process simple and effective , certain learning aids and necessary use of such aids for transacting a complex idea make the class room live and students get more and more involved. The advances in science and technology may be effectively utilised for this purpose. Some of the learning aids are listed below.

- Multimedia
- Over Head Projector
- Computer
- Internet
- Liquid Crystal display Projector
- TV, VCD, DVD and tape recorders
- Working models
- Charts
- Slides
- Video Conferencing facility
- Library
- Text book
- Source book

Society

The new educational policy uplifts the social commitment of the learner. Therefore the society can also give some valuable contributions in this changing situation. The new system also ensures that the learner can perform certain useful services for the betterment of society. The social obligations can be illustrated as follows.

- To enrich social values, aptitude and ability in learner
- To develop entrepreneurial aptitude and ability which helps social welfare and self employment
- New system of education adopts OJT, PTC etc as a part of vocational curriculum which helps to make close contact with the society.
- The resources available from our society can be positively utilised to convene seminars, interview etc.
- Social organisations can help learners to make their education socially committed.
- The social clubs like NSS, Tourism Club, Eco Club, Energy Club etc functioning in schools can make direct link with the society.

2. LEARNING STRATEGIES

In the modern era of globalization the introduction of new technologies ensures only the survival of the fittest. So it becomes a necessity to equip the learners to face the growing challenges in the competitive world. Hence the traditional approach to learning is no more relevant in the present context. The teacher should use instructional techniques that motivate the student to construct his own knowledge. Now the learners are not passive listeners , but they are the active participants in the construction of knowledge. Here the teacher – student interaction should be given much importance.

In the new instructional strategy while selecting the methods of teaching, the social and psychological aspects of the learner is to be taken into consideration. The given activities for learning are only suggested one. It can be altered according to the discretion of the teacher.

To obtain the objectives, the new system of education is introduced in the Vocational Higher Secondary Education for attaining the objectives of the courses in this system, we can adopt the following strategies.

1. Assignment

Assignment is some specific work assigned to the students as a part of their academic enrichment. There are learning activities undertaken as a continuation of class room activities to realize the curriculum objectives to a broader extent . They should be completed in time bound manner. They help to lead learner to higher level of learning from the present status. Challenging assignment can motivate the students to involve in group dynamics and achieve fruitful results . The teachers may act as a guide.

Assignments may be given on individuals or group basis. Assignment includes preparation of notes, preparation of charts, models, collection, of materials from institutions etc. Assignment develop skills of reference, observation, enquire reporting etc. It ensure the effective utilization of leisure time of the students.

2. Seminar

Seminar is a learning strategy involving an in-depth analysis of specific topic, preparation of a paper and presentation . The paper is presented by either one student or a group of students. After the presentation, there will be a discussion / interaction in which all the students can participate . The students get an opportunity to clear their doubts and make clarification.Seminar helps to develop communication skill and overcome stage fright.

Stages

i. Selection of Topic

The topic of seminar should be relevant to the subject of study

ii. Assignment of topic to individual student or team

The topic may be assigned to one student or subtoipcs may be given to a group of students

iii. Collection of relevant information

Information required for seminar can be collected from various sources namely books, magazines, internet, institutions, place and persons.

iv. Preparation of draft paper

Based on the information collected the student may prepare a draft paper and submit it to the teachers for comments. Revise the draft paper based on the comments of the teachers. The required drafts is submitted for approval.

v. Programme Scheduling

The date, time and venue of the seminar is fixed. A seminar leader may be selected from the students

vi. Seminar paper presentation

The student/ students shall present the paper in the seminar. The teacher may function as the moderator during the initial stages.

vii. Discussion / Interaction

Welcome maximum number of responses from the students. Make comments on the topic. This will be followed by a general discussion. All the group members should actively participate in discussion.

viii. Summing up deliberation

The moderator sums up the deliberation

ix. Evaluation / Feed back

Both teachers and students evaluate the programme.

x. Preparation of final report

A final seminar report is prepared covering all the additional points discussed and consolidated.

3. Panel Discussion

It is a learning strategy in which a panel of experts are allowed to discuss a specific subject under the control and direction of a moderator. Subject can be divided according to the number of panel members. Number of panel members are fixed according to subdivision of points in the subject. Relevant materials and hand out may be given in advance to the learners. The monitor or moderator introduces the subject of discussion and invite a panel member to start the discussion. Each panel member is invited for discussion afterwards. After briefing by the panel members the question are raised from the audience and the panel members give suitable answer to them. A report should be submitted by each learner to the moderator .

4. Project

Project is a self-learning strategy which can exert great influence on the overall development of the learner. Project as learning strategy is to be selected where a problem arises in any part of the curriculum. The students may be divided into groups and assigned different aspects of the problem. Each group works independently .Specific aspects of the problem such as data collection, classification, analysis, report preparation and presentation is to be undertaken by each of the members. Even though the work is divided among the members, it must be ensured that the execution of each and every activity is done with the active participation of all. After analyzing data collected from different sources, the learner arrives at a conclusion that can help to solve the problem. Thereby learner learns the topic through his own activity. The other advantage of this learning activities is that it helps the learner to scientifically handle any problematic situation. It helps in the development of scientific thinking and thereby builds up the students aptitude for the subject.

Stages of the project

i. *Selection of a topic*

The project selected should be related to the curriculum and it should not be a project for projects sake. The topic or problem should arise from the curriculum.

ii. *Planning of the Project*

(A) Hypothesizing: Hypothesizing means making assumptions based on the available primary information.

(B) Methods and Technique : The methods and Technique should be based on the aim and Hypothesizing of the Project. The nature of the project, suitability of the tools, and the methods of learning should be related to each other.

iii. *Collection and Tabulation of Data*

The data may be primary, Secondary or teritiary. Either census or sampling method can be used based on the objective of the project. Suitable questionnaires are to be prepared for the collection of primary data.

The collected data is to be classified and tabulated so as to make it easily understandable.

iv. *Analysis of data and formulation of conclusion*

By analyzing the data, the reliability of the hypothesis can be examined. Preparation of graphs and diagrams and maps will positively help the analysis. The similarities, relations and differences gathered from the analyzed information would tell whether the hypothesis should be accepted or rejected.

v. *Preparation of Report*

The cover page should have the title of the project, the period of study, name (s) of investigator / group, and the address of the school. The report should be structured in the following order.

- Title
- Preface
- Hypothesis and aim
- Methodology
- Sources of data
- Analysis and conclusion
- Suggestions (if any)
- References
- Appendices (Questionnaire, Observation schedule, check list Etc.)

vi. Presentation of the Project

When the project is presented , the learner is being evaluated and accepted. It is through this presentation that ideas are shared with others in the class and society.

The project methods promotes scientific self learning and makes him capable of solving the problem arising in real life situations.

5. Debate

Debate is a hot and interesting learning activities. A debate can be organized only on a topic on which there is difference of opinion. Therefore a topic suitable for debate has to be found.

Debate can be on relevant topic that is different and interesting to the students and relevant to society. Students with different opinion have to be identified for discussion. Those who have similar opinion should join together to form a side . Those who hold the opposite view will form the other side. It would be good to write down the topic of the debate and displayed in advance. There should also a person to control debate.

Students should be given opportunity to absorb the ideas obtained from discussion and debate, develop the idea through reading and study, and to express them through writing or other means

Stages of Debate

- Topic Selection
- Selection of panels keeping in balance with intelligence, gender etc.
- Selection of moderator
- Collection of information guided by the teacher
- Conducting the debate under the control of moderator by avoiding any sort of personal conflicts
- Conclusion by the moderator expressing his final version or verdict.

6. Case Study

A case may be a person, institution or a community. Case study is an indepth analysis of an actual event or situation. It presents real pictures of situation with facts, information or data . Learners analyse the case to interpret, predict and resolve issues associated with it. The case study provides the learner an opportunity to analyse and apply concepts, data and theory taught from the class. Learners can work individually or in groups.

By studying realistic cases in the classroom, students develop new insights into the solution of specific on – the – job problem and also acquire knowledge of the latest concepts and principles used in problem solving.

Case may be presented by the teacher or may be provided in print form.

A simple case study may have the following steps

- Collection of data
- Conversion of data into information
- . Analysis of the case in groups
- Presentation of the finding by each group leader.
- Evaluation

In addition to the above mentioned learning strategy there are many other learning strategies which can be used in appropriate situations to enrich leaning process such as problem solving, Role play, brain storming, debate etc.

7. Brain Storming

This is the best method for solving creative problems. It facilitates generation of ideas quickly.

Rules for conducting Brain storming.

- No response is wrong. So welcome every response.
- Welcome as many responses as possible
- No criticism is allowed
- Allow to work on others idea

Steps in Brain storming

- Pressentation of the problem
- Provide relevant information
- Record the ideas put forth by the participants
- Combine similar ideas
- Evaluate each idea / solution
- Selection of the best solution

If brainstorming is used as an instruction strategy, the last step is not essential

8. Discussion

Discussion is essential for the student to share new finding, idea and conclusion at each stage of learning with fellow students and teachers. In general discussion the teachers should guide the discussion though questioning and summarizing. The major steps involved are

- Introduction initiated by the teacher
- Development of discussion by giving lead points and follow up interactions
- Transition stage in which the key points are reviewed by the teacher and
- Summarizing stage in which teacher provides additional support materials to ensure the achievement of the objectives

9. Group Discussion

Group discussion is an ideal method to develop Co-operation, democratic attitude, friendliness and compromising attitude which are the ultimate aims of education. During group discussion the teacher may observe each group and if needed help them to Channel the discussion towards the common objectives. All students may be given opportunity to take part and express their ideas within a time limit. The conculsion reached may be entered by each student. A group representative must present this during consolidation in which the teacher may correct or add information to ensure that all the relevant ideas have been covered

10. Collection

Collection is a continuous learning activity, which ensure complete participation of students. The Collected item may be materials, pictures, charts, ideas, data etc. Collection provides direct experience to learners. An exhibition of collected materials will help to strengthen the concept.

11. Practical works

Experimentation contains the process skill in an integrated way. In the new approach of curriculum the student forms idea and comes to conclusion through process. The term 'Practical ' when associated with a science subject usually means an experiment. The objective of doing experiment is to verify some principles associated with theory. The Subjects end here. But this is not the case with 'Vocational Practical'

The ultimate goal of a Vocational Education is to generate skill through continuous practice along with investigation and invention. Continuous practice transforms the unskilled to the skilled. This is the significance and importance of practicals in the Vocational stream. Hence it is very crucial that Vocational teachers as well as instructor should understand the importance of vocational practical and act accordingly.

10. Quiz

Quiz programme can be used as an interesting class room tool for transaction

of curriculum objectives as well as to evaluate the effectiveness of transaction and achievement of students.

For conducting a quiz programme a topic should be selected based on the above objective

The students are asked to prepare question based on the topic individually. The next day / next hour the students are grouped into 3-4 groups randomly. A question is raised by a particular team and the other teams to answer them. If they can answer the question they get points for that . If all other teams fail to answer the question raised by the team, then the team itself answers the question and explain the background if necessary. All the teams get equal number of chances to ask the question . Time limit is also prescribed for the conduction of the programme. The team who scores maximum points wins

All the participants can make notes on the questions asked, answers and their explanation which help them in learning

13. Models

Models are used in learning process. It enhances the learing experience. This is based on 'seeing is believing". It helps the learner a chance to see and feel the model presented . Still models and working models help the students to understand the structure , working principles, actual operation etc.

Steps involved in model preparation are

- Feeling the problem
- Planning the type of model according to co's
- Grouping the students
- Briefing the tasks
  - Aim
  - Need
  - Material required
  - Source of Materials
  - Cost of materials
  - Division of Labour
  - Guidance
  - Fixing of a time limit
- Presentation by each group about
  - How the models were prepared
    - Details of - Expenses
    - Working and principles

- Documentation of the process
- Evaluation
  - By other groups and by the teacher

14. Games

Class rooms can be made attractive by introducing different types of games. Games should be interesting as well as informative. Some of suitable games are

1. Odd man out
2. Cross word puzzles
3. Match the following
4. 'Aswamedham'
5. Link game – Answer using clues.

15. Survey

This strategy involves collection of data from a group under study (books, persons, materials etc.) It develops the social interaction and communication ability of the learner. It also provide a scope for discovery learning.

Steps involved in survey

- Objective of survey
- Selection of area for survey/sampling frame
- Selection of survey method
  - Direct method
  - With help of questionnaire/schedule
- Tabulation and analysis
- Consolidation and Presentation

16. Exhibition

It is a learning strategy by which the learner can get a chance to show the skill developed. It provides the intrinsic motivation and exposure.

Exhibition item can be conducted either individually or as a group task. It can be conducted at school / Regional/State/National Level. Necessary publicity and other arrangement can be provided. Presentation, documentation participation and innovative skills of the learner can be evaluated.

17. Interview

Interview is one of the important learning strategy taking the help of a resource person. Interview is an innerview. It provide opinion and information about a topic.

An interview is conducted through the following steps

- Introducing a problem?
- Invite a resource person
- Decide the questions by learners
- Decide the time, place etc.
- How to discuss ?
- How many students to participate?

7. Implementation of the interview
8. Conclusion (Facilitator)

Interview Schedule should be prepared before conducting an interview . It contains list of questions prepared by learners, Selection of students, selected names sequence of question etc.

18. Field Visit

Field visit is an inevitable vocational tool to be implemented in vocational Higher Secondary Education. This helps the students to familarise with the modern technologies and new situation in a different atmosphere. It provides learning though viewing. It is based on the principle that seeing is better than hearing. It enables the learner to retain the learned informations longer and to make the subject more interesting. It motivates and give more confidence in his/her particular vocation.

A suitable centere or institution or site should be identified and prior permission from the authorities should be obtained before conducting the field visit. Give instructions to the learners for collection data/information/materials/ Specimens. Teacher may assign different duties to learners by working in different groups.

Each learner should take utmost care and interest during the visit. He/She should observe and interact at the centre/ institution where the field visit is conducted

After the visit, learner should acquire the ability to apply the ideas/concepts in his future carrier. Each learner should submit a detailed report about the field visit.

20. Demonstration

Through demonstration we can present an item/product and emphasize its features very effectively

Eg:- To understand the functioning of a computer

Demonstration Process includes

- Introduction about the item/Material
- Principles – Working
- Operation
- Components
- Merits of the item

20. Chart display

It is also one of the important teaching aids. It can be used in every activities of a learning process.

Chart display is a written or pictorial representation of idea or concept. It is abbreviate, brief and clear. It is prepared by students.

Major benefits of Chart display

- A learner gets clear idea about the concept
- The leaner can retain the ideas in his mind for longer periods
- A complicated idea can be simplified though a chart
- Cheap method of teaching aid.

PLANNING

Planning is a pre-requisite for the pragmatic approach pertaining to any sort of activity. It beings from the phenomenon of dreaming which in reality. Proper planning inculcates confidence to take any challenges. In the new system of education, the learning process is learner centered and activity oriented. A proper planning by the teacher enables the learner to attain the objective more effectively in a time bound manner.

In the planning of a curriculum, the objectives, time, social and economic impacts etc are to be considered. Before facing the learners the teacher with a changed role as a facilitator should have planned each and every activity to be performed Planning is to be done from the commencement of work to the end result. Teacher mist be a good planner to motivate the learners to move from one aim to another. To attain the effective transaction of the whole curriculum, the teacher must prepare three planning documents such as year plan, unit plan and daily plan.

Term	Month	Unit No.	Module No.	Name of Unit	Period		Total Period
					Theory	Practical	
I	June	Unit 1	Module 1 & 2	Farm Electrification	10	30	
	July	Unit 1	Module 3 & 4	Farm Electrification	15	35	
	August	Unit 1	Module 5 & 6	Farm Electrification	15	35	140
II	September	Unit 2	Module 1, 2 & 3	Post Harvest Processing and Storage of Agricultural products	10	40	
	October	Unit 2	Module 4, 5, 6 & 7	Post Harvest Processing and Storage of Agricultural products	15	40	
	November	Unit 2	Module 10, 11	Post Harvest Processing and Storage of Agricultural products	15	40	
	December	Unit 2	Module 12, 13	Post Harvest Processing and Storage of Agricultural products	10	40	210
III	January	Unit 3	Module 1 & 2, 3	Harvest Equipments & Storage Structures	20	60	
	February	Unit 3	Module 4, 5, 6 & 7	Harvest Equipments & Storage Structures	20	60	
	March	Unit 3	Module 8, 9	Harvest Equipments & Storage Structures	20	60	210
				Total hours			**560**

YEAR PLAN

Introduction

Year plan is a document covering the entire activities for the whole year. This plan includes the total number of units to be transacted through the three terms, units and curriculum objectives to be covered during each month and the number of hours required for each unit. A sample year plan is given below.

UNIT PLAN

Introduction

Unit plan is a specific and systematic plan of a unit. It will be in time with activities assigned in the year plan. Teacher may prepare unit plan before the actual transaction of the unit. This plan must make clear the curriculum objectives intended, periods required for transaction of these objectives and materials required. The methods to evaluate the outcomes may also be mentioned in it. A sample unit plan is given below. It is only a suggested model; hence the teacher can modify learning activities according to the need and demand of the class room environment and situations. Unit analysis for each unit given in the source book may be utilized for preparing unit plan.

Sample unit plan

Name of the teacher	:	
Name of the school	:	
Subject	:	MSA
Unit	:	Farm electrification
Class	:	IInd year MSA
Time		

Curriculum Objectives

- To make them understand an idea about the use of electricity.

Syllabus

- Electricity on the farm

Content specification

- Parts
- Working
- Possible faults, reason
- Maintenance and servicing

Learning Activities

- Study of measuring instruments (practical)
- Dismantling and assembling of a cycle dynamo

Concepts/idea/terms

- AC current
- DC current
- Ohm's law
- Generators
- Parallel circuit
- Series circuit
- Power transmission
- Wiring

Learning materials

- Charts
- Generator , motor, starter
- Tools, testing equipments

Output

- Discussion notes, practical record

CE items

- Practical skill, class test

DAILY PLAN

Introduction

Daily plan is a document continuing the systematic arrangement of learning activities that has to be performed for each period. The learning activities designed should be appropriate to achieve the respective curriculum objectives. It includes curriculum objectives, content specification, learning activities, learning aids, and feedback. It can be arranged in two columns. The first column contains the learning process and the second column feedback/ response. The guidelines for preparing a daily plan is given below.

Guidelines for preparing a daily plan

- Curriculum objectives should be stated clearly
- Include content/ topic/ subtopic
- Learning activities should be framed for developing different skills of the learner
- Learning process should be appropriate in time need of learner, learning atmosphere and age of the learner.
- The teacher can club the periods judicious/ to get continuity in learning process.
- Individual participation should ensured in the group activities and group discussion
- Learning activities should be challenging, lively, interesting and through provoking.

- The teacher must motivate the learner by giving tips and clues in every stage of the learning process
- Evaluation questions may be asked to know the level of comprehension of the learner
- Response part of the daily plan can be completed only after the execution of the class room activity
- Further planning should be based on this responses
- Special information's, principles, ideas and concepts etc can be written separately in a book in the process columns.

A sample daily plan is given

Sample daily plan

Class : II year MSA
Date :
Time:
Subject : MSA
Unit : 2 Post Harvesting process and storage
Topic : Thresher
Curriculum Objectives : To make them able to understand the working of the thresher
Materials : Hay

Learning process/ activity	Feed back/ Response
1. Assembling and disassembling of thresher 2. Sketch the different parts of thresher 3. Maintenance and repairing of thresher 4 Complete the work ie, Assembling, Deassembling, maintenance, repairing	• Performance of the learners were satisfactory • The participation were very enthusiastic • Learners done the work properly and recorded • Two of them needed more attention while conducting the practical

EVALUATION

INTRODUCTION

Evaluation is a systematic process of collecting, analysing, synthesising and interpretering evidences of student's progress and achievements, both in cognitive and non cognitive areas of learning. Evaluation has to play significant role in making the learning process more effective. It provides diverse experience to the learners, keeping in view the skills to be attained continuously by them.

As the curriculum is based on a particular vocation, the selected stream is the most important part and it should be evaluated accordingly. Technical skills, interest and devotion in the field, communication skills, organisational and presentation skills are to be evaluated. Evaluation of the personal and social qualities also should be done. So the evaluation should be continuous and comprehensive.

Term End Evaluation (TE)

It is the written form of evaluation aimed at evaluating the facts, concepts and ideas gained by the learner. The test should not be aimed to evaluate the memory alone. Questions are framed in such a way that the learners are able to apply different mental process while answering. The term end evaluation question give more emphasis on application, analysis and synthesis level.

The maximum scores for TE is 80 and the minimum is 24 (30%). The questions and score should be formulated taking into consideration the time required to read, think, understand and write answers. To avoid wild guessing, multiple choice questions of application level may be used. The total number of questions may vary from time to time. All the questions should be based on the curricular objectives. Open ended questions may also be included. Internal choice may be given to questions but the choice question also should be based on the same curricular objectives.

Continuous and Comprehensive Evaluation (CCE)

Our traditional evaluation methods measure only the memory and recollection capacity of the learner. To eliminate / these limitations the evaluation should be done on multi dimensional ways by measuring multiple intellectual capacities of the learner. So it is better to evaluate the learner in a continuous and comprehensive manner. CCE helps the learner to understand and evaluate his own progress and to develop adequate strategies for further improvement.

Merits

- Assess the all round development of the learner on a continuous basis through variety of activities.
- Effective feed back is possible.
- Remedial and diagnostic teaching is possible.
- Process as well as product are assessed.

A series of learning activities are grouped into five major thrust areas as follows

1. Investigative Activities

Activities which create a spirit of enquiry, investigation and a mind for research in the learner belongs to this group.

For example
- Study project
- Case study
- Field study
-
-

2. Interactive activities

Activities which improve the communication skill, abilities of sharing ideas, etc

For example
- Seminar
- Panel discussion
- Debate
- Group discussion
-
-

3. Assigned Task

Activities assigned to the learner to enrich/strengthen the concepts and ideas

For example
- Assignments
- Collections
-
-

4. Performance Task (Tests)

Activities related to the achievements of the learner.

For example
- Class test (Oral/ Written / Performance test)
- Quiz
- Open Book Examination
- Interview
- Group testing
-
-

5. Practical based activities like

For example
- Preparation of working model
- Album
- improvisation
-
-

From the above five group of activities, the teacher has the freedom to choose any three areas for evaluation purpose.

CE Items

1. Study Project

Sl No.	Stages	Criteria	Score	Total Scores
1.	Planning	• Relevatace of the study • Identification of problem: Ability to select appropriate tools • Ability to select suitable learning method	4/3/2/1	
2.	Data Collection	• Ability to collect sufficient and relevant data. • Ability to classify. • Arrange data for analysis. • Reliability and authenticity of the data collected	4/3/2/1	
3.	Analysis and Inference	• Ability to analyse the data. • Systematic arrangements. Ability to draw inferences based on analysis. • Ability to give suggestions based on inference.	4/3/2/1	
4.	Report presentation	• Ability to present in logical and sequential order. • Authenticity of report. • Time bound completion	4/3/2/1	
5.	Viva - Voice	• Knowledge of content and process. • Ability to analyse data • Ability to justify inference. • Ability to explain. • Stratigies and methods adopted	4/3/2/1	
		Total	20	

2. Case study

Sl No.	Criteria	Score
1.	Identify the problem	4/3/2/1
2.	Approach to the problem	4/3/2/1
3.	Time bound Action	4/3/2/1
4.	Analysis of the problem	4/3/2/1
5.	Problem solving / Reporting	4/3/2/1
	Total	20

3. Field Study

Sl No.	Criteria	Score
1.	Attitude and readiness towards the task	4/3/2/1
2.	Capacity for observation	4/3/2/1
3.	Data collection	4/3/2/1
4.	Application of ideas	4/3/2/1
5.	Documentation / Recording	4/3/2/1
	Total	20

4. Assignment

Sl No.	Criteria	Score
1.	Awarness of the content	4/3/2/1
2.	Comprehensiveness of the content	4/3/2/1
3.	Systematic and sequential arrangement	4/3/2/1
4.	Observation / suggestion/ views / judgements/ evaluation	4/3/2/1
5.	Timely submission	4/3/2/1
	Total	20

5. Seminar

Sl No.	Criteria	Score
1.	Planning and Organisation	4/3/2/1
2.	Collection of data / content	4/3/2/1
3.	Observation / appraisal and clarity	4/3/2/1
4.	Content knowledge	4/3/2/1
5.	Presentation	4/3/2/1
	Total	20

6. Debate

Sl No.	Criteria	Score
1.	Readiness to participate	4/3/2/1
2.	Depth of subject knowledge	4/3/2/1
3.	Communication skill	4/3/2/1
4.	Ability to justify the stand	4/3/2/1
5.	Presentation	4/3/2/1
	Total	20

7. Group Discussion

Sl No.	Criteria	Score
1.	Readiness to participate	4/3/2/1
2.	Depth of subject knowledge	4/3/2/1
3.	Communication skill	4/3/2/1
4.	Ability to justify in a democratic way	4/3/2/1
5.	Leadership quality	4/3/2/1
	Total	20

8. Interview

Sl No.	Criteria	Score
1.	Planning	4/3/2/1
2.	Preparation of Questions	4/3/2/1
3.	Communication skill	4/3/2/1
4.	Participation	4/3/2/1
5.	Report preparation	4/3/2/1
	Total	20

Practical Evaluation (PE)

The goal of Vocational Education is to generate skills through continuous practices along with investigation and inventions. Continuous and comprehensive practice transforms the unskilled learner to a skilled one. This is the importance and significance of vocational practicals.

PE is done to evaluate the practical skills achieved by the learner in the concerned vocational subject Total score for PE is 150 and minimum is 60 Score (40%) Practical Examination is conducted for a batch of 8 learners having 6 hours duration.

Vocational Competency Evaluation (VCE)

Vocational competency evaluation is to evaluate the vocational skills and aptitude developed by the students during the learning process. This is a system to evaluate judiciously the required value addition and consequent capacity building in the concerned vocational curriculum. The vocational education is aimed at developing interest, skills and devotion in specific vocational fields. As other evaluation components like CE, PE and TE cannot assess the vocational competencies and professional skills, acquired by the students an Internship Evaluation (IE) components have been introduced to meet this requirement.

Intership Evaluation should be done based on the follwing components like regularity and punctuality, value addition and capacity building

1. Regularity and Punctuality

Regularity and punctuality has vital role in vocational education Learning is a continuous process, the regular presence of the learner is a must for attaning maximum efficiency.

2. Value Addition

Value addition is the qualitative measure of the learner's interest, devotion perseverance and efficiency. Value addition can be evaluated through conducting field visits/ vocational survey. The experiences gained through field visit/ Vocational survey increase the level of intrinsic motivation and develop positive attitude towards the vocational field and thereby increase his value as a semi-professional.

3. Capacity Building

It gives a quantitative measure of the student's skill in graded area exposure. Capacity building can be evaluated through conducting the following activities.

1. OJT / Simulated experiment
2. Performance - camp /exhibition / clinic
3. Performance - Production / Service cum Training centre (PTC)

These components help the learner to practise the acquired skills in the real situation and thereby increasing self - comfidence and promoting self reliance.

Vocational Competency Evaluation Indicators

No	Items	Score
1.	Regularity and punctuality	10
2.	Field visit / Survey / Vocational project (anyone)	20
3.	OJT / simulated experiment Perfomance - camp / exhibition / clinic Performance - PTC Practical skills (any one)	20
	Total	50

1. Regularity and Punctulity can be assessed by using attendance of the learner and time bound completion of tasks. It is evaluated by using 5 point grading system.

Rating Scale

Sl. No.	Item	1	2	3	4	5
1	Regularity	Never regular	often regular	usually regular	most of the time regular	Always regular
2.	Punctuality	Never punctual	often punctual	usually punctual	most of the time punctual	Always punctual

VCE Items	*Evaluation Indicators*	*Scoring*	*Score*
Regulatarity and punctuality			10
Value addition	Field Visit 1. Attitude and readiness towards the task	4/3/2/1	
	2. Capacity for observation	4/3/2/1	
	3. Data collection	4/3/2/1	
	4. Application of ideas	4/3/2/1	
	5 Documentation / recording	4/3/2/1	
	OR		20

VCE Items	*Evaluation Indicators*	*Scorin*	*Score*
	Survey 1. Planning	4/3/2/1	
	2. Data Collection	4/3/2/1	
	3. Consolidation of data and analysis	4/3/2/1	
	4. Drawing inference	4/3/2/1	
	5. Reporting	4/3/2/1	
Capacity Building	OJT / Simulated experiment		
	1. Involvement / participation	4/3/2/1	
	2. Skills in doing work / communication skills	4/3/2/1	
	3. Time bound action	4/3/2/1	
	4. Capacity for observations, analysis and innovation	4/3/2/1	
	5. Documentation, Recording and display	4/3/2/1	
	OR		20
	Performance in camp / exhibition / clinic		
	1. Ability for planning and organising	4/3/2/1	
	2. Mastery of subject	4/3/2/1	
	3. Ability for communication	4/3/2/1	
	4. Innovation	4/3/2/1	
	5. Involvement / Social commitment	4/3/2/1	
	OR		
	Performance in Production/ Service cum training centre (PTC)		
	1. Mastery of vocational skills	4/3/2/1	
	2. Managerial capacity	4/3/2/1	
	3. Promiting self condidence	4/3/2/1	
	4. Innovative approach	4/3/2/1	
	5. Promoting self reliance	4/3/2/1	

Consolidated Statement of VCE

Course : ECG & AMT **Year:** **Class:**

Roll No	Name of Pupil	Regularity of Punctuality (10)	Value addition (20)	Capacity Building (20)	Total Score (50)	Grade

Consolidated Grade Record of Vocational Subjects

Course : ECG & AMT **Year:** **Class:**

Vocational Theory						Vocational Practical		VCE	
Roll. No	Name of Pupil	CE 20	TE 80	Total 100	Grade	PE 150	Grade	IE 50	Grade

PRACTICAL EVALUATION

Practical evaluation is the important part of vocational practicals. The practical skills must be evaluated from time to time. A practical examination is conducted for 150 score and should cover all required indicators to evaluate the technical skill and practical knowledge of ECG and AMT

Indicators for PE-ECG & AMT

Indicators	**Score**	**Total**
Identification of tools and items	20	20
Procedure-2 experiments	5 x2	10
Technique	20x2	40
Observation, tabulation, inference	20x2	40
Result	5x2	10
Record	1x10	10
Viva voice		20
Total		**150**

LEARNER EVALUATION PROFILE

Course : ECG & AMT
Year :

Name of Subjects		Ist Year			II Year				
		Term			Term			Mini. Score	Max Score
		I	II	III	I	II	III		
Part I	CE								
1. English	TE								
	Total								
	Grade								
2. GFC	CE								
	TE								
	Total								
	Grade								
Part II Voc. Theory	CE								
	TE								
	Total								
	Grade								
Voc. Practical	Total								
	Grade								
VCE	IE								
	Grade								
Paper III Paper I Physics	CE								
	TE								
	PE								
	Total								
	Grade								
Paper II Chemistry	CE								
	TE								
	PE								
	Total								
	Grade								
Paper III Biology	CE								
	TE								
	PE								
	Total								
	Grade								

Consolidated Statement of CE

Course :
Class :

Sl. No	Name	CE items	Evaluation Indicators					Total (20)	Total (60)	Average CE (20)
			1	2	3	4	5			
		1.....								
		2.....								
		3.....								
		1.....								
		2.....								
		3.....								
		1.....								
		2.....								
		3.....								
		1.....								
		2.....								
		3.....								
		1.....								
		2.....								
		3.....								

CURRICULUM OBJECTIVES

Unit 1 Farm Electrification

- To create an awareness of electricity used in the farm and agriculture through discussion, farm visiting, refer books, charts, seminar etc.
- To make students able to identify the series circuit and parallel circuit through visit the companies, sketches, visit the workshops, discussion, seminar, observation, refer books etc.
- To understand the students power transmission and distribution through visit the Electrical power station, main station, sub station and local stations, all wire connections are noted and draw the sketches, Explain the different connection with the help of sketches through LCD projector.
- To create an awareness about the different types of Generators through visiting the companies of making generators, Generator repairing, workshops, farm also class demonstration, skill models, seminar, debates etc.
- To understand the students working of the transformer through demonstration, making a model, seminar etc.
- To make the students able to understand the difference between the DC motor and AC motors, different types of motors, working, advantages and disadvantages through visit the companies, motor repairing workshop, skill models, demonstration, seminar, debates etc.
- To make the awareness about the wire connections to different types of starters through diagram, demonstration etc.
- To understand the student's difference between DC motor starters and AC motor starters through discussion, visit the repairing workshops, note the wire connections and prepare the report.
- To create the student's study the different types of DC motor starters through visit the motor repairing workshop and noted the difference and prepare the detailed report.
- To understand the students different types of AC motor starters through visit the motor repairing workshop and noted the difference between AC motor starter is prepare the report.
- To discuss about the selection of electric motors through experimental study, observation etc.
- To understand the care of electric motors through discussion, seminar etc.

- To understand the students how to clean a motor through discussion, seminar etc.
- To make the students safety precautions to prevent the electric shock through discussion, seminar, debate etc.

Unit 2 Post Harvest Processing and Storage of Agricultural Products

- To make harvesting and various types of harvesters through field visit, discussin, demonstration etc.
- To make understand about threshing operation and various types of threshers through demonstration, discussion and farm visiting.
- To make the awareness about the cleaning and sorting through demonstration workshop practicals etc.
- To understand the students able to dehusking the paddy through experimental study, farm visits, observation, visit the flouring mills etc.
- To discuss about the study and operation for traditional methods of drying through demonstration, various experiments, conducting a farm, visit the filed etc.
- Create an awareness about necessity and working of oil extracting through visit the oil expeller, make the models of expeller units and experimental study, refer books, conducting a seminar, debate etc.
- Develop the awareness about the different methods of rice processing through visit the farm, demonstration, and experiments conducted.
- To make the awareness about the seed processing technology through demonstration, discussion and seminar etc.
- Make the students understand the problems of scientific storage through discussion, experimental study, seminar etc.
- To make the students understand the moisture and its effect through discussion, seminar etc.
- To discuss about the assessment of storage losses through debate, seminar etc.
- To create an awareness about the storage requirements for agricultural products through experiments, observation, field visit, seminar etc.
- Develop the awareness about the refrigeration and cold storage through visit the refrigeration repairing workshop, sketch a detailed diagram, explain the working of refrigeration, demonstration etc.

Unit 3 Harvest equipments and storage structure

- To make them able to understand overhauling, maintenance and operation of threshers

through demonstration, discussion, visit the farm, workshop practicals and service manuals.

- To make them aware about the necessity and operation of winnowers through demonstration, making a models, diagrams, seminar etc.
- To create an awareness about necessity of combine harvesters through demonstration, refer books, visit the farm, seminar etc.
- To make them aware about the working of different types of mills through demonstration, discussion, visit the flour mills, make the models, seminar etc.
- To create the students about the working of burr mill through visit the mill, demonstration, sketches, seminar etc.
- To create the students about the idea of working of Hammer mill through visit the mill, demonstration, discussion, seminar etc.
- To understand the students the difference between the burr mill and hammer mill through discussion, demonstration etc.
- To enable the students the advantages and disadvantages of mills through discussion, demonstration, visit the field etc.
- To discuss about operation for different types of crushers through visit the unit, refer books, demonstration, make the models, seminar etc.
- To create an awareness about necessity of different types of dryers through demonstration, filed visiting and discussion.
- To make the students understand the different types of parboiling through experimental study, observation, discussion demonstration, seminar etc.
- To create the students able to idea about the traditional methods of parboiling through experimental study, demonstration, discussion etc.
- To make them aware about the modern methods of parboiling through experimental study, demonstration, visit the parboiling unit, seminar making the models etc.
- To understand the students the advantages and disadvantages of traditional methods and modern methods through various studies conducted in the parboiling unit, demonstration, seminar etc.
- To create the students able to idea about the huskers through visit the mill, demonstration, making a models, refer books, seminar etc.
- To understand the students about the idea of under runner disc sheller, Rubber roller shellers and hullers through visit the huller mill, making a models, service manuals, demonstration, seminar etc.
- To create the students able to idea about the advantages and disadvantages of shellers through demonstration, discussion, seminar etc.
- To make them able to idea about the whitening operation through visit the mill, demonstration, discussion, seminar etc.

- To understand the students about the idea of different types of rice whiteners through visit the mill, observe the working of whitener and prepare the detailed report, demonstration, making the models, seminar etc.
- To create the students about the advantages and disadvantages of whiteners through discussion, demonstration, seminar etc.
- To make them able to understand the students about the storage structures on the farm through visit the farm, demonstration, discussion, seminar etc.
- To make them able to idea about the modern storage systems through demonstration, discussion, seminar, visit the field etc.

Unit 1 Farm Electrification

Module 1

Electricity on the farm - uses of electricity in farm agriculture - Direct current - alternating current.

Electric circuit - Ohm's law - Series Circuit - Parallel circuit.

Power Transmission and distribution.

Module 2

Generators - D.C. Generator - working - A.C Generator - working.

Module 3

Transformer - working - step up transformer step down transformer.

Module 4

Farm motors - D.C. Motor - A.C Motor single phase motor - split phase capacitor type

Polyphase motors - two phase motors - three phase motors

Module 5

Starters - D.C. motor starters - three point starter - four point starter - A. C motor starters - Push button starter - Star Delta starter.

Module 6

Selection of electric motors - care of electric motors - how to clean a motor safety precautions of electricity.

Unit 2 Post Harvest Processing and Storage of Agricultural Products

Module 1

Harvesting - different methods of harvesting.

Module 2

Threshing - different types of threshing

Module 3

Cleaning and sorting (Winnowing)

Module 4

Dehusking or Deshelling

Module 5

Drying - different types of drying.

Module 6

Oil extraction methods

Module 7

Different methods of rice processing.

Module 8

Seed processing technology

Module 9

Principles and problems of scientific storage

Module 10

Moisture and its effect

Module 11

Assessment of storage losses

Module 12

Storage requirements for agricultural products - chemicals - fumigants - insect pests - seed dressing.

Module 13

Refrigeration and cold storage changes during storage.

Unit 3 Harvest equipments and storage structure

Module 1

Thresher - Indian threshers - oil pad thresher - Japanese type rotary paddy thresher - power thresher.

Winnower - combine harvesters

Module 2

Different types of mills - Burr mill - working of burr mill - Hammer mill - working of hammer mill - comparison of mills.

Module 3

Crushers - vertical sugar cane crusher.

Module 4

Grain drying methods of drying Grains - factors that affect drying - methods of air drying grain - sack dryer - batch dryer - Rotary dryer - continuous flow dryer.

Module 5

Parboiling - principles of parboiling - advantages and disadvantages of parboiling - methods of parboiling - traditional methods - single boiling - double boiling - modern methods -

CFTRI - process - Kissan continuous parboiling method - pressure parboiling - Sodium Chromate method.

Module 6

Huskers or shellers - under runner disc - sheller - rubber roller shellers - hullers - advantages and disadvantages.

Module 7

Whitening - rice whitener - vertical cone rice whitener - horizontal abrasive rice whitener - advantages and disadvantages.

Module 9

Storage structures on the farm silos - permanent tower silos - horizontal soils - pit silos - trench silos - requirements of good storage structures - Bukghari type structure - Kothar type structure - Marai type structure - grain bins - cylindrical bins - Rectangular bins.

Modern storage systems.

1 FARM ELECTRIFICATION

MODULE 1 ELECTRICITY ON THE FARM

Introduction

In ancient times, man had no idea of electrical energy. They took the flash of lightning during a thunder storm to be a signal for an impending destruction from the heavenly Gods. With the passage of time science in its own way explained the mystery of this great energy called electricity. Today we cannot imagine the normal life without electricity.

In fact, the word 'electric' originated from the Greek word Electron. Based on the theory of Electro - magnetic induction of Michael Faraday in 1831, first successful generator or Dynamo was made in Germany in 1867, USA produced electricity by running turbines with the help of falling water in 1858. Subsequently hydel and thermal power stations came into existence all over the world. During the 20th century many nuclear power stations were established to meet the growing demand of electricity.

Electricity is a form of energy. It can be stormed in batteries or sent along wires to make electric trains, computers, light bulbs and other devices, work. Electricity is an invisible form of energy created by the movement of charged particles. It flows into our homes along wires and can be easily converted into other energy forms, such as heat and light.

The discovery that an electric charge could be created by rubbing two materials together was first made by the Greek philosopher Thales over 2,600 years ago. He found that if he rubbed the fossilised tree sap, amper, with silk, it extracted feathers and dust.

For an electrical appliance such as a torch to work, its electricity source (the battery) must be connected to the bulb by wires or a metal in an unbroken loop. This is known as a circuit. The job of the torch's ON/ OFF switch is to close or open a gap in the circuit respectively. When the switch is an, electricity is allowed to flow around the circuit, lighting the bulb. When the switch is off, the circuit is broken and the current cannot flow.

Batteries have a limited amount of chemicals and can provide a certain amount of electricity. That is why most electrical devices are powered by a main supply. Wires connect millions of wall sockets to a power station. An electric current flows train the power station along the equipment being used. To complete the circuit, the current returns to the power station through yet more wires.

The electricity that comes out of a power station is in the form of alternating current (AC). Unlike a battery, which produces a steady are way, current called a direct current (DC), the main supply flows first in one direction and then in the other. The current changes direction very rapidly (about 50 cycles a second) in most of the power supply lines.

Electricity is supplied to air homes, schools, factories and stores through copper or aluminium wires from power stations. These power stations burn coal or oil, use nuclear reactions or the energy of falling water to produce energy to run the generators. The power thus generated is then transmitted to different cities and places where it is required. Electricity is then transmitted through transmission lines.

To avoid the loss of power, the output voltage from the generator is first stepped up to a high voltage by a step-up transformer. After being received at the city power station, it is again reduced to low voltage, before it reaches our homes to factories.

Curriculum objectives

- To create an awareness of electricity used in farm and agriculture it can be done through discussion, farm visiting, referring books, charts, seminars etc.
- To understand the difference between alternating current and direct current through discussion diagrams etc.

Syllabus

- Electricity on the farm - uses of electricity in farm and agriculture - direct current - alternating current.

Curriculum objectives

- To make students able to identify the series circuit and parallel circuit through visit the companies, sketches, visit the workshops, discussion, seminar, observation, refer books etc.
- To understand the students power transmission and distribution through visit the Electrical power station, main station, sub station and local stations, all wire connections are noted and draw the sketches, Explain the different connection with the help of sketches through LCD projector.

Syllabus

- Electric circuit - Ohm's law -series circuit - parallel circuit - power transmission and distribution.

Learning activities

Activity 1

- To study the various uses of electricity on the farm through conducting a seminar.

Activity 2

- Dismantling and assembling of a cycle dynamo.

Activity 3

- Study about the series and parallel circuit wiring through demonstration and experiments.

Activity 4

- To make a model of the power transmission and distribution.

MODULE 2 GENERATORS

Introduction

An electrical generator is a machine which converts mechanical energy into electrical energy. The energy conversion is based on the principle of the production of dynamically induced EMF whenever conductor cuts magnetic flux dynamically induced EMF is produced in it. According to Faradays laws of electro magnetic induction this EMF causes a current to flow if the conductor circuit is closed - hence to basic essential parts of an electrical generators are (1) a magnetic field (2) a conductor (or) conductors this can so more as to cut the flux.

Curriculum objectives

- To create an awareness about the different types of Generators through visiting the companies of making generators, Generator repairing, Workshops, farm also class demonstration, skill models, seminar, debates etc.

Syllabus

- Generators - De generators - working - AC generator - working

Learning activities

Activity 1

- To make a simple working model of wind mill.

Activity 2

- To make a simple working model of hydraulic power plant

Activity 3

- To visit a generator repairing workshop and detailed study of the difference between the AC generator and DC generator and prepare the report and conduct seminars.

MODULE 3 TRANSFORMERS

Introduction

A transformer is a very common and efficient electric machine. Huge transformers are used in power houses while smaller ones are used in our radio sets.

A transformer is used mainly to increase or decrease the voltage of an alternating current. To understand its working we have to keep one fact in mind that when electric current passes

through a coil of wire it behaves like a magnet. Similarly, as long as a wire keeps on cutting a magnetic field, an electric current is generated in it.

There are many types of transformers and they are used for different purposes. They handle power from a fraction of a watt to millions of watts. Transformers are used to produce electricity at a very high voltage for long distance transmission. This voltage is then lowered in many transformers before it reaches homes. A transformer cannot increase or decrease a direct voltage because it cannot produce induced voltage.

Curriculum objectives

- To make them able to understand the working of the transformer through demonstration, refering books, making a model, service manuals, seminar, visiting transformer repairing workshop etc.
- To create an idea about the different types of transformers through demonstration, making a model, service manuals, seminar etc.

Syllabus

- Transformer - working - step-up transformer - step-down transformer.

Learning activities

Activity 1

- Disassembling and assembling of transformer. Prepare a detailed report for the parts of the transformer.

Activity 2

- Making a still model of transformer.

Activity 3

- Give demonstration of simple radio transformer and to identify the voltage transformation with the help of multimeter.

MODULE 4 FARM MOTORS

Introduction

An electrical motor is a machine which converts electric energy into mechanical energy its action is based on the principle that when a current carrying conductor is placed in a magnetic field, it experiences a mechanical force, whose direction is given by fleming left hand rule and whose magnitude is given by F = BIL Newton.

Curriculum objectives

- To make the students able to understand the difference between the DC motor and AC motors, different types of motors, working, advantages and disadvantages through visiting the companies, motor repairing workshop, skill models, demonstration, seminar, debates etc.

- To discuss the study of wire connections to starters and motors through demonstration, connection, diagrams and workshop practice.

Syllabus

- Farm motors - DC motors - AC motor - Single phase motor - split phase capacitor - Poly paryphase motor - two phase motor - three phase motor

Learning activities

Activity 1

- Dismantling, assembling and repairing of DC motor

Activity 2

- Dismantling and assembling and repairing of AC motor.

Activity 3

- Identify all the parts of the motors and give the awareness about the maintenance and repairing of each part.

MODULE 5 SELECTION OF ELECTRIC MOTORS

Introduction

To select the right type of motor for any particular job, the following factors should be considered;

(i) Characters of the power supply [(ac or dc), single or three phase]

(ii) Horse power requirements

(iii) Duty requirement

(iv) Speed of operation

(v) Starting current requirement

(vi) Atmospheric and environmental conditions

(vii) Over load protection device and

(viii)Price

Curriculum objectives

- To discuss the selection of electric motors through experimental study, observation etc.
- To understand the care of electric motors through discussion, seminar etc.
- To understand how to clean a motor through discussion, seminar etc.
- To make the students to follow the safety precautions to prevent the electric shock through discussion, seminar, debate etc.

Syllabus

- Selection of electric motors - care of electric motors - how to clean a motor - safety precautions of electricity.

Learning Activities

1. To prepare a chart for the selection of electric motor and specify the main things noted to select a motor
2. To make awareness of periodical maintenance of motors i.e., daily, weekly, monthly and yearly.
3. Dismantling the motor and demonstrate about the cleaning process sequentially.
4. To prepare an assignment about safety precautions about doing work on electric motors.

2 POST HARVESTING PROCESSING AND STORAGE OF AGRICULTURAL PRODUCTS

MODULE 1 HARVESTING

Introduction

Harvesting of field crop constitutes one of the most labour consuming operation of farming in India. The harvesting of field crops in India is mostly done by human hands with the help of sickle. It takes about 170 to 200 man-hours to harvest one hectare of paddy crop. Due to high labour demand at the time of harvesting, the entire operation continues for weeks together, resulting in over during of crops in the field, which in firm causes grain losses to the extent to 5 or 15 percent in subsequent operations.

Curriculum Objectives

- To make understand about harvesting operation and various type of harvesters through filed visit demonstration and discussion.
- To understand the students about the different methods of harvesting through experimental study visit a farm.

Syllabus

- Harvesting - different types of harvesting.

Learning Activities

Activity 1

- To visit a farm and identify the different types of harvesting and prepare advantages and disadvantages of different methods of harvesting.

MODULE 2 THRESHING

Introduction

Threshing is the removal of grain from the plant by striking, threading or rubbing. Today in various parts of the world threshing is accomblished by treading the grain under the feet of men or the hooves of the animal and striking the grains with sticks.

Curriculum Objectives

- To make understand about threshing operation and various types of threshers through demonstration, discussin and farm visiting.

Syllabus

- Threshing - different types of threshing

Learning Activity

- To visit a farm and identify the different types of threshig and prepare advantages and disadvantages of different methods of threshing.

MODULE 3 CLEANING AND SORTING (WINNOWING)

Introduction

Winnowing is the process of separating grain from a mixture of grain and chaff in an air stream. Created artificially or naturally separation is obtained by allowing the air stream to pass things the mixture falling vertically down. The grain being the behaviours of materials gets deposited almost at the place of dropping the lighter materials chaff is blown away to a greater distance. The winnowing operation is done on the threshing floor. One or more persons poor the threshed material with a basket from slightly above their own height.

Curriculum Objectives

- To make the awareness about the cleaning and sorting (winnowing) through demonstration. Workshop practicals and farm visit etc., can be arranged.

Syllabus

- Cleaning and sorting (winnowing)

Learning activity

Activity 1

- To visit a farm and identify the cleaning and sorting (winnowing) and prepare notes of different winnowing methods and conducting seminars.

MODULE 4 DEHUSKING OR DESHELLING

Introduction

The shell covering the rice grain Kernal is known as husk and the process by which this removed without any damage to the rice Kernel is what is termed as deshelling. Operation and the machines employed to carry out this, are named either as huskers or shellers.

Curriculum Objectives

- To understand the students ability to dehusk the paddy through experimental study, observations visit the flouring mills etc.

Syllabus

- Dehusking or Deshelling

Learning activity

Activity 1

- To visit a floor mill and identify the dehusking process and prepare notes on different dehusking methods and conducting seminars.

MODULE 5 DRYING

Introduction

Drying is the method of conditioning grain by removing moisture to a moisture content (m-c) level that is in equilibrium with normal atmospheric air in order to preserve its quality and nutritive value.

Curriculum Objectives

- To discuss the study and operations traditional methods of drying through demonstration, various experiments conducting in a farm, visit the field etc.

Syllabus

- Drying different methods of drying.

Learning activity

Activity 1

- To give the demonstration about the drying process and prepare notes about drying finally conducting seminars.

MODULE 6 OIL EXTRACTION METHOD

Introduction

Extraction is the process of making oils, juices etc., from coconut, sugar cane, sunflower, fruits, palm, vegetables with the help of extracting machines. This chapter provides for understanding an idea about the coconut oil from coconut, sunflower oil from sunflower etc., i.e., explained traditional method and modern method.

Curriculum objectives

- Create an awareness about necessity and working of oil extraction through visiting the oil expelling make the models of expeller units, experimental studies, refer books. Conducting a seminar, debate etc.

Syllabus

- Oil extraction methods

Learning activity

Activity 1

- To visit an oil extraction expeller units and study the working of the unit then prepare a report about the machine and to conducting seminars.

MODULE 7 DIFFERENT METHODS OF RICE PROCESSING

Introduction

Agricultural processing includes those induces those operations which maintain or raise the quality of raw material, its change its form, or prepare it for market. Its importance is growing and will continue to increase as farming becomes more commercialised, specialised and mechanised in India.

Post harvest technology in the rice industry goes much further than just drying. Storage and milling it involves everything that happens or does not happen to paddy from farmers fields to the customers table. It starts with harvesting and continuous through threshing, cleaning, drying etc. After drying transport the grains, various steps are involved i/e, marketing, miling, distribution to customers and handling by ulimate consumer.

Curriculum Objectives

- Develop the awareness about the different methods of rice processing through visiting the farm, demonstration and experiment conducted.

Syllabus

- Different methods of rice processing

Learning activity

Activity 1

- Demonstration of different rice processing methods like harvesting, threshing, transport, drying, storage, parboiling, milling, rice marketing and make a report of each and conducting seminars about the processing methods.

MODULE 8 SEED PROCESSING TECHNOLOGY

Introduction

Good seed is an important agricultural input. It is as important as other inputs like - irrigation water, pesticides etc., to obtain good quality seed it is necessary to process the seed abtained from the farm to get rid of inert materials - weed seeds, Other crops seeds etc. Seed can seldom be planted without proper conditioning or processing many seeds have clusters and other defects which prevent free flow of these seeds through the seed drill.

Curriculum Objectives

- To make the awareness about the seed processing technology through demonstration, discussion and seminar etc.

Syllabus

- Seed processing technology

Learning Activity

Activity 1

- To visit a seed processing unit and to study about the processing unit then make a report for the unit and conducting a seminar in the classroom.

MODULE 9 PRINCIPLE AND PROBLEMS OF SCIENTIFIC STORAGE

Introduction

In general, the life of the seed during storage revolves around its moisture content, storage temperature and humidity. However, the processed seed has better storability. The rate of deterioration of crop seed increase as respiration goes up with high moisture content.

Curriculum objectives

- To make them able to idea about the scientific storage systems through demonstration, discussion, seminar, visit the field etc.

Syllabus

- Scientific storage system

Learning activity

Activity 1

- The teacher can explain scientific storage system and visit should be conducted at the modern storage system. Make a model of modern storage system and prepare a assignment. A seminar should be conducted.

MODULE 10 MOISTURE AND ITS EFFECTS

Introduction

In general the life of the seed during storage depends on its moisture content, storage temperature and humidity. The processed seed has better storability the rate of deterioration of crop seeds increases as respiration goes up with high moisture content. In open storage conditions the moisture content fluctuates with changes in relative humidity. Once state of equilibrium is reached further exchange of moisture will not take place as long as the storage atmosphere moisture is stable.

Curriculum objectives

- To make the students to understand the moisture and its effect through discussion, seminar etc.

Syllabus

- Moisture and its effect

Learning Activity

Activity 1

- The teacher can explain moisture and its effects and a visit should be conducted at the seed storage areas. Then make a report with the aid of visit. A seminar should be conducted.

MODULE 11 ASSESSMENT OF STORAGE LOSSES

Introduction

FCI had in the past suffered a total loss on account of transit and storage of grain handled by it. This amounts 70 crores in about four years. By establishing proper norms the transit losses can be reduced. Very large savings could result even by marginal reductions in transit and storage losses incurred by the Food Corporation of India and other organisation involving in handling and storage of food grains. Strict and useful norms could be developed as quickly as possible. An attempt should then be made to minimise the lose and to make it with in limits.

Curriculum objectives

- To discuss above the assessment of storage losses through debate, seminar etc.

Syllabus

- Assessment of storage losses

Learning activity

- The teacher can explain the storage losses and to contact with the food and grain storing companies. With the help of them make a report and conduct a seminar.

MODULE 12 STORAGE REQUIREMENT OF AGRICULTURAL PRODUCT

Introduction

There has been a spectacular increase in food grain production in India. However there has a marginal increase in the structure for grain storage. This has resulted in losses both in quantity and quality of harvested grain. The qualities loss may be due to chemical changes in the protein Carbohydrates and fat and by the contamination or micotoxins. Pesticides reduce insect fragments. The quantitative loss in storage may be on the account of the activities

of the birds, rodents, and insects. Enzyme activity of microorganism etc. Rats cause serious loss by eating or breaking the grains into pieces. It is therefore, essential that grain be stored in structures of standard types which, after careful study have been found suitable for different regions in the country.

Curriculum Objectives

- To create an awareness about the storage requirements for agricultural products through experiments, observation, field visits, seminar etc.

Syllabus

- Storage requirement of agricultural products - chemicals - Fumigrants - insect pests - seed dressing.

Learning activity

Activity 1

- To study the various storage requirements

Activity 2

- Identify different chemicals used for the purpose of storage requirements.

Activity 3

- Doing simple experiments for the storage of agricultural products

Activity 4

- Make a report for the different types of chemicals used for the storage of agricultural products.

Activity 5

- To identify the requirement of good storage structure and also identify what are the different types of storage structure by demonstration, field visit, seminar etc., and make a note for them.

MODULE 13 REFRIGERATION AND COLD STROAGE CHANGES DURING STORAGE

Introduction

Refrigeration is the process of lowering the temperature of the substance below that of its surrounding atmosphere. The refrigerant or heat absorbing body must be at a temperature lower than that of the product to be cooled. The heat extracted from the body by the refrigerant is delivered to the atmosphere by air or water.

Cold Storage

Cold storage is the method of processing perishable commodities in this fresh and whole some for a longer period by controlling temperature and humidity within the storage component.

Curriculum Objectives

- Develop the awareness about the refrigeration and cold storage through visit the refrigeration and cold storage companies or diaries, and identify the different parts of a refrigerators and cold storage by visiting workshops and make a detailed diagram of these two.

Syllabus

- Refrigeration and cold storage changes during storage

Learning activities

Activity 1

- To study the working of refrigerator and cold storage by Refrigerator and cold storage workshop, dairy visits and referring books.

Activity 2

- To make an awareness of refrigeration and cold storage. Changes during the time of storage.

Activity 3

- Teacher can explain what are the different methods of refrigeration and cold storage and make a report for different types of refrigeration and cold storage changes during storage.

3 HARVEST EQUIPMENT AND STORAGE STRUCTURE

MODULE 1 THRESHER

Introduction

Threshing is the removal of grain from the plant by striking treading or rubbing. Today in various parts of the world threshing is accomplished by trading the grain under the fat of men or the hooves of the animal. Striking the grains with sticks. Fails or a threshing machine pegs or loops and removing the grain by rubbing between stone or wooden rollers on a threshing floor or between the rasp bar and concave of combine.

Curriculum Objectives

- To make them able to understand overhauling, maintenance, and operation of threshing through demonstration, discussion, visit the form, workshop practicals and service manuals.

Syllabus

- Thresher - Indian threshers - oil pad thresher - Japanese type rotary paddy threshers - power thresher.

Activity

- The teacher can explain the working and construction of different type of threshers.
- To understand complete maintenance and repairing or threshers by visiting a farm, thresher manufacturing companies, workshop etc.
- To prepare a chart from the working process of threshers.
- To make a report of all types of threshers.
- Then conduct a seminar in the classroom with the help of report.

MODULE 2 WINNOWERS

Introduction

Winnowing in the process of separating grain from a mixture of grain and chaff in as air steam created artificially or naturally. Separation is achieved by allowing the air stream to pass through the mixture falling vertically down. The grain being heavier materials gets

deposited almost at the place of dropping, whereas the lighter materials (chaff) is blown away to greater distance.

When the natural wind velocity is not adequate, artificial mean are used to create a sufficiently strong air blast. Winnowing fans either manually operated or mechanically operated, are mostly used.

Curriculum Objectives

- To make them are about the necessity and operation of winnowers through demonstration, making models, diagrams, seminar, group discussion etc.
- To make them aware about necessity of combine harvesters through demonstration, refer books; visit the farm, seminar etc.

Syllabus

- Winnower - combine harvesters

Activity

- To make the awareness of winnowers combine harvester, with the help of farm visits, workshops, winnower, manufacturing companies etc.
- To understand complete maintenance, repair and servicing of different types of combine harvesters and winnowers (manually operated or mechanically operated)
- To make a model winnower
- To prepare a report for the winnower - combine harvesters with the help of visits and also conduct a seminar.

MODULE 3 DIFFERENT TYPES OF MILLS

Introduction

All the concentrated feed should be ground in order to obtain the maximum feeding value other wise $^1/_3$ to ½ of the grain may pass through cattles. When it is fed to them grinding is also profitable for many crops with other kinds of like.

Concentrated feed is mostly feed to the livestock in the form of either powder or broken pieces in order to reduce the size of the feed, same type of feed grinder is used. Common practice for reducing the size is to be used the hand operated small grain pounding stone, power grinders are used to large purpose.

Curriculum Objectives

- To make them aware about the working of different types of mills through demonstration, discussion, visit the flourmill make the models, seminar etc.
- To create the students aware about the working of burr mill through visit the mill, demonstration, sketches, seminar etc.

- To create the students about the ideas of working of hammer will through visit the mill, demonstration, discussion, seminar etc.
- To understand the students the difference between the burr mill and hammer mill through discussion, demonstration etc.
- To enable the students the advantages and disadvantages of mills through discussion, demonstration, visit the field etc.

Syllabus

- Different type of mills - burr mills - working of burr mill - hammer mill - working of hammer mill - comparison of mills.

Learning activities

Activity 1

- Prepare the models of different types of mills.
- The teacher can explain the difference between different types of mill and also explain the advantages and disadvantages of each of them.
- To understand the students complete overhauling and servicing of mechanical parts of the mills by visit, demonstration and discussion.
- To prepare the neat diagram of each mill and make notes for their parts and functions of parts.
- To prepare report about the different types of mills with the help of visits, demonstration, discussion etc.
- Finally conduct a seminar.

MODULE 4 CRUSHERS

Introduction

India is the largest sugar cane producing country in the world. About 28 percent of the total cultivable area of the country is under sugar cane crop. It is estimated that there are about 6,00,000 sugar cane, crushers in use in India, almost all of which are manufactured with in the country. The vertical three-roller type bullock driven crushers are mostly used for crushing sugar canes in rural areas. The total extraction capacity of these rollers varies between 50 and 70 percent.

Curriculum Objectives

- To discuss the operation for different type of crushers through visit the unit, refer books, demonstration, make the models, seminar etc.

Syllabus

- Crushers - vertical sugar cane crushers.

Activity

- To understand students the working of crusher by explanation, discussion, field visit etc.
- The teacher can explain complete function of vertical sugar cane crusher.
- To make them able to understand the mechanism, maintenance, repairing and servicing of vertical sugar cane crushing with the aid of field visit, workshop practicals, demonstration, discussion etc.
- To prepare a diagram of vertical sugar cane crusher and conduct seminars.

MODULE 5 GRAIN DRYING

Introduction

Drying is the universal method of conducting grain by removing moisture to an MC level that is in equilibrium with normal atmospheric air in order to presence its quality and nutritive value for feed and food and its viability. For seeds recent trends in packly production aim at harvesting the crop relatively high MC to present grain shattering which are actual initial losses. Losses due to shedding and shattering of grains in the filed can be considerably reduced when paddy is harvested between 23 and 25 percent MC. Hence the need to bring down the moisture to the safe level of 12 to 14 parent. Sunlight in not a dependable source of heat to dry paddy because in many areas harvest time coincides with heavy rains and moist paddy cannot be stored safely more than a day or two without damages from fermentation.

Curriculum Objectives

- To create the awareness about the necessity of different types of dryers through demonstration, field visiting and discussion.

Syllabus

- Grain drying - method of drying grains - factors that affect drying - methods of air drying grain - sack dryer - batch dryer - rotary dryer - continuous flow dryer.

Learning activities

- To make an awareness about the function of different types of dryer with the help of field visit demonstration and discussion.
- The teacher can explain the function of different type of dryers.
- The students are able to understand the function overhauling, mechanism and servicing of dryers with the help of visits.
- To make diagram for each type of dryers and prepare an assignment.
- After that conduct a seminar
- Finally make a model of dryer.

MODULE 5 PARBOILING

Introduction

Many pre milling techniques have been devised to increase the milling, nutritional, cooking and eating quality of rice. The latest and most widely used of these treatments is parboiling. The structure of paddy grain shows that the endosperm which covers the major volume of rice grain, is mainly composed of polygonal starch granules. The voids or inter granular spaces are filled with air and moisture. The presence of voids and fissures and cracks, developed during maturity cause break of rice during milling. Such a breakage may be eliminated by gelatinising the starch, which will fill the voids and cement the fissures and cracks.

Swelling of starch granules can be achieved by soaking paddy in cold or hot water. During hot soaking, energy supplied in the form of heat weakness the granule structure by disturbing the hydrogen bonds. This gives more space for water absorption by starch granules. This permits further hydration and irreversible granules swelling initiated by more active dissociated water molecules. This is called gelatinisation of starch temperature for a suitable duration depending on the variety. Then parboiled paddy may be dried in shade or in sun or with hot air.

Curriculum Objectives

- To make them understand the parboiling through experimental study, observe the results, demonstration, discussion, seminar etc.
- To create the students able to idea about the traditional methods of parboiling through demonstration, field visit, conducting experiments, discussion, seminar etc.
- To make them aware about the modern methods of parboiling through experimental study, demonstration, visit the parboiling unit, seminar, making the models etc.
- To understand the students the advantages and disadvantages of traditional methods and modern methods through various studies conducted in the parboiling unit, demonstration, seminar etc.

Syllabus

- Parboiling - principles of parboiling - advantages and disadvantages of parboiling - methods of parboiling - traditional methods - single boiling - double boiling - modern methods - CFTRI process, kissan continuous parboiling methods - pressure parboiling - sodium chromate method.

Learning Activities

Activity 1

- Visit a parboiling unit and prepare the report of different methods of parboiling.

Activity 2

- To make a par boiler model.

Activity 3

- Different methods of parboiling i.e. single, double and modern methods. This methods are compared and note the advantages and disadvantages of parboiling with the aid of visiting the parboiling unit.

Activity 4

- To draw the diagrams to different types of parboiling and mentioned its parts and understanding the function of each parts.

Activity 5

- Finally conduct a seminar about different types of parboiling.

MODULE 6 HUSKERS OR SHELLERS

Introduction

The shell covering of the rice grain Kernel is known as husk and the process by which this is removed without to be adjusted damage in the rice Kernal is, what is termed as all shelling operation and the machines employed to carryout this are named either as huskers or shellers.

Curriculum Objectives

- To make the students get the idea about the huskers through visiting the mill, demonstration, making models, refer books, seminar etc.
- To understand the student about the idea of under runner disc shellers, rubber roller shellers and hullers through visit the huller mill, making a model service manuals, demonstration, seminar etc.
- To make students get the idea about the advantages and disadvantages of shellers through demonstration, discussion , seminar etc.

Syllabus

- Huskers or shellers - under runner disc sheller - Rubber roller shellers - Hullers - advantages and disadvantages.

Learning Activities

- Initially the teacher can explain huskers or shellers. The students get in idea about this.
- Create an awareness about different types of huskers i.e.., under runner disc shellers - rubber roller shellers - hullers.
- To make the student able to do the repairing, maintenance and servicing through field visit and making a model of huskers.
- To draw the diagrams of each type of huskers and make an assignment.
- After that conduct a seminar for each type of huskers. Also understand the advantages and disadvantages of each type.

MODULE 7 WHITENING

Introduction

A paddy grain after being properly deshelled, remains coated with a thin layer of bran, the germ being loosely adhered to the rice Kernal. This bran layer displays a dull appearance to the rice grains to obtain the acceptable appearance to the consumer and at the same time to make the grain suitable for human consumption, whitening is done. The process by which this removal of bran is accomplished is known as whitening of rice and the machine doing this operation as rice whitener.

Curriculum objectives

- To make them able to idea about the whitening operation through visiting the mill demonstration, discussion, seminar etc.
- To understand the student about the idea of different type of rice whitener through visiting the mill observe the working of whitener and prepare the detailed report demonstration make the model, seminar etc.
- To create the students about the advantages and disadvantages of whitener through discussion, demonstration, seminar etc.

Syllabus

- Whitening - rice whitener - horizontal - abrasive rice whitener - advantages and disadvantages.

Learning activity

- To create an awareness about rice whitener, by demonstration and discussion.
- To make the student able to do the maintenance, repairing and servicing of different types of whitener with the help of visit.
- To make a diagram of different type of whitener and identify parts and function.
- To make small model of rice whitener and prepare an assignment.
- Finally conduct a seminar.

MODULE 8 STORAGE STRUCTURES ON THE FARM

Introduction

A variety of storage structures are required on the farm to store animal fodder and feeds, fertilisers, seeds, vegetables, mils and milk products, farm machinery etc. All these products need different kinds of storage conditions, and as a result they have to be stored in special types of storage structures.

Silo is a farm structure used to store and protect the animal fodder so that it is preserved in an ideal condition for the farm animals. This chapter provides for understanding an idea about

classification of silos i.e., tower silos and horizontal silos, pit silos, trench silo, requirement of good storage structures and different types of structures.

Curriculum objectives

- To make them able to understand the students about the storage structures on the farm through visit the farm, demonstration, discussion, referring books, seminar etc.
- To create an idea about the different types of silos through visit the farm demonstration, discussion, referring books, seminar etc.
- To make them able to understand idea about different types of structures through visit the farm, demonstration, discussion, seminar etc.

Syllabus

- Storage structures on the farm - silos - permanent tower silos - horizontal silos - pit silos - trench silos - requirement of good storage structures - Bukhari type structure - Kothar type structure - Morai type structure - Grain bins - cylindrical bins - rectangular bins.

Learning activities

Activity 1

- Study of different types of silos and compare the advantages and disadvantages of silos.

Activity 2

- Prepare the different diagrams of silos and explained with the help of LCD projector.

Activity 3

- Study of different types of storage structures and compare the advantages and disadvantages of structures.

MODULE 9 MODERN STORAGE SYSTEM

Introduction

In India, food grains are stored in conventional godowns designed for bagged storage. Their godowns have sidewalls of brick or stone masonry and stopped roofing in asbestos or corrugated galvanised iron (CG) sheets over sheet trusses. Generally a godown has capacity of 5000 tonnes and consist of 3 compartments, each having a span of not less that 21.7m with a clear height of 5.4m. Air circulation is maintained through sheet ventilator and air insets of rolled steel sections. The present cost of construction of these godowns works out to around Rs.180/- per tonne capacity. Requirement of steel and cement is about 50 and 30 mt respectively. Bagged food grains are arranged in stocks with a bare of 6m x 9m with stock height varying from 4 to 5m, leaving 27 percent of the floor areas for alleyways.

Curriculum Objectives

- To make them able to idea about the modern storage systems through demonstration, discussion, seminar, visit the field etc.

Syllabus

- Modern storage systems

Activity

- The teacher can explain modern storage system and a visit should be conducted at the modern storage system. Then make a report with the aid of visit. A seminar should be conducted.
- Make diagrams of different types of modern storage system.

PRACTICAL

PRACTICAL ACTIVITIES

Module 1 study of measuring instruments

1 Least count calculation of vernier caliper

2 Least count calculation of screw gauge

3 Measurement of voltage by multimeter

4 Findings gap of spark plug using Feeder gauge

5 Study of an different types of gauges and then usage.

Module II Motor Circuits Windings and rewinding of Motors and characteristics of motor

1 Dismantling the electric motors and identify the construction of winding

2 Motor winding experiment

3 To identify the characteristics of motors and specifications of motor

Module III Study of generation operation

1 To identify the different parts of a generator

2 Dismantling of assembling of generators

Module IV Wire connections to starters and motors

1 To make a wire connection diagram experimentally

2 Practicing the connection by experiment

3 To make a connection diagram of starters and motors

Module V Study of special electrical equipments used in farms

Module VI Manual methods of threshing mechanical threshing

1 To identify different components contributing threshing machine

2 Complete over hauling, maintenance and repairing of manual threshing machine and mechanical threshing machine.

3 Make a simple model of threshing machine.

Module V Cleaning , sorting

1 To identify different types of cleaning and sorting process.

2 To study about cleaning and sorting

Module VI Size reduction and De husking

1 To study about size reduction and DC husking

2 To understand complete over healing maintenance and repairs of De huskers

3 To understand the function of each part of the machine

4 To make a simple model of de huskers

5 Study the various size reduction process.

Module VII Traditional method of drying

1 To study about traditional method of drying like, sun drying.

2 Students are able to understand the need of drying

3 To make them able to understand factors affecting the drying process.

Module VIII Oil Extraction

1 To identify the function of an oil extractor with the help of visit and identify various parts of an oil extractor

2 To make them able to understanding the function, over healing, maintenance and repairs with the help of an oil extractors workshop cors manufacturing companies.

3 Study and understand the need of an oil extractor

Module IX Rice processing

1 To make an awareness to rice processing and need of rice processing

2 To identify the what are the different methods of rice processing

3 To understand factors should considered for rice processing

4 To make an awareness of different rice processing machinery

Module X Seed processing

1 Making them able to understand the needs of seed processing

2 Factors affecting seed processing

3 To make them able to understand different type of seed processing unit and their maintenance of servicing

Module XI Moisture studies

1 The teacher can explain the moisture and its effects an grains and seeds

2 The students are able to understand the influence on moisture content relative humidity

temperature and storage fungi on stored seed through visit the seed and grain storage unit.

3 To make an awareness the temperature variation in seed and grain storage units.

Module 12 Evaluation of storage losses.

1 Make them understand the different types of storages losses.

2 The students are able to understand the different factors affect during the time of storage through visit the seed and grain storage unit

Module 13 Studies on storage requirement

1 To make them able to understand different specification of storage unit.

2 The students are able to understand the curriculum and working of storage unit with the aid of workshop, visit and practical experience.

Module 14 Physical chemical and biological change during storage

1 To make them able to understand physical, chemical and biological changes during storage through experiment.

Module 15 Over Hauling Maintenance and operation of threshers and winnowers

1 To make them to understand the complete ower hauling, maintenance and operation of threshers through, visit the workshop, manufacturing companies, workshop

2 To make them to understand the complete over hauling maintenance and operation of winnowers through visit the workshop, manufacturing companies, workshop practical etc.

Module 16 Sprayers

1 To make an awareness about the need of sprayers by explanation

2 Make them to understand the working, maintenance, repairing of different types of agricultural sprayers and washers.

Module17 Evolution of different types of shuffle washers

1 To make an awareness about the different types of shuffle washers

2 To study the function of shuffle washers

Module 18 Sorters and separators threshing, winnowing

1 To make a awareness about threshing and winnowing

2 To make them to understand complete over hauling, repairing and maintenance of different types of threshers and winnowers with the helps of field visits, manufacturing companies, workshop practical etc.

3 To study about the need of crashers and winnowers

Module 19 Mills and Crushers

1 Make them to understand the mud of mills and crushers

2 To make them able to do the over hauling, maintenance, and servicing of different types of mills and crushers through visit the mills, crushing unit, workshop practical etc

Moduel 20 Driers

Activities

1 To understand the student need of drying

2 To make them to understand different methods of drying, through visit

3 To make them to understand the mechanism of dries

Module 21 Parboiling

Activities

1 To make them to understand the need of parboiling

2 To make the able to do the maintenance and repairs of different type of parboiling unit with the aids of visit the parboiling unit, manufacturing companies, workshop practice etc.

Module 22 Extractors

Activities

1 To make them to understand the need of extractors

2 To understand the students different types of extractors

3 To prepare them to do the over hauling, maintenance , servicing of repairs of different type of extractors.

Module 23 Study of farmsilos

1 To understand the student about farm silos

2 Study the need of form silos

Module 24 Study of Structure components of modern storage system

1 To understand the students the modern storage system

2 To identify the difference between modern storage and traditional storage system

3 To study about the structural component of modern storage system

4 To make them able to understand the maintenance of modern storage system

Module 25 AutoCAD - mechanical

Simple practice for 2D and 3D drawings

REFERENCES

A Title of course workshop technology

1 Hajra Choudary - Workshop technology Vol -I

2 Chapman Waj - Workshop technology Part I

3 Gupta K.N and J. P Kawshik - Workshop technology Vol I

B Title of courses : Farm Engines and motors

1 Michael A.M and T.P Ojha : Principles of agricultural engineering vol I, Jan Brothers, New Delhi

2 Sabay, Jayadishwar : Elements of agricultural engineering Vol I agro book agency, Patna 1977

3 P.Andorson.Edwin : Auddes Electric motor Guide D.B, Taraporevala Sons & Co-pvt Ltd Bombay

4 E. Bricker, Frederik : Audles Automobiles guide D.B Taraporevala & Co-Pvt Ltd

C Title of course Farm Equipment

1 Michael A.M and T.P Ojha : Principles of agricultural engineering vol I, Jan Brothers, New Delhi, 1978

2 Sabay, Jayadishwar : Elements of agricultural engineering Vol I agro book agency, Patna 1977

3 Bindra O.S.Singh Harichandran : Practical application equipments 2nd Ed - Oxford and IBH Publishing Co- New Delhi 1977

D Title of Course: Irrigation Equipment

1 Israelsen, O.W and W.E Hansern : Irrigation principle of practice Jownwiley and Sons Inc 1962

2 Michael A.M and T.P Ojha : Principle of agricultural engineering Vol II Jain Brothers New Delhi 1978

3 Michael A.M and T.P Ojha : Irrigation theory and practices

4 Siranappam R.K and K.R Marai Growder Irrigation and drainage popular book dept Madras 1977

E Titles of course : form Eletrification

1	Brown R.H	:	Farm electrification MC Graw, Hill Book, Co.Ince New York 1956
2	Asderses A.I	:	Electricity for the farm the Macmillan company, New York
3	Tharaja B.L	:	Electrical Technology, Niraj Prasahad New Delhi 1966

F Post Harvest processing and storage agriculture products and post harvest equipments and storage structure

1	Henderson S.M and R.L Parry	:	Agricultural process engineering 3rd edition the VI publishing company inc .. 1976
2	Michael A.H and T.P Ojha	:	Principle of agricultural engineering Vol I Jain Brothers New Delhi 1978
3	Sahay Jagadiswar	:	Elements of agricultural engineering VolI agro book patna 1977