

E-mail: vapabal@gmail.com

Vigyan Ashram

Pabal; Dist.Pune 412 403

Tel: 02138-292326

Basic Rural Technology Syllabus. (Accredited by NOS)

Target Group:

Rural Youth, who have studied up to SSC level and dropped out.

It is intended to train them for income generation through self-employment preferable and also for position of Instructors in the formal Introduction to Basic Technology Course in schools.

Batch size: 20-24

Duration: 300 working days of 8 hours each. From 1 July to 25 June.

Syllabus:

6 papers:	I	Theory	50 marks	4 hrs/week; 120 hours.
	II	Drawing & Costing	50	4 hrs/week 120 hours
	Practicals:			
	III	Engineering	100 marks	40 hrs/week 400 hours
	IV	Energy-Environment	100 marks	40 hrs/week 400 hours
	V	Agriculture	100 marks	40 hrs/week 400 hours
	VI	Home-Health	100 marks	40 hrs/week 400 hours
Projects:			100 marks	term work
	Total		600 marks	1840 hours

The practical course is divided into 2 sessions.

The first session is devoted to introduction to the techniques and their potential.

The second is to carry out projects to demonstrate their use and create an asset or wealth in some form, to benefit the community.

Session I July- March

Theory: 4 hours per week: 60 Hours

- 1 Measurement; Metric and SI units; terminology, mass, length and time; area, volume, force, pressure, work, energy, power. Least Count and interconversion.(5 Hours)
- 2 Work, Power, Energy (5)
- 3 Concepts of Strength; tensile, crushing and shear.
- 4 Electricity: Electrons; analogy with water flow. Conductor; non-conductor, resistance. Pressure/voltage; flow/current. Ohms Law (2)
Simple circuits; earth as a conductor and store for electrons. Power watts,; unit of energy WH/KWH (3)
- 5 Simple machines; lubrication (3)
- 6 Material; steel, other metals; wood; cement; soil and bricks. (5)
- 7 Water resources and their use. (2)
- 8 Plant and animal kingdom; evolution (3)
- 9 Plant and animal nutrition. Ruminants and birds (2)

10 Fertilisers, compost; Life in soil (2)

11 Simple Accounts. (5)

Drawing and Costing

4 hours per week 60 hours

Concept of plan, elevation, and side view; isometric views

Section views.

Sketch maps Contours and drawing contours.

Making flow charts; graphic representation; bar and pie charts.

Costing; a fabricated steel job; ferrocemnt articles; an RCC or Brick construction; costing of poultry; costing of an agricultural crop.

Practicals:

40 hours per week

Engineering 260 hours.

Choose articles for fabrication, which have some use and which between them involve all the following operations:

Welding; soldering; general workshop practice lie filing, drilling tapping, threading; carpentry; use of hand tools; sharpening chisels and saws; simple joints, laminates.

Examples: stool, chair, and table Reinforcement for a RCC.beam or water tank.

Making Ferro-cement sheets, or wash basin etc. Mud bricks, cement blocks

Making RCC framework and pouring concrete. Marking layouts on ground. Use of string and level for building foundations; bricklaying and waterproofing, termite treatment.

3-4 students work in a team.

Energy-Environment 260 hours

Prepare a map using plane table survey.

Mark contours for a small watershed and build checkdams.

Make a soakpit.

Electrical simple circuits. Fuse wire installation. Connecting 3 phase motors. DOL starter. Winding coils for a transformer or motor.

Parts of a diesel engine and maintenance.

35 cc petrol engine and setting.

Inspection of biogas plant.

Measuring efficiency of a diesel engine pumpset.

Handpump dismantling and assembly.

Agriculture

All Practicals to be done concurrently over 3 month span.

Growing a crop; pest control including assembly and disassembly.

Grafts different types; drip system; irrigation measurement.

Growing a batch of broilers; housing requirement layers management.

Visit to a dairy and AI center.

Care of Goats and dairy animals. Feed requirement.

Home-Health

Common stitches and repair; basic knitting.
MPN test for water quality.
Hemoglobin measurement.
Blood group.
Food preservation and agri-product analysis.
Soil analysis, pH, N, P, K by spot tests.

Session II April- June

Theory 4 hrs per week; 60 hours.

- 1 Conservation of Mass and Energy; concept of mass and energy balances. Concept of efficiency and its applications.
- 2 Structures for strength; reinforcement; triangles and squares; beams and arches; Square sections and tubes; application in every day life.
- 3 Sanitation and waste disposal; how diseases spread; Prevention of diseases; Immunity and vaccines Hygiene.
- 4 Balanced diet and deficiency diseases.
- 5 Genetics; elementary principles. Artificial insemination.
- 6 Scalar and Vector parameters; their use n analysis of forces.
- 7 Three phase electric supply; starters and motors.
- 8 IC engines; Biogas; Solar Energy.
- 9 Selection of Pumps.
- 10 Balance sheet; profit and loss; cash flow.

Drawing and Costing 4 hrs per week 60 hrs.

Orthographic projection.
Missing view problems of simple objects.
Conversion of contours into profiles.
Electric wiring diagram of DOL starter and 3 phase motor.
Drawings of a fabricated job.
Making flow charts for the projects undertaken.
Costing of all project work.

Practicals 40 hours per week

Projects to be done in Session II

4 projects will be done by each student, one from each module.

The projects should

- 1 Give the concepts of planning, report writing, drawing conclusions, referring to earlier work.
- 2 More practice in using acquired skills.
- 3 Produce assets for the institution or community

4 Some idea about the costs, market price and potential demand.

The following are examples of projects to illustrate possibilities. These have been carried out. Projects may be formulated, to suit local needs and conditions. Reference material may be made available. Project reports should be preserved.

Engineering: 140 hours

- ◆ Drinking water system including water tank, piping, and waste water disposal.
- ◆ Setting up a WC block.
- ◆ Part construction of a house or sanitary block.
- ◆ Fabrication of simple workshop equipment such as bench or pipe vice, drill stand or power hacksaw.
- ◆ Fabrication of simple furniture for home or school, rack, cots, table, chair, desks blackboard and stand etc.
- ◆ Fabrication of useful transport aids, wheel barrow, trolley, cycle trailer etc.
- ◆ Fabrication of simple farm equipment, such as harrow, weeding tool, seed drill etc.
- ◆ Services such as sharpening, repair, etc to a predefined value.

Agriculture: 140 hours

- ◆ Planning crops for Kharip or Rabbi preparing the land for sowing, etc. upto transplant if needed.
- ◆ Growing a complete grain or cash crop in 10 gunthas by a team.
- ◆ Setting up drip irrigation for some fruit trees.
- ◆ Pest control service to 5 crops.
- ◆ Making silage 2000-3000 kg
- ◆ Growing and selling 25 broiler birds.
- ◆ Dairy operation for 3 months, including milk tests, records, profit calculations.
- ◆ Attachment to a village AI center for 3 months.

Energy & Environment: 140 hours

- ◆ Wiring of Households or school premises.
- ◆ Complete installation of a water pump, electric motor or diesel engine.
- ◆ Watershed survey and planning.
- ◆ Survey of a site for a percolation tank.
- ◆ Locating sites for wells; VES tests.
- ◆ Pump head survey and selection of a pump.
- ◆ Setting up and maintenance of a biogas plant or smokeless Chula.
- ◆ Maintenance of hand pumps.
- ◆ Building of small bunds and water harvesting channels.
- ◆ Maintenance of a diesel engine, including measuring of its efficiency.

Home & Health: 140 hours.

- ◆ Making a complete simple garment.

- ◆ Developing and testing simple menus for low cost, solar cooker use etc for time saving or better nutrition.
- ◆ Health survey of children.
- ◆ Survey of anemia patients in risk groups, small children, pregnant women etc.
- ◆ More diagnostic tests: blood sugar, blood grouping, jaundice etc.
- ◆ Drinking water quality of village sources.
- ◆ Methods of purification of drinking water and their effectiveness by MPN test.
- ◆ Making milk products like khoa, pedhas, paneer etc and selling.
- ◆ Making food preserves and selling.
- ◆ Soil analysis and moisture content of agri- products as a service.

Teaching Material Available:

- 1 Text books in 3 volumes.
- 2 Practical Handbook.
- 3 Rural Laboratory Handbook
- 4 Design Manuals
- 5 Four Video Lessons- Plane Table Survey; Measurement of Animal Temperature; ferrocemnt sheet making; Pesticide Sprayer.
- 6 Also unedited video lessons on Measurement; Borewell Handpump Repair ;Diesel Engine; Petrol Engine; and electrical wiring.
- 7 Video Reports on Vigyan Ashram by different sponsor.

Organizational Aspects:

The students are organized into 4 groups of 4-6 each, and each group is assigned to one instructor.

Two batches are assigned to Agriculture and Home-Health. The other two start with Engineering and Energy-Environment.

From July to mid-November, Group 1 and 2 do Part 1 of Agriculture, including Animal Husbandry and Home-Health. (400 hrs Agriculture + 260 hrs Home-Health) During the same period, groups 3,4 do Part 1 of Engineering and Energy-Environment. From Mid November to March end the groups 1,2 do the Engineering and Energy-Environment, and Groups 3,4 do Agriculture and Home-Health.

Thus by end March, all 4 groups should have done all of Part 1. The Agriculture and Animal husbandry Practicals, growing a crop, rearing a poultry batch are also included as projects. So between April- June, the students do only 3 projects in Home-Health, Engineering, and Energy-Environment.

	1 July- 14 Nov (720 hrs)	14 Nov-31 March (720 Hrs)	1 Apr-25 June (520 hrs)
Part 1 Gr1,2	660 hrs+60 spare	520 hrs +200 spare	
Gr 3,4	520 hrs+200 spare	660 hrs+60 spare	

Part 2	420 hrs + 100 spare
	420 hrs + 100 spare

The course content has many items that cannot be scheduled in a timetable but are controlled by outside factors, not in our control. It is therefore necessary that we have spare time for flexibility. This is particularly true for requirements such as growing crops, rearing a poultry batch and selling, giving services to the community, and earning while learning.

Also, though the course starts in July, many students join later, even as late as mid August. To accommodate such students, the first two batches work in Agriculture and H-H. Here many agricultural operations have already been done before July. Also the spare time is less. The late comers go into batches 3,4 where the spare time is more and late comers can be accommodated.

Groups doing agriculture and H-H, do crop, poultry-dairy and H-H in rotation. But the groups doing engineering and Energy-Environment complete the topic before they go to the other.

Groups 1,2 start with crops already planted in June. They may therefore be asked to prepare the land for the Rabi. The groups 3,4 could take up the planning and land preparation for the Kharip as a Project or can do it as an earning scheme.

Examination System:

We believe the true evaluation technique should evaluate, without producing tension among the students. Again it should record the level of performance rather than be a filter. We have therefore devised a scheme, where the practical examination paper is fixed, and the students can practice it as much as they like before the examination. The minimum levels of skills will be covered in this and is listed separately below. These will carry 50 marks in each module. Any one who fails in any of these will have to pass this test by appearing again, paying fresh examination fees.

This will be the minimum level of skill and understanding. In addition to this, the student will himself volunteer to give additional topics/skills in which he is proficient. These may be additional skills he has learnt, items he has fabricated, projects he has completed, etc, which raises him above the minimum. He may show his initiative, inventiveness or ability to collect information, and learn by himself. One such topic or more should be offered in each of the above four modules. The marks will be given on the basis of the extent of skill and understanding, and initiative or inventiveness shown. This will carry the balance of 50 marks for each of the modules.

We wish to have the theory also as an open book exam, but have not done this yet.

Work Experience:

There are several points that are too minor for explaining in a classroom, and are best taught while doing the work. Also from the point of consolidating the experience, we believe the students should be given assignments from real life situation, where they do some useful work for which they can be paid in cash or kind.

To date we have a system of giving them work experience assignments, one day every week, in return for which they are given free mid-day meals throughout the

month. In addition they are also given opportunities to earn income by doing maintenance or other work on contract basis.

It is our intention that we should make this obligatory and specify a minimum level or period of work.

Minimum Levels of Learning- Skills.

Engineering:

Workshop:

- 1 Measurement in meters, centimeters, and millimeters. feet and inches; interconversion of metric units and metric to British and vice versa.
- 2 Costing including weights of common steel sections.
- 3 Welding, straightening, drilling, cutting and grinding; enough to make a strong weld, without burning of the metal, negligible sputtering and continuous weld.
- 4 Threading and tapping with dies and taps for sizes upto 12 mm and threading of pipes of up to 3" dia.
- 5 Knowing and soldering of MS sheet/GI articles. Procedure to be known but skill not expected.
- 6 Painting with a brush, use of thinner, use of polish paper, and meaning of terms such as primer, covering power, and thinner. Enamel paints, aluminium paint, red oxide, and black japan.

Construction:

- 1 Use of level tube and line out of plan; marking and checking right angles; alignment with other buildings; etc.
- 2 Ferrocement construction; cutting and fixing weld mesh, and chicken mesh, preparing and using mortar; and finishing plaster. Should be able to splash plaster and get a smooth finish.
- 3 Repairs to plaster; cleaning surface and filling with grout/plaster.
- 4 RCC. Making reinforcement frame as per drawing by tying welding. Use of torsion bar; making a mould; wooden centering or steel frame. Making a concrete of given proportion; (1:2:4 or 1:3:6 as specified) Making concrete and pouring with rodding, curing and removing the centering.
- 5 Brick laying: use of string, plumb line, spirit level, and common tools for straight walls and corners. Names of bonds need not be known. Use of mortar and pointing and plastering.
- 6 Simple estimation of materials for given volume/ area of concrete or wall plaster. Use of tables/calculators allowed. Costing of small jobs.

Energy-Environment:

Water Resource Development:

- 1 Plane table survey with traverse.
- 2 Able to draw mark on the ground, contours using level tube or A frame or any other device. Know the use of contours; and read on the map.
- 3 Able to draw sketch map of an area of 10 ha using approx. dimensions and directions.

- 4 Hand pump repair, know the functions of each part; cylinder valves, rods, pipes and chain; water tank, handle etc.

Electrical:

- 1 Making joints of wires; removing insulation; connecting with a terminal or twisting together; names not necessary; Kinds of wires; single, two three core; armoured cable; Twin flexible wire; multistrand; PVC coated wire with single strand; SWG; knowing fuse wire.
- 2 Simple two room wiring; using one way and two way switches; Plug point, holders;(bracket, baton, or pendant); DP switches; and fuses;
- 3 Connecting and direction reversing of 3ph motors using an ICTP and DOL starter; Circuit inside DOL starter not expected.
- 4 Estimate load and fuse size; given load wattage, fuse to nearest 5 amps. Approx. sizes of wires for each load.
- 5 To be able to take a meter reading and calculate the bill given the rate per KWH.

IC engines; other devices;

- 1 Know the names of externally visible parts of a diesel engine; to be able to check level of oil and fuel; add as necessary; to be able to start the diesel engine.
- 2 To be able to dismantle 35 cc engine from a pesticide sprayer and reassemble; set the spark plug and breaker point setting; clean the filter and know the need of /for the choke.
- 3 Able to dismantle and assemble a pressure and wick stove. Change wicks, washers etc. clean the burner.
- 4 Understand and use the biogas stove. Clean the jet and set the air gap.
- 5 Understand the working of a biogas plant and know common problems; water condensate collection and leakage; leakage testing with soap solution.
- 6 Principles of common Chula; need of grate, convection currents; chimney; fuel efficiency measurement.

Environment: Principles only

- 1 Construction of soak pit. Septic tank; principles and sizing
- 2 Biogas as energy producer and sewage disposal system.
- 3 Tree as air purifier and moisture and soil retention system.
- 4 Measuring and recording rainfall; min. max temperatures and humidity. To be able to set up and record all data

Agriculture:

- 1 Growing a crop or vegetable plot. Budget estimate and recording costs and calculate profitability. Planning on the basis of profitability.
- 2 Pest control equipment; Aspi Bolo Sprayer; dismantling and assembling sprayer; knapsack sprayer;
- 3 Preparing for pest control; choosing the pesticide, choosing the concentration; making the solution and spraying;
- 4 Making grafts; cuttings (with or without hormone treatment); budding; splicing other methods should be know.

5 Irrigation methods; drip irrigation; be able to connect a capillary to a pipe. Recognising shortage of water for a crop and a tree. Measurement and estimation of water needs.

6 Understanding soil quality and sampling.

Animal Husbandry:

7 Poultry: vaccination (lasota) weighing; feeding; watering; brooder management.

8 Ability to draw and use graph of weight growth Vs age; concept of FCR; making a P & L statement for a poultry batch.

9 Measuring temperature of an animal, using a clinical thermometer.

10 Estimating weight and age of a cow.

11 Estimating feed needs of a cow, goat and poultry.

Home & Health:

Lab Techniques

1 Blood sample and estimation of hemoglobin

2 Blood group testing.

3 MPN test for water contamination by E.coli

4 Fat estimation in Milk; Moisture estimation in food products. Fodder etc

5 Chlorination and iodination of water for making safe drinking water.

6 Soil analysis; sampling; pH and NPK spot tests.

Foods:

7 Making a food product from at least one vegetable one fruit and one cereal, pulse or grain.

8 Knowing the concept of food preservation, by making water unavailable to bacteria, or heat killing them.

9 Milk products; khoa, pedhas.

10 Costing of food products.

Home care;

11 Sample stitches on a kerchief.

12 Stitching buttons or repair.

13 Information and demonstration only

Detergents and their use.

Fuels and their use.

Plastics and synthetic fibres; recognising and care.

XX