

**L\_All\_Vocational\_Ed\_Agri**

**Sector: Agriculture**

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**VOCATIONAL EDUCATIONAL QUALIFICATION FRAMEWORK**  
**(Sector-Agricultural: Specialization- Food Processing)**  
**NVEQF/AGRI/PFE**

<b>S.No.</b>	<b>Certificate Level</b>	<b>Vocational Hours</b>
1.	Level-I	200 hrs
2.	Level-II	250 hrs
3.	Level-III	350 hrs
4.	Level-IV	350 hrs
5.	Level-V	500 hrs
6.	Level-VI	550 hrs
7.	Level-VII	750 hrs

**Certificate Level- I**

**Workshop Practice – I**  
**Carpentry shop – I**

Making of various joints (Also draw the sketches of various wooden joints in the Practical Note Book)

- Cross lap joint
- T -lap joint
- Comer lap joint
- Mortise and tenon joint
- Dovetail joint

Fabrication of utility items of farm tools by wood turning lathe

**Fitting and Plumbing Shop – I**

Use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps and dyes etc.)

Making of simple jobs using chipping tools.

Practice of simple operation of hack saw in straight and angular cutting.

Practice of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge

Cutting and filing practice on a square MS flat

Angular cutting practice of 45° (on the above job)

Preparation of stud (to cut external threads) with the help of dies (mm or BSW)

Drilling, counter drilling and internal thread cutting with Taps

Pipe cutting practice and thread cutting on GI Pipe with pipe dies

**Fundamentals of Food Engineering**

To find the thickness of wire using a screw gauge

To find volume of solid cylinder and hollow cylinder using a vernier caliper.

Practical problems on Systems of units (FPS, CGS, MKS and SI units)

To determine the atmospheric pressure at a place using Fortin's Barometer

Practical problems on Work, Power and Energy

### **Engineering Drawing – I**

Different types of Lines and Free Hand Sketching

Different types of lines in engineering drawing as per BIS specifications

Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses

### **Food Processing I**

Study of applications of dimensional analysis,

Determination of liquid properties

(a) Density (b) Viscosity

Determination of physical properties of food products; such as size, shape, bulk density and porosity of cereals, pulses and oil seeds grains. Measurement of moisture content.

## **Certificate Level- II**

### **Engineering Drawing – II**

Practice of various lettering techniques (6 sheets)

### **Surveying and Leveling**

Surveying of the given area using Chain survey method.

### **General Workshop Practice-II**

#### **Welding Shop**

Preparation of cap joint by arc welding

Preparation of Tee joint by arc welding

Preparation of single V or double V butt joint by using Electric arc welding

Gas welding practice on worn-out and broken parts

#### **Electric Shop**

Wiring practice in batten wiring, plastic casing-capping and conduit

Control of one lamp by one switch

Control of one lamp by two switches

Control of one bell by one switch

Assemble a Tube light

Dismantle, study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler

Laying out of complete wiring of a house (Single-phase and Three-phase)

### **Manufacturing Technology – I**

#### **Fitting shop**

Bench work and fittings; simple male-female fitting (fitting of pulley, bearings, gears on shafts), scraping, pipe fittings with leakproof joints, checking alignment and centre distance

#### **Basics of Electrical systems - I**

Connection of a three-phase motor and starter with fuses and reversing of direction of rotation

Connection of a single-phase induction motor with supply and reversing of its direction of rotation

Charging of a lead - acid battery

### **Food Processing II**

Study of shape and size of cereals, pulses and oil seeds grains.

Determination of fineness modulus. Determination of uniformity index. Determination of effectiveness of screens.

Determination of hardness of grain.

Study of hammer mill, attrition mill, pin disc mill, ball mill and ultra fine grinder.

Study of belt, chain, screw conveyor, bucket elevator, pneumatic conveyors.

Study of air screen cleaner, disc separator, indented cylinder separator, spiral separator, specific gravity separator, cyclone separator.

## **Certificate Level- III**

### **General Workshop Practice – III**

Forge a L hook or Ring from MS rod 6 mm  $\diamond$

Forge a chisel and give an idea of hardening and tempering

Lap joint with forge welding

Making sheet metal joints

Making sheet metal tray or a funnel or a computer chassis

Preparation of sheet metal jobs involving rolling, shearing, bending and cornering

Prepare a lap riveting joint of sheet metal pieces

### **Manufacturing Technology – II**

Pattern making and foundry shop

To prepare pattern of rectangular block, 'V' block, step pulley with core box, split pattern

Preparation of open floor mould of solid pattern, cope drag mould using split pattern

Visit to foundry to see castings of cast iron, steel, non-ferrous materials, hand moulding, machine moulding and melting furnaces. Induction heating and gas fixed furnaces

### **Basics of Electrical systems – II**

Troubleshooting in domestic wiring system

Study of a distribution board for domestic installation

Use of ammeter, voltmeter, wattmeter, energy meter and multi-meter

Ohm's Law verification

Verification of law of resistance in series

Verification of law of resistance in parallel

Study of different types of fuses

Practice of earthing and various types of earthing, applications of MCBs and ELCBs

### **Food Processing III**

Determination of EMC, ERH. Study of solar dryer, tray dryer, fluid bed dryer, drying rate period, milk dryers, spray dryer.

Study of simple processes for mass and energy balance during

(a) Evaporation (b) Drying

Study of single and multiple effect evaporators

Study of solar dryers, mechanical convective dryers, drum or roller dryer, spray dryer, atomization system.

## **Certificate Level- IV**

### **Communication Skills**

Visit to factory, construction site, modern office, etc.  
and preparing a report on it.

### **Engineering Drawing – III**

Construction of plain and diagonal scales  
Drawing 3 orthographic views of given objects  
Sketching practice of pictorial views from isometric objects

### **Applied Mechanics**

Experiments on Moment, Friction & Centre of Gravity, Principle of moment and its applications

Moment of a force and units of moment, Parallel forces, coefficient of friction, angle of friction, angle of repose, cone of friction

Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

### **Machine Drawing – II**

- Drawing sheets of Shaft Couplings
- Oldham coupling
- Universal coupling
- Drawing sheets of Bearings
- Bush bearing
- Foot step bearing
- Plummer block
- Self aligning bearing
- Brackets

### **Manufacturing Technology – III**

- Practice of Lathe operations
- Plain turning, facing, centring, parting off, undercutting, taper turning, eccentric turning, drilling, reaming, thread cutting and knurling, speeds and feeds of cut.
- Practice of Shaper operations
- Practical use of Instruments and Gauges:
- Height gauge, depth gauge, bore gauge, slip gauge, sine bar, measurement of taper by use of slip gauges, limits, fits and tolerances, interchangeability, Go and Not-Go gauges, screw thread micrometer, thread gauge, radius gauge, dial gauge, and gear tooth vernier, hardness checking instruments, coating thickness checking instruments, surface finish checking instruments,

### **Food Processing –IV**

- Preservation of food by high concentration of sugar i.e. preparation of jam.
- Preservation of food by using salt- Pickle.

- Preparation of fruit Jelly
- Preparation of fruit squash and juice
- Preparation of grape raisin, dried fig and dried banana.
- Preparation of Bread, biscuits and Cake.
- Preparation of fruit candy



## **Certificate Level- V**

### **Advanced FoodProcessing-I**

Study of blanching of foods, Study of pasteurizers, Study of evaporators; Study of various types of mechanical drying of fruits and vegetables, Calculation of energy consumption in evaporators, Performance evaluation of single and multi stage evaporators.

Determination of time required for thermal processing for Canning.

Study of irradiation, ohmic heating, high pressure processing.

Study of microwave heating.

Study the effect of thermal processing on food quality.

## **Certificate Level- VI**

### **Advanced Food Processing-II**

Drying of foods using freeze-drying process.

Study of freezers;

Calculation of freezing time.

Demonstration of preserving foods by freezing process.

Design and layout of processing plant

Selection of processes, plant capacity.

Project design, selection of equipments, process and controls.

Familiarization with local grain storage structures.

Design of grain storage structures.

## **Certificate Level- VII**

### **Advanced Food Processing-III**

Planning of agro processing centers

1. Establishment of agro processing centers
2. Operation and maintenance of agro processing centers
3. Planning and marketing of value added produced

#### **Seminar**

Preparation of presentations using power point and delivering of seminars for developing communication and presentation skills.

#### **Project**

Planning, execution, presentation and report submission of project related to farm machinery and power.

**VOCATIONAL EDUCATIONAL QUALIFICATION FRAMEWORK**  
**(Sector -Agriculture-Specialization – Farm Machinery and Power)**  
**NVEQF/AGRI/FMPE**

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**Certificate Level- I**

**Workshop Practice – I**

**Carpentry shop – I**

Making of various joints (Also draw the sketches of various wooden joints in the Practical Note Book)

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- T -lap joint
- Comer lap joint
- Mortise and tenon joint
- Dovetail joint

Fabrication of utility items of farm tools by wood turning lathe.

**Fitting and Plumbing Shop – I**

Use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps, dyes etc.)

Making of simple jobs using chipping tools.

Practice of simple operation of hack saw in straight and angular cutting.

Practice of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge

Cutting and filing practice on a square MS flat

Angular cutting practice of 45° (on the above job)

Preparation of stud (to cut external threads) with the help of dies (mm or BSW)

Drilling, counter drilling and internal thread cutting with Taps

Pipe cutting practice and thread cutting on GI Pipe with pipe dies

**Applied Physics**

To find the thickness of wire using a screw gauge

To find volume of solid cylinder and hollow cylinder using a vernier caliper

To determine the thickness of glass strip

To determine the atmospheric pressure at a place using Fortin's Barometer

## **Engineering Drawing – I**

Different types of Lines and Free Hand Sketching

Different types of lines in engineering drawing as per BIS specifications

Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses

## **Agricultural Hand Tools**

Practice of common hand tools used in the farm for various operations such as tillage, sowing, interculture, harvesting etc. for crop production.

## **Certificate Level- II**

### **Engineering Drawing – II**

Practice of various lettering techniques (6 sheets)

### **Surveying and Leveling**

Surveying of the given area using Chain survey method.

### **General Workshop Practice-II**

#### **Welding Shop**

Preparation of cap joint by arc welding

Preparation of Tee joint by arc welding

Preparation of single V or double V butt joint by using Electric arc welding

Gas welding practice on worn-out and broken parts

#### **Electric Shop**

Wiring practice in batten wiring, plastic casing-capping and conduit

Control of one lamp by one switch

Control of one lamp by two switches

Control of one bell by one switch

Assemble a Tube light

Dismantle, study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler

Laying out of complete wiring of a house (Single-phase and Three-phase)

#### **Crop Production**

Identification of crops and their seeds.

Identification of different types of fertilizers.

Identification of different crop weeds and methods of weed control.

Estimation of yield of crops.

Visits to the mechanized/modernized farms of agricultural universities/central state farms for the study of growth phases in various crops and to get the exposure of modern techniques being used for raising different crops.

#### **Manufacturing Technology – I**

##### **Fitting shop**

Bench work and fittings; simple male-female fitting (fitting of pulley, bearings, gears on shafts), scraping, pipe fittings with leak-proof joints, checking alignment and centre distance

##### **Basics of Electrical systems - I**

Connection of a three-phase motor and starter with fuses and reversing of direction of rotation

Connection of a single-phase induction motor with supply and reversing of its direction of rotation

Charging of a lead - acid battery

**Draught animal power in agriculture**

Practice of common animal drawn implements used in the farm for various operations such as tillage, sowing, intercultural, harvesting etc. for crop production, adjustments, maintenance and trouble shooting

### **Certificate Level- III**

#### **Agricultural Botany – II**

Familiarization of the important crop namely sugarcane, groundnut, mustard, castor, cotton and pluses in field.

#### **General Workshop Practice – III**

Forge a L hook or Ring from MS rod 6 mm ◊

Forge a chisel and give an idea of hardening and tempering

Lap joint with forge welding

Making sheet metal joints

Making sheet metal tray or a funnel or a computer chassis

Preparation of sheet metal jobs involving rolling, shearing, bending and cornering

Prepare a lap riveting joint of sheet metal pieces

#### **Crop Production – II**

Methods of seed bed preparation.

Measurement of soil properties such as soil texture, bulk density, soil porosity, soil moisture content etc.

Methods of seed treatment

#### **Manufacturing Technology – II**

Pattern making and foundry shop

To prepare pattern of rectangular block, 'V' block, step pulley with core box, split pattern

Preparation of open floor mould of solid pattern, cope drag mould using split pattern

Visit to foundry to see castings of cast iron, steel, non-ferrous materials, hand moulding, machine moulding and melting furnaces. Induction heating and gas fixed furnaces

#### **Basics of Electrical systems – II**

Troubleshooting in domestic wiring system

Study of a distribution board for domestic installation

Use of ammeter, voltmeter, wattmeter, energy meter and multi-meter

Ohm's Law verification

Verification of law of resistance in series

Verification of law of resistance in parallel

Study of different types of fuses

Practice of earthing and various types of earthing, applications of MCBs and ELCBs

#### **Farm Power – I**

Identification of various types of diesel engines

Identification of various tools used for dismantling and assembling IC engines

Performing pre-starting checks on engine

Engine dismantling and inspection of various parts, measurements of clearances

Engine assembly and trouble shooting



## **Farm Machinery and Implements – I**

Practice of fitting of different Flat and V -belt drives, various adjustments such as length, ratio etc.

Study of belt dynamometer

## **Certificate Level- IV**

### **Communication Skills**

Visit to factory, construction site, modern office, etc. and preparing a report on it.

### **Engineering Drawing – III**

Construction of plain and diagonal scales

Drawing 3 orthographic views of given objects

Sketching practice of pictorial views from isometric objects

### **Applied Mechanics**

Experiments on Moment, Friction & Centre of Gravity, Principle of moment and its applications  
Moment of a force and units of moment, Parallel forces, coefficient of friction, angle of friction, angle of repose, cone of friction

Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

### **Crop Production – III**

Study of different methods, tools and equipment required for intercultural.

Familiarization of various pests, diseases etc. in different crops.

### **Machine Drawing – II**

Drawing sheets of Shaft Couplings

Oldham coupling

Universal coupling

Drawing sheets of Bearings

Bush bearing

Foot step bearing

Plummer block

Self aligning bearing

Brackets

### **Manufacturing Technology – III**

Practice of Lathe operations

Plain turning, facing, centring, parting off, undercutting, taper turning, eccentric turning, drilling, reaming, thread cutting and knurling, speeds and feeds of cut.

Practice of Shaper operations

Practical use of Instruments and Gauges

Height gauge, depth gauge, bore gauge, slip gauge, sine bar, measurement of taper by use of slip gauges, limits, fits and tolerances, interchangeability, Go and Not-Go gauges, screw thread micrometer, thread gauge, radius gauge, dial gauge, and gear tooth vernier, hardness checking instruments, coating thickness checking instruments, surface finish checking instruments,

### **Farm Power – II**

Valve system – study and adjustments.

Oil & Fuel - determination of physical properties.

Study of Air cleaning system.  
Study of Fuel supply system of CI engine.  
Study of Cooling system: thermostat and radiator.  
Study of Lubricating system.  
Study of engine performance curves.  
Visit to engine manufacturer/ assembler/ spare parts agency.

### **Farm Machinery and Implements – II**

Introduction to various farm machines and visit to implement's shed.  
Construction details, adjustments and working of M.B. plough.  
Construction details, adjustments and working of disc plough.  
Construction details, adjustments and working of disc harrow.  
Construction details, adjustments and working of secondary tillage tools.  
Construction and working of rotavator.  
Field capacity and field efficiency measurement of tillage and planting equipment.  
Draft & fuel consumption measurement of different implements.

## **Certificate Level- V**

### **Farm Tractor System - I**

Introduction to transmission systems and components.

Assembling and disassembling of the following:

Clutch system.

Different types of gear box

Differential and final drive of a tractor.

Brake system (mechanical and hydraulic) of a tractor

### **Farm Machinery and Implements – II**

Field evaluation of following implements

Seed-cum-fertilizer drill and its calibration.

Planters.

Weeding equipments.

Familiarization with various farm machines related to harvesting.

Study of cutterbar: constructional details, adjustments and working.

Field operation of the following:

Vertical conveyor reaper

Potato harvester

Forage harvester

Maize sheller

Post hole digger.

### **Hydraulic Drives**

Introduction to Hydraulic Systems.

Study of Hydraulic Pumps.

Study of Hydraulic Actuators.

Study of Hydraulic Motors.

Study of Hydraulic Valves.

Hydraulic codes and circuits.

Building simple Hydraulic Circuits.

Hydraulics in Tractors.

Pneumatics in Agriculture

### **Pesticides Application And Equipment – I**

Study of various types of nozzles

Study of manually operated sprayers.

Study of power operated sprayers.

Testing of different types of nozzles.

## **Certificate Level- VI**

### **Field Operation and Maintenance of Tractors – I**

Introduction to various systems of a tractor viz. fuel, lubrication, cooling, electrical, transmission, hydraulic and final drive system.

Familiarisation with tractor controls and learning procedure of tractor starting and stopping.

Study of driving safety rules: Road signs, traffic rules, road safety, driving and parking of tractor.

Familiarisation with different makes and models of tractors in India.

Forward and reverse tractor driving practice.

Tractor driving practice with two wheeled tractor trailer forward and reverse.

### **Field Operation and Maintenance of Farm Machinery – II**

Adjustment and maintenance of primary and secondary tillage equipment viz. M.B. plough, disc-plough and disc harrow.

Study and practising the hitching and dehitching of implements.

Field operation and field adjustments of m.b. plough and disk plough.

Field operation of disk harrow.

Adjustment and maintenance of seeding and planting machines.

Field operation and adjustments of seed drill/planter.

### **Farm Machinery and Implements – III**

Field operation of the following:

Vertical conveyor reaper

Potato harvester

Forage harvester

### **Land Development and Grading –I**

Field layout of farm for grading and land levelling

### **Pesticides Application and Equipment – II**

Study of manually operated dusters.

Study of power operated dusters.

Calibration of sprayers.

Calibration of dusters.

## **Certificate Level- VII**

### **Field Operation and Maintenance of Tractors – II**

Familiarisation with tools and equipment used for maintaining and servicing of tractors and farm machines; Doing the 10-hours service jobs and Maintenance after 50- hours of operation; Maintenance after 100 hours of operation; Maintenance after 250 hours of operation; Maintenance after 500 hours and 1000 hours of operation.

Dismantling and assembling of major engine parts.

Visit to tractor/ engine repair workshop.

### **Field Operation and Maintenance of Farm Machinery – II**

Adjustment and maintenance of plant protection equipment.

Adjustment and maintenance of reapers and threshers.

Adjustment and maintenance of combine harvesters and straw combines.

Visit to small scale farm machinery manufacturers and their repair shops, seasonal repair of farm machinery.

### **Land Development and Grading – II**

Study of bulldozer and field operation for calculating of output.

### **Seminar**

Preparation of presentations using power point and delivering of seminars for developing communication and presentation skills.

### **Project**

Planning, execution, presentation and report submission of project related to farm machinery and power

**VOCATIONAL EDUCATIONAL QUALIFICATION FRAMEWORK**  
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**Certificate Level- I**

**Workshop Practice – I**

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Practice of simple operation of hack saw in straight and angular cutting.

Practice of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge

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**Applied Physics**

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To determine the thickness of glass strip

To determine the atmospheric pressure at a place using Fortin's Barometer

**Engineering Drawing – I**

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Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses

### **Watershed Hydrology**

Visit to meteorological observatory; Study of different types of rain gauges; Exercise on analysis of rainfall data.

### **Soil and Water Conservation**

Study of soil loss measurement techniques; Study of details of Coshocton wheel and multi-slot runoff samplers; Determination of sediment concentration through oven dry method



## **Certificate Level- II**

### **Engineering Drawing – II**

Practice of various lettering techniques (6 sheets)

### **Surveying and Leveling**

Surveying of the given area using Chain survey method.

### **General Workshop Practice-II**

#### **Welding Shop**

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Laying out of complete wiring of a house (Single-phase and Threephase)

### **Manufacturing Technology – I**

#### **Fitting shop**

Bench work and fittings; simple male-female fitting (fitting of pulley, bearings, gears on shafts), scraping, pipe fittings with leakproof joints, checking alignment and centre distance

#### **Basics of Electrical systems - I**

Connection of a three-phase motor and starter with fuses and reversing of direction of rotation

Connection of a single-phase induction motor with supply and reversing of its direction of rotation

Charging of a lead - acid battery

#### **Wells and Pumps :**

Verification of Darcy's Law; Study of different drilling equipments; Sieve analysis for gravel and well screens design; Estimation of specific yield and specific retention; Testing of well screen

**Irrigation systems:**

Measurement of soil moisture by different soil moisture measuring instruments; measurement of irrigation water; measurement of infiltration rate; computation of evaporation and transpiration; land grading exercises; design of underground pipe line system

## **Certificate Level- III**

### **General Workshop Practice – III**

Forge a L hook or Ring from MS rod 6 mm ⇄

Forge a chisel and give an idea of hardening and tempering

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Study of a distribution board for domestic installation

Use of ammeter, voltmeter, wattmeter, energy meter and multi-meter

Ohm's Law verification

Verification of law of resistance in series

Verification of law of resistance in parallel

Study of different types of fuses

Practice of earthing and various types of earthing, applications of MCBs and ELCBs

### **Drainage :**

In-situ measurement of hydraulic conductivity; determination of drainage coefficients; installation of piezometer and observation well; preparation of iso-bath and iso-bar maps

### **Watershed Hydrology :**

Double mass curve technique; Determination of average depth of rainfall and frequency analysis; Study of stage recorders and current meters; Exercise on estimation of peak runoff rate and runoff volume; Exercises on hydrograph and unit hydrograph; Exercises on design and location of retards for channel improvement; Exercises on flood routing problems.

## **Certificate Level- IV**

### **Communication Skills**

Visit to factory, construction site, modern office, etc.  
and preparing a report on it.

### **Engineering Drawing – III**

Construction of plain and diagonal scales  
Drawing 3 orthographic views of given objects  
Sketching practice of pictorial views from isometric objects

### **Applied Mechanics**

Experiments on Moment , Friction & Centre of Gravity , Principle of moment and its applications  
Moment of a force and units of moment, Parallel forces, coefficient of friction, angle of friction, angle of repose, cone of friction  
Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

### **Machine Drawing**

Drawing sheets of Shaft Couplings  
    Oldham coupling  
    Universal coupling  
Drawing sheets of Bearings  
    Bush bearing  
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    Brackets

### **Manufacturing Technology – III**

Practice of Lathe operations  
Plain turning, facing, centering, parting off, undercutting, taper turning, eccentric turning, drilling, reaming, thread cutting and knurling, speeds and feeds of cut.

Practice of Shaper operations

Practical use of Instruments and Gauges:

Height gauge, depth gauge, bore gauge, slip gauge, sine bar, measurement of taper by use of slip gauges, limits, fits and tolerances, interchangeability, Go and Not-Go gauges, screw thread micrometer, thread gauge, radius gauge, dial gauge, and gear tooth vernier, hardness checking instruments, coating thickness checking instruments, surface finish checking instruments.

### **Soil and Water Conservation**

Problems on Universal Soil Loss Equation; Preparation of contour map of an area and its analysis; Design of vegetative waterways; Design of contour bunding system; Design of graded

bunding system; Design of various types of bench terracing systems; Determination of rate of sedimentation and storage loss in reservoir; Design of Shelter belts and wind breaks.

**Wells and Pumps:**

Testing of well screen; Drilling of a tubewell; Measurement of water level and drawdown in pumped wells; Estimation of aquifer parameters by Thies method, Coopers-Jacob method , Chow method, Theis Recovery method; Well design under confined and unconfined conditions, well losses and well efficiency; Estimating ground water balance; Study of artificial ground water recharge structures; Study of radial flow and mixed flow centrifugal pumps, multistage centrifugal pumps, turbine, propeller and other pumps; Installation of centrifugal pump; Testing of centrifugal pump and study of cavitations; Study of performance characteristics of hydraulic ram; Study and testing of submersible pump.

## **Certificate Level- V**

### **Irrigation**

Land grading exercises; design of underground pipe line system; infiltration-advance in border irrigation; measurement of advance and recession in border irrigation and estimation of irrigation efficiency; measurement of advance and recession in furrow irrigation and estimation of irrigation efficiency; measurement of uniformity coefficient of sprinkler irrigation method; measurement of uniformity coefficient of drip irrigation method; field problems and remedial measures for sprinkler and drip irrigation method.

### **Drainage**

Measurement of hydraulic conductivity and drainable porosity; design of surface drainage systems; design of subsurface drainage systems; determination of chemical properties of soil and water; fabrication of drainage tiles; testing of drainage tiles; determination of gypsum requirement for land reclamation; installation of sub-surface drainage system; cost analysis of surface and sub-surface drainage system.

## **Certificate Level- VI**

### **Watershed Hydrology**

Double mass curve technique; Determination of average depth of rainfall and frequency analysis; Study of stage recorders and current meters; Exercise on estimation of peak runoff rate and runoff volume; Exercises on hydrograph and unit hydrograph; Exercises on design and location of retards for channel improvement; Exercises on flood routing problems

### **Soil and Water Conservation**

Preparation of contour map of an area and its analysis; Design of vegetative waterways; Design of contour bunding system; Design of graded bunding system; Design of various types of bench terracing systems; Determination of rate of sedimentation and storage loss in reservoir; Design of Shelter belts and wind breaks.

### **Wells and Pumps**

Estimation of aquifer parameters by Thies method, Coopers-Jacob method , Chow method, Theis Recovery method; Well design under confined and unconfined conditions, well losses and well efficiency; Estimating ground water balance; Study of artificial ground water recharge structures; Study of radial flow and mixed flow centrifugal pumps, multistage centrifugal pumps, turbine, propeller and other pumps; Installation of centrifugal pump; Testing of centrifugal pump and study of cavitations; Study of performance characteristics of hydraulic ram; Study and testing of submersible pump.

## **Certificate Level- VII**

### **Micro Irrigation Systems**

Study of different types of micro-irrigation systems and components; Field visit of micro-irrigation system; Study of water filtration unit; Discharge measurement study of different micro-irrigation systems; Study of water distribution and uniformity coefficient; Study of wetted front and moisture distribution under various sources of micro-irrigation system; Design of micro-irrigation system for an orchard; Design of micro-irrigation system for row crops design of spray type micro-irrigation system; Design of micro-irrigation system for hilly terraced land; Study of automation in micro-irrigation system; Study of micro climate inside a Polyhouse; Study of maintenance and cleaning of different components of various systems; Design of sprinkler irrigation system; Design of landscape irrigation system

### **Watershed Planning and Management**

Study of watershed characteristic; analysis of hydrologic data for watershed management; Delineation of watershed and measurement of area under different vegetative and topographic conditions; Measurement of water and sediment yield from watershed; Study of different watershed management structures; Study of various water budget parameters; Study of watershed management technologies; Preparation of a techno-economically effective project proposal.

### **Minor Irrigation and Command Area Development (100hrs)**

Topographic survey and preparation of contour map; preparation of command area development layout plan; land leveling design for a field; earthwork and cost estimation; irrigation water requirement of crops; preparation of irrigation schedules; planning and layout of water conveyance system; design of Irrigation systems; conjunctive water use planning; application of remote sensing for command area development; technical Feasibility and economic viability of a command area project. Study tour to minor irrigation and command area development projects.

### **Gulley and Ravine Control Structures**

Determination of flood stage-discharge relationship in a watershed; determination of flood peak-area relationships. Determination of frequency distribution functions for extreme flood values using Gumbel's method; Determination of frequency distribution functions for extreme flood values using log-Pearson Type-III distribution; Determination of confidence limits of the flood peak estimates for Gumbel's extreme value distribution; Determination of probable maximum flood; Standard project flood and spillway design flood; Design of levees for flood control; Design of jetties; Study of vegetative and structural measures for Gulley stabilization; Designing and planning of a flood control project; Cost and benefit analysis of a flood control project.

### **Remote Sensing and GIS Application(150 hrs)**

Familiarization with remote sensing and GIS hardware; use of instruments for aerial photo interpretation; interpretation of aerial photographs and satellite imagery; basic GIS operations such as image display; study the various features of GIS software package; scanning and digitization of maps; data base query and map algebra; GIS supported case studies in water resources management.

**Seminar**

Preparation of presentations using power point and delivering of seminars for developing communication and presentation skills.

**Project**

Planning, execution, presentation and report submission of project related to farm machinery and power



**VOCATIONAL EDUCATIONAL QUALIFICATION FRAMEWORK**  
**(Section-Agriculture -Specialization – Greenhouse Technology)**  
**NVEQF/AGRI/GHT**

S.No.	Certificate Level	Vocational Hours
1.	Level-I	200 hrs
2.	Level-II	250 hrs
3.	Level-III	350 hrs
4.	Level-IV	350 hrs
5.	Level-V	500 hrs
6.	Level-VI	550 hrs
7.	Level-VII	750 hrs

**Certificate Level- I**

**Carpentry shop – I**

- Making of various joints (Also draw the sketches of various wooden joints in the Practical Note Book)
- Cross lap joint
- T -lap joint
- Comer lap joint
- Mortise and tenon joint

Dovetail joint

Fabrication of utility items of farm tools by wood turning lathe

**Fitting and Plumbing Shop – I**

Use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps and dyes etc.)

Making of simple jobs using chipping tools.

Practice of simple operation of hack saw in straight and angular cutting.

Practice of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge

Cutting and filing practice on a square MS flat

Angular cutting practice of 45° (on the above job)

Preparation of stud (to cut external threads) with the help of dies (mm or BSW)

Drilling, counter drilling and internal thread cutting with Taps

Pipe cutting practice and thread cutting on GI Pipe with pipe dies

**Applied Physics**

To find the thickness of wire using a screw gauge

To find volume of solid cylinder and hollow cylinder using a vernier caliper

To determine the thickness of glass strip

To determine the atmospheric pressure at a place using Fortin's Barometer

## **Engineering Drawing – I**

Different types of Lines and Free Hand Sketching

Different types of lines in engineering drawing as per BIS specifications

Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses

## **Food Processing I**

Study of applications of dimensional analysis, Determination of liquid properties

(a) Density (b) Viscosity

Determination of fineness modulus, Determination of uniformity index, Determination of effectiveness of screens, finding the shape and size of cereals, pulses and oil seeds grains and determination of the bulk density of grains and porosity of grain of screens, finding the shape and size of cereals, pulses and oil seeds grains and determination of the bulk density of grains and porosity of grain

## **Certificate Level- II**

### **Engineering Drawing – II**

Practice of various lettering techniques (6 sheets)

### **Surveying and Leveling**

Surveying of the given area using Chain survey method.

### **General Workshop Practice-II**

- **Welding Shop**

Preparation of cap joint by arc welding

Preparation of Tee joint by arc welding

Preparation of single V or double V butt joint by using Electric arc welding

Gas welding practice on worn-out and broken parts

- **Electric Shop**

Wiring practice in batten wiring, plastic casing-capping and conduit

Control of one lamp by one switch

Control of one lamp by two switches

Control of one bell by one switch

Assemble a Tube light

Dismantle, study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler

Laying out of complete wiring of a house (Single-phase and Threephase)

### **Manufacturing Technology – I**

- **Fitting shop**

Bench work and fittings; simple male-female fitting (fitting of pulley, bearings, gears on shafts), scraping, pipe fittings with leakproof joints, checking alignment and centre distance

### **Basics of Electrical Systems - I**

Connection of a three-phase motor and starter with fuses & reversing of direction of rotation

Connection of a single-phase induction motor with supply and reversing direction of rotation

Charging of a lead - acid battery

- **Greenhouse Design & Construction Technology**

Design of different types of greenhouse

Studies on materials of construction of greenhouse

Studies on construction of pipe framed greenhouse

Studies on Greenhouse benches and space management

Studies on repairing, maintenance and operation of greenhouse

Design of modern irrigation techniques i.e. sprinkler and drip irrigation.

## **Certificate Level- III**

### **General Workshop Practice – III**

- Forge a L hook or Ring from MS rod 6 mm  $\diamond$
- Forge a chisel and give an idea of hardening and tempering
- Lap joint with forge welding
- Making sheet metal joints
- Making sheet metal tray or a funnel or a computer chassis
- Preparation of sheet metal jobs involving rolling, shearing, bending and cornering
- Prepare a lap riveting joint of sheet metal pieces

### **Manufacturing Technology – II**

- Pattern making and foundry shop
- To prepare pattern of rectangular block, 'V' block, step pulley with core box, split pattern
- Preparation of open floor mould of solid pattern, cope drag mould using split pattern
- Visit to foundry to see castings of cast iron, steel, non-ferrous materials, hand moulding, machine moulding and melting furnaces. Induction heating and gas fixed furnaces

### **Basics of Electrical systems – II**

- Troubleshooting in domestic wiring system
- Study of a distribution board for domestic installation
- Use of ammeter, voltmeter, wattmeter, energy meter and multi-meter
- Ohm's Law verification
- Verification of law of resistance in series
- Verification of law of resistance in parallel
- Study of different types of fuses
- Practice of earthing and various types of earthing, applications of MCBs and ELCBs

### **Greenhouse Environment Control & Instrumentation**

- Studies on greenhouse cooling systems.
- Studies on greenhouse microclimate parameters and supplemental lighting system
- Design calculation of natural ventilation, fan-pad and fogging system
- Performance evaluation of fan-pad cooling system.
- Studies on Greenhouse environment measuring instruments
- Studies of data logging system
- Studies on greenhouse environmental automation systems.

## **Certificate Level- IV**

### **Communication Skills**

Visit to factory, construction site, modern office, etc.  
and preparing a report on it.

### **Engineering Drawing – III**

- Construction of plain and diagonal scales
- Drawing 3 orthographic views of given objects
- Sketching practice of pictorial views from isometric objects

### **Applied Mechanics**

- Experiments on Moment , Friction & Centre of Gravity , Principle of moment and its applications
- Moment of a force and units of moment, Parallel forces, coefficient of friction, angle of friction, angle of repose, cone of friction
- Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

### **Machine Drawing – II**

- Drawing sheets of Shaft Couplings
- Oldham coupling
- Universal coupling
- Drawing sheets of Bearings
- Bush bearing
- Foot step bearing
- Plummer block
- Self aligning bearing
- Brackets

### **Manufacturing Technology – III**

- Practice of Lathe operations
- Plain turning, facing, centring, parting off, undercutting, taper turning, eccentric turning, drilling, reaming, thread cutting and knurling, speeds and feeds of cut.
- Practice of Shaper operations
- Practical use of Instruments and Gauges:
- Height gauge, depth gauge, bore gauge, slip gauge, sine bar, measurement of taper by use of slip gauges, limits, fits and tolerances, interchangeability, Go and Not-Go gauges, screw thread micrometer, thread gauge, radius gauge, dial gauge, and gear tooth vernier, hardness checking instruments, coating thickness checking instruments, surface finish checking instruments,

## **Greenhouse Irrigation & Plant Nutrition Management**

- studies on different micro irrigation systems
- Design and performance evaluation of drip irrigation system
- Measurement of quality of irrigation water
- Studies on Soil sterilization methods
- Measurement of EC and pH of different root media
- Measurement of properties of different root media
- Studies on Greenhouse fertigation system
- Calculation of fertilizers for preparation of stock solution for different crops
- Studies on different containers
- Studies on Hydroponic/soilless cultivation of crop.

## **Certificate Level- V**

### **Greenhouse Plant Protection Management**

Identification of disease & pests of major greenhouse crops.

- Study of disease-pest management in green house.

### **Greenhouse Agro Techniques & Crop Cultivation**

- On-hand experience & study of greenhouse facilities for flower & vegetable cultivation
- Study of propagation methods under green house.
- Study of lay out for planting of flower & vegetable crop in green house.
- Study of bed preparation and plantation methods in green house
- Study of special horticultural techniques for green house crops.
- Laying out for irrigation system

## **Certificate Level- VI**

### **Green House Design Exercise**

Design of green house, shed house, net house, design and installation of modern irrigation techniques (drip, sprinkler and sheet), design of misting unit, cooling pads and parameters for natural convection and forced convection green house, Control parameters for Carbon dioxide, relative humidity, temperature and air flow rate etc. Crop cultivation practices, hands-on exercise and experiential learning in actual use. Federating farmers into business group.



## **Certificate Level- VII**

### **Post Harvest Technology of Greenhouse Products**

Studies on greenhouse flowers harvesting techniques, Studies on Pre cooling of greenhouse flowers, MAP storage techniques of vegetables, Studies on pretreatments of flowers for storage and transportation, Studies on packaging of greenhouse products and Studies on Drying methodology of flowers and vegetables

### **Seminar**

**VOCATIONAL EDUCATIONAL QUALIFICATION FRAMEWORK**  
**(Sector -Agriculture - Specialization - Renewable Energy)**  
**NVEQF/AGRI/RE**

<b>S.No.</b>	<b>Certificate Level</b>	<b>Vocational Hours</b>
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4.	Level-IV	350 hrs
5.	Level-V	500 hrs
6.	Level-VI	550 hrs
7.	Level-VII	750 hrs

**Certificate Level- I**

**Workshop Practice – I**

**Carpentry shop – I**

Making of various joints (Also draw the sketches of various wooden joints in the Practical Note Book)

- Cross lap joint
- T -lap joint
- Comer lap joint
- Mortise and tenon joint
- Dovetail joint

Fabrication of utility items of farm tools by wood turning lathe

**Fitting and Plumbing Shop – I**

Use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps and dyes etc.)

Making of simple jobs using chipping tools. Practice of simple operation of hack saw in straight and angular cutting. Practice of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge Cutting and filing practice on a square MS flat Angular cutting practice of 45° (on the above job) Preparation of stud (to cut external threads) with the help of dies (mm or BSW) Drilling, counter drilling and internal thread cutting with Taps Pipe cutting practice and thread cutting on GI Pipe with pipe dies

**Applied Physics – I**

To find the thickness of wire using a screw gauge

To find volume of solid cylinder and hollow cylinder using a vernier caliper

To determine the thickness of glass strip

To determine the atmospheric pressure at a place using Fortin's Barometer

## **Engineering Drawing – I**

Different types of Lines and Free Hand Sketching

Different types of lines in engineering drawing as per BIS specifications

Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses

## **Energy and Environment**

Identification of different plant species for energy plantation. Determination of biomass properties such as bulk density, moisture content, volatile solids, ash content, calorific value. Measurement of calorific value of solid, liquid and gaseous fuels. Study of biomass cutter. Study of briquetting machines. Performance evaluation of improved cook stoves. Study on alcohol production from sugar, starch and cellulose.

## **Certificate Level- II**

### **Engineering Drawing – II**

Practice of various lettering techniques (6 sheets)

### **Surveying and Leveling**

Surveying of the given area using Chain survey method.

### **General Workshop Practice-II**

#### **Welding Shop**

Preparation of cap joint by arc welding

Preparation of Tee joint by arc welding

Preparation of single V or double V butt joint by using Electric arc welding

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Control of one lamp by one switch

Control of one lamp by two switches

Control of one bell by one switch

Assemble a Tube light

Dismantle, study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler

Laying out of complete wiring of a house (Single-phase and Three-phase)

### **Manufacturing Technology – I**

#### **Fitting shop**

Bench work and fittings; simple male-female fitting (fitting of pulley, bearings, gears on shafts), scraping, pipe fittings with leakproof joints, checking alignment and centre distance

#### **Basics of Electrical Systems - I**

Connection of a three-phase motor and starter with fuses and reversing of direction of rotation

Connection of a single-phase induction motor with supply and reversing of its direction of rotation

Charging of a lead - acid battery

#### **Natural Resources and their conservation**

Study of natural resources soil, water, air mineral and energy, air pollution, water pollution, land pollution, renewable energy sources, assess potential of renewable energy sources and soil erosion and its causes. Mineral and renewable energy devices etc.

## **Certificate Level- III**

### **General Workshop Practice – III**

Forge a L hook or Ring from MS rod 6 mm  $\diamond$   
Forge a chisel and give an idea of hardening and tempering  
Lap joint with forge welding  
Making sheet metal joints  
Making sheet metal tray or a funnel or a computer chassis  
Preparation of sheet metal jobs involving rolling, shearing, bending and cornering  
Prepare a lap riveting joint of sheet metal pieces

### **Manufacturing Technology – II**

Pattern making and foundry shop  
To prepare pattern of rectangular block, 'V' block, step pulley with core box, split pattern  
Preparation of open floor mould of solid pattern, cope drag mould using split pattern  
Visit to foundry to see castings of cast iron, steel, non-ferrous materials, hand moulding, machine moulding and melting furnaces. Induction heating and gas fixed furnaces

### **Basics of Electrical Systems – II**

Troubleshooting in domestic wiring system  
Study of a distribution board for domestic installation  
Use of ammeter, voltmeter, wattmeter, energy meter and multi-meter  
Ohm's Law verification  
Verification of law of resistance in series  
Verification of law of resistance in parallel  
Study of different types of fuses  
Practice of earthing and various types of earthing, applications of MCBs and ELCBs

## **Farm Power – I**

Identification of various types of diesel engines

Identification of various tools used for dismantling and assembling IC engines

Performing pre-starting checks on engine

Engine dismantling and inspection of various parts, measurements of clearances

Engine assembly and trouble shooting

## **Energy Resources**

Study of energy use pattern and management strategies in various Agro-industries, Assessment of overall energy consumption, production and its cost in selected agro industries, Determination of calorific value of biogas, Analysis of biogas to determine its constituents and Study of Wind Energy Conversion Devices.

## **Certificate Level- IV**

### **Communication Skills**

Visit to factory, construction site, modern office, etc. and preparing a report on it.

### **Engineering Drawing – III**

Construction of plain and diagonal scales Drawing 3 orthographic views of given objects  
Sketching practice of pictorial views from isometric objects

### **Applied Mechanics**

Experiments on Moment , Friction & Centre of Gravity , Principle of moment and its applications Moment of a force and units of moment, Parallel forces, coefficient of friction, angle of friction, angle of repose, cone of friction Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

### **Machine Drawing**

Drawing sheets of Shaft Couplings Oldham coupling Universal coupling Drawing sheets of Bearings Bush bearing Foot step bearing Plummer block Self aligning bearing Brackets

### **Manufacturing Technology–III**

Practice of Lathe operations Plain turning, facing, centring, parting off, undercutting, taper turning, eccentric turning, drilling, reaming, thread cutting and knurling, speeds and feeds of cut. Practice of Shaper operations Practical use of Instruments and Gauges: Height gauge, depth gauge, bore gauge, slip gauge, sine bar, measurement of taper by use of slip gauges, limits, fits and tolerances, interchangeability, Go and Not-Go gauges, screw thread micrometer, thread gauge, radius gauge, dial gauge, and gear tooth vernier, hardness checking instruments, coating thickness checking instruments, surface finish checking instruments.

### **Renewable Energy Devices**

Study of a box type solar cooker, solar steam cooker, solar dryer, solar distillation plant, improved cook stoves, solar furnace, solar water heater, solar PV system and different batteries used in PV system, Performance evaluation of solar PV pumps for lighting power etc.

## **Certificate Level- V**

### **Renewable Energy Technology-I**

Design and construction of box type solar cooker, solar distillation plant, biomass densification i.e. pelletisation, briquetting and cubing machine, direct and indirect solar dryer, KVIC biogas plant, Deenbandhu biogas plant, biomass gasifier, biogas appliances, improved cookstoves, Wind Energy Conversion Devices, solar water heater and solar dryer.

**Case Study related to Techno- economics of Different Renewable Energy devices**



## **Certificate Level- VI**

### **Green Technologies**

Fabrication and evaluation methods of solar cells, study of VI characteristics of solar PV system, Performance evaluation of solar PV pumps for lighting power, study of MHD generation system details, study of thermo ionic power conversion systems, study of different batteries used in PV system and identification the defects in biogas plant and its repair

### **Carbon Credit**

Case study related to CR and CDM

### **Waste Recycling and Resource Recovery System**

Incineration, Bio-methanation, direct combustion and recycling methods

### **Waste Recycling and Resource Recovery System**

Incineration, Bio-methanation, direct combustion and recycling methods

## **Certificate Level- VII**

### **Renewable Energy Devices**

Study of producer gas generators such as open core, throat type for shaft power production and thermal application. Study of incinerator and co-generators for power production. Biodiesel production from different feedstock. Preference of CI engine with biodiesel. Alcohol production methods To repair and maintain of solar cooker , solar water heater, solar PV system and solar dryers etc

### **Energy audit Exercise**

Exercise on walk through, mini audit and maxi audit of farm installations

### **Seminar**

Preparation of presentations using power point and delivering of seminars for developing communication and presentation skills.

### **Project**

Planning, execution, presentation and report submission of project related to farm machinery and power