HORTICULTURE ASSISTANT

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – Agriculture and Allied Services

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

HORTICULTURE ASSISTANT

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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1. ATI ,Ludhiana
2. Deptt.of Farm Machinery & Power Engg. PAU Ludhiana
3. Fruit Science, Deptt. of Horticulture, PAU, Ludhiana

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Co-ordinator for the course: Sh _____.

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
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CONTENTS

1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.

- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

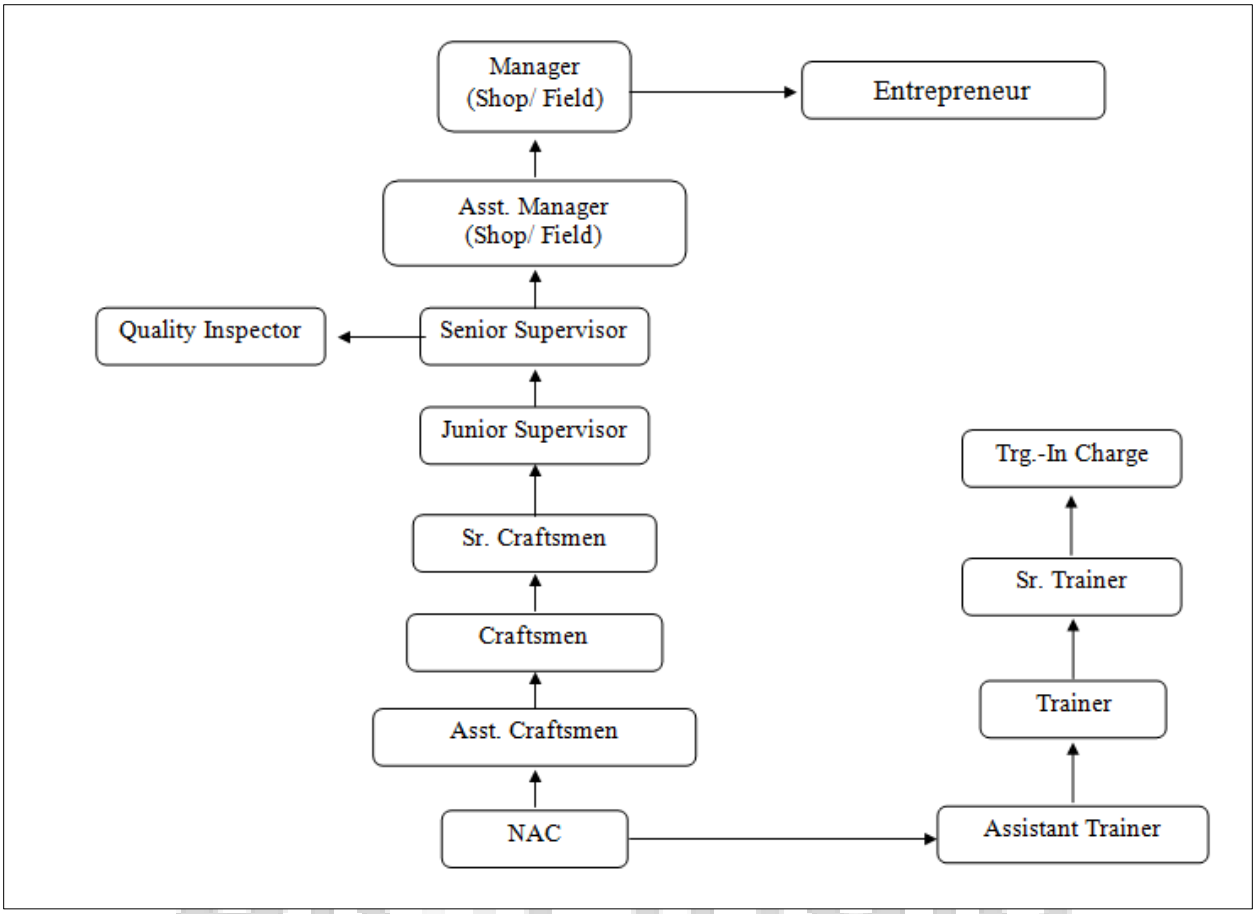
Horticulture Assistant trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Used the work with help of hand tools, machinery in Horticulture.
- Demonstrate the different types of fruit plants, soil requirement, implements and equipment's used and techniques used in Horticulture
- Knowledge of scientific principles, familiarization with horticulture, and basics of fruit nursery production and cultivation of fruit crops.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	**1-3**	**4-12**	**13-15**	**16-24**
Basic Training	**Block– I**	**-----**	**Block – II**	**------**
Practical Training (On - job training)	**----**	**Block – I**	**------**	**Block – II**

A. Basic Training

For 02 yrs. Course (Non-Engg.):- **Total 03 months:** 03 months in 1st yr. only
For 01 yr. Course (Non-Engg):- **Total 03 months:** 03 months in 1st yr.

Sl. No.	Course Element	Total Notional Training Hours
		For 02 yrs. course
1	Professional Skill (Trade Practical)	270
2	Professional Knowledge (Trade Theory)	120
3	Employability Skills	110
	Total (including Internal Assessment)	**500**

B. On-Job Training:-

For 02 yrs. Course (Non-Engg.) :-(**Total: 9 months in 1st yr.+12months in 2nd yr.**)

Notional Training Hours for On-Job Training: 3120 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. Course (Non-Engg.)	500 hrs.	3120 hrs.	3620 hrs.
For 01 yr. Course (Non-Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set

	standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Horticulture Assistant roles as Field Man, Agriculture; Mate Agriculture distributes and controls labour of Agricultural or Horticulture farm and supervises ploughing, sowing, harvesting, etc. under directions of superiors. Checks attendance of labour, Allots work to each worker. Collects seeds, fertilisers and equipment from stores and distributes them to workers. Controls workers engaged in ploughing, manuring, sowing, irrigating, gap filling, harvesting, weeding, threshing, winnowing etc. Collects from workers at close of day all implements distributed to them in morning and deposits them in stores. Reports progress of work to superior and arranges payment of wages by superior. Attends to any other job assigned by superior.

Reference NCO - 2015:

i) 6111.2000 - Field man, Agriculture

4. NSQF LEVEL COMPLIANCE

NSQF level for Horticulture Assistant trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. Professional knowledge,
c. Professional skill,
d. Core skill and
e. Responsibility.

The Broad Learning outcome of Horticulture Assistant trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

LEVEL	Process required	Professional knowledge	Professional skill	Core skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	HORTICULTURE ASSISTANT
NCO - 2015	6111.2000
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	10th Passed
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for basic training	As per related trade of ITI.
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for Horticulture Assistant Apprenticeship	Horticulture

Note:

- *Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Horticulture Assistant course of 02 years duration under ATS.

Block I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, percentage, units, Menstruation, Heat & Temperature, Basic electricity, Material science, Mass, weight ,density]*
3. Select and ascertain measuring instrument and measure dimension of components and record data.
4. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
5. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
7. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Identify the important fruit plants (evergreen and deciduous) with their varieties.
2. Utilize the Horticultural tools and implements and their practical utilization
3. Identify the different farm machinery used in horticulture and their uses
4. Identify of nutritional disorders in Horticultural crops
5. Prepare the herbarium for vegetables, weeds, seasonal flowers, fruit crops
6. Calculate cost of cultivation of Horticultural crops
7. Collect the soil samples separately from each soil layer i.e. for top 15 cm, 15-30 cm, 30-60 cm, 60-90 cm, 90-120 cm, 120-200 cm. Put soil samples in separate clean cloth bags. Label each bag and should be send to soil testing laboratory. Trainee should analysis the soil testing report

8. Plan and Orchard layout: methods of layout: square, rectangular, quincunx, hexagonal, contour, triangular systems, These systems should be demonstrated practically at farmer's field with the help of rope, poles, pegs, cross staff, measuring tape and planting board etc. Layout an orchard with different systems. Significance of wind break/fencing. Layout of

kitchen garden (Vegetables and Fruit crops).

9. Calculate the number of plants per acre according to different methods of layout on the basis of fruit plant. Digging of pits (1 x 1 x 1 m). Preparation of potting mixture, potting, de-potting &repotting of containers, filling of pits.
10. Explain Seed dormancy and methods of breaking seed dormancy: scarification and stratification. Seed and media treatment. Calculation and preparation of growth regulators solution for foliar sprays. Extraction of seeds, procurement of root stocks etc
11. Explain Seed treatments for breaking seed dormancy, soil sterilization (fungicides, sterilizers) and solarization, preparation of potting mixture (FYM, sand, coco peat, vermiculite, perlite), filling of potting mixture, preparation of seed and nursery beds; sowing of seeds on nursery beds, transplanting of seedlings, Preparation of potting mixtures for propagation of plants, role of planting board, methods for layout. Application of manure & fertilizers in Horticultural crops.
12. Layout of drip, sprinkler, check basin, surface and sub surface irrigation methods.
13. Estimate the water and irrigation for Horticultural crops.
14. Maintain the mother trees, collection of scion wood, certification and nursery registration Act.
15. Practice and raise the different types of cuttings methods in the nursery in different Horticultural crops.
16. Practice and raise of different type of layering and budding methods in the nursery in different Horticultural crops.
17. Practice and raise of different types of grafting methods in the nursery in different Horticultural crops.
18. Propagate through corms, runners, suckers etc in different Horticultural crops
19. Uprooting/digging/labeling and packing of nursery plants. Maintenance of nursery and orchard records..
20. Demonstration and application of nutrients, insecticides, weedicides and fungicides in fruit nursery/orchards with spray equipment/pumps. Identification of insects and diseases in fruit crops. Study of IPM model in horticultural crops
21. Training and pruning of evergreen and deciduous fruit crops.
22. Prevent and periodic maintenance of tractor and Implements. Project preparation for establishing commercial orchards.
23. Maturity indices, harvesting, grading, packaging and storage of different fruit crops. Waxing, grading and packing of fruit crops. Ripening techniques in various Horticultural crops. Visit to post harvest Lab, waxing, grading and pack houses in the state.

Block – II

24. Identify the important vegetables seeds/varieties, ornamental trees, shrubs, climbers, palms, seasonal flowers, creepers, indoor plants, foliage plants, grasses, cacti and succulents.
25. Identify the horticultural tools and their practical utilization

26. Identify the farm power machinery and their uses
27. Identify the nutritional disorders in Horticultural crops
28. Identify the Rabi and Kharif weeds.
29. Draw the Layout of special types of gardens, rock garden, preparation of land and planting for lawn and their maintenance. Seed production for seasonal ornamental flowers.
30. Plan and design the garden structures – boundary, hedges, flower beds, flower beds, carpet garden; house garden etc.
31. Practice the flower arrangement, dry flower and bouquet, bonsai creation.
32. Prepare the seed beds, raising of nurseries of different types of seasonal and vegetables crops in trays, seed beds under open and protected conditions. Growing vegetables and flowers under protected cultivation (low tunnel, polyhouse, net house. Protection of horticultural crops against adverse weather conditions.
33. Produce hybrid seeds of chilli, brinjal, tomato and muskmelon. Techniques for selfing and crossing, bagging emaculation, pollen collection and storage, seed extraction, seed plot techniques.
34. Maturity indices, harvesting, grading, packaging and storage of different vegetable crops. Visit to post harvest Lab, waxing, grading and pack houses in the state. Value added products from horticultural crops like jam, pickles, RTS, marmalades, squashes, vinegar, tomato ketch up, sauces, French fries, candies, puree, chutneys etc.
35. Demonstration and application of nutrients, insecticides, weedicides and fungicides in fruit nursery/orchards with spray equipments/pumps. Identification of insects and diseases in fruit crops.
36. Study of IPM model in horticultural crops.
37. Visit to commercial vegetable farms. Intercultural operations in vegetable plots. Seed production in vegetable crops.
38. Prevent and periodic maintenance of tractor and Implements.
39. Sale of raised nurseries of vegetable crops and ornamental seasonal flowers, recording keeping for nurseries etc.

NOTE: Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic electrical and	2.1 Explain concept of basic science related to the field such as work, energy and power, heat & temperature.

apply in day to day work.*[Different mathematical calculation & science -Work, Power & Energy, Algebra &Menstruation, , Heat & Temperature, Material science properties, Mass, weight & density]*	2.2 Calculate mathematical calculation such percentage, unit system, decimal and fractions, algebra and Menstruation
	2.3 Explain concept of material sciences such mass, density and weight.
	2.4 Explain basic concept of electricity.
3. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	3.1 Explain the concept of productivity and quality tools and apply during execution of job.
	3.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	3.3 Knows benefits guaranteed under various acts
4. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	4.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	4.2 Dispose waste following standard procedure.
5. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	5.1 Explain personnel finance and entrepreneurship.
	5.2 Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	5.3 Prepare Project report to become an entrepreneur for submission to financial institutions.
6. Plan and organize the work related to the occupation.	6.1 Use documents, drawings and recognize hazards in the work site.
	6.2 Plan workplace/ assembly location with due consideration to operational stipulation
	6.3 Communicate effectively with others and plan project tasks
	6.4 Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

SPECIFIC OUTCOME
Block-I & II
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I & block – II**(section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skillsand some skill of collecting and organizing information, communication) and **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week no.	PROFESSIONAL SKILL (Trade Practical)	PROFESSIONAL KNOWLEDGE (Trade Theory)
1	Definition, Importance and scope of Horticulture. Classification of fruit crops. Climate zones of Horticulture crops. Selection of site and soil. Soil and water testing for orchards.	Identification of fruits crops.
2	Planning and layout of orchards - different types of layout systems, planting distance in different fruit plants, high density plantation. Digging and filling of pits. Media for nursery production. Raising of virus free fruit plants. Role of growth regulators	Layout of orchards. Identification of horticulture tools. Digging and filling of pits. Soil and water sampling techniques for Horticulture crops Effect of forces on material in such application as extending, bending & shearing.
3	Different types of irrigation systems (Drip, flood, sprinkler, check basin etc.). Nutrition management: chemical composition of different organic and inorganic fertilizers and their application. Fertilization, foliar application of nutrients and role of bio fertilizers in different Horticulture crops. Leaf sampling in different fruit crops. Nutritional deficiencies in horticultural crops	Layout of different irrigation systems in the field. Identification of different fertilizers, application of fertilizers. Leaf sampling techniques and collection of leaf samples for different fruit crops. Identification of nutritional deficiencies symptoms in Horticultural crops
4	Weeds- Introduction, harmful and beneficial effects, characteristics and classification and their application. Type of mulches and their role in Horticulture. Green manuring, inter cropping in horticultural crops. Different types of sprayers and horticultural tools	Identification of weeds and their management. Use of mulches for weed control and moisture conservation
5	Soil sterilization and fumigation; seed treatment: stratification, scarification, preparation of seed and nursery beds, raising of nursery for different horticulture crops, transplanting of seedlings, preparation of potting mixtures for propagation of plants. Potting and re potting. Frost protection measures in Horticultural crops	Practical hands in layout and preparation of seed and nursery beds, sowing of seeds. Stratification of root stocks seeds. Methods of soil sterilization, filling of polybags, preparation of soil mixture

6-7	Sexual and asexual propagation their advantages and disadvantages. Different methods of propagation for Horticulture crops - cutting, layering, grafting, budding, tissue culture etc.	Demonstration of different methods of propagation in Horticulture crops
8	Training and pruning and their importance, Canopy management of Horticultural crops. Rejuvenation techniques for old and senile orchards. Post-harvest management for horticultural crops (Harvesting techniques, maturity indices, storage and ripening techniques; grading and packaging).	Practices of different types of training and pruning methods in the field
9	Major insect-pests and diseases in fruit crops and their control measures	Identification of insect-pests and diseases in Horticultural crops
10-12	Cultivation of different major and minor fruit crops of India (Introduction, origin and distribution, soil and climate requirement, improved cultivars, propagation, planting methods, irrigation and fertilizers, weed management, intercropping, harvesting and handling, storage, insect-pest/disease/disorders).	Identification of different fruit species Definition of work, energy, horse-power, efficiency, mechanical advantage, torque, speed, pressure and volume and their application of units. Torque , powers and their calculations. Calculations on field capacity. Simple calculations on grain moisture measurement relative humidity, wet and dry bulb temperatures.
13	**Assessment /Exam-03 days**	

NOTE: -

More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

BASIC TRAINING (Block – II)

Duration: (03) Three Months

Week no.	PROFESSIONAL SKILL (Trade Practical)	PROFESSIONAL KNOWLEDGE (Trade Theory)
1-2	Scope of vegetable cultivation in India. Importance of vegetables in human nutrition and their role in diversification. Role of soil, climatic and agronomic factors in vegetable and floriculture production. Principles of cultivation including direct sowing, nursery management, transplanting, hardening of seedlings and vegetable forcing. Weeds and their control. Rotation and Inter cropping in vegetable crops.	Identification of important vegetable seeds and plants. Raising of vegetable nurseries. Transplanting of vegetable seedlings in main field. Layout of kitchen garden and its maintenance. Ornamental nursery Preparation nursery beds, weed control, transplanting, raising of nursery in trays, plugs etc
3-4	Introduction to floriculture and landscaping. Planning of gardens. Formal and informal gardens. Use of trees, shrubs, climbers, palms, houseplants and seasonal flowers in the gardens. Making and maintenance of lawns. Training and pruning of rose, pinching disbudding in chrysanthemum etc. Landscaping-art principles.	Identification of trees, shrubs, house plants, seasonal flowers Simple calculation on water requirements, discharge and shape size of open channel. Calculations on suction head and discharge of tube well.
5	Hybrid seed production of chilli, brinjal, tomato and muskmelon. seed plot technique, seed production in flowers	Selfing and crossing techniques, evaluation of hybrids progenies and seed production
6-8	Cultivation of potato, brinjal, chilli, tomato, root crops, cucurbitaceous, leafy vegetables: climate, soil, varieties, sowing, seed rate, method of sowing, diseases and pests, , harvesting and post-harvest handling	-do-
9	Cultivation of shrubs, tree, climbers, cut flowers, annual, pot flowers, rose, gladiolus etc,	Practice on cultivation of shrubs, tree, climbers, cut flowers, annual, pot flowers, rose, gladiolus etc,
10	Harvesting, grading, packaging and post harvest management in vegetables and flowers	Harvesting indices of different vegetable and flowers. Grading and packing of vegetables.

11	Major insect-pests and diseases in vegetables and flowers and their control measures	Identification of major pest-insects and diseases in vegetables and flowers
12	Importance of organic production of vegetable crops; Methods for enhancing soil fertility, mulching, raising green manure crops. Indigenous methods of compost, Panchgavya, Biodynamics preparation etc. -Certification or organic products; organic production and export opportunity and challenges.	Layout for inter cropping, preparation of FYM, vermicompost, biodynamics preparation etc.
13	Assessment /Exam -03 days	

NOTE: -

- *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I (Duration – 55 hrs.)	
1. English Literacy Duration: 20 Hrs.	**Marks : 09**
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy Duration: 20 Hrs.	**Marks : 09**
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.

Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills **Duration: 15 Hrs.**	**Marks : 07**
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude

Block – II **Duration – 55 hrs.**	
4. Entrepreneurship Skills **Duration: 15 Hrs.** **Marks : 06**	
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes& procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity **Duration: 10 Hrs.** **Marks : 05**	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education **Duration: 15 Hrs.** **Marks : 06**	
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment.

	Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in -house environment.
7. Labour Welfare Legislation **Duration: 05 Hrs.** **Marks : 03**	
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools **Duration: 10 Hrs.** **Marks : 05**	
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block – I (On-the-Job Training) (9 Months)

1. Identify the important fruit plants (evergreen and deciduous) with their varieties.
2. Utilize the Horticultural tools and implements and their practical utilization
3. Identify the different farm machinery used in horticulture and their uses
4. Identify of nutritional disorders in Horticultural crops
5. Prepare the herbarium for vegetables, weeds, seasonal flowers, fruit crops
6. Calculate cost of cultivation of Horticultural crops
7. Collect the soil samples separately from each soil layer i.e. for top 15 cm, 15-30 cm, 30-60 cm, 60-90 cm, 90-120 cm, 120-200 cm. Put soil samples in separate clean cloth bags. Label each bag and should be send to soil testing laboratory. Trainee should analysis the soil testing report
8. Plan and Orchard layout: methods of layout: square, rectangular, quincunx, hexagonal, contour, triangular systems, These systems should be demonstrated practically at farmer's field with the help of rope, poles, pegs, cross staff, measuring tape and planting board etc. Layout an orchard with different systems. Significance of wind break/fencing. Layout of kitchen garden (Vegetables and Fruit crops).
9. Calculate the number of plants per acre according to different methods of layout on the basis of fruit plant. Digging of pits (1 x 1 x 1 m). Preparation of potting mixture, potting, de-potting & reporting of containers, filling of pits.
10. Explain Seed dormancy and methods of breaking seed dormancy: scarification and stratification. Seed and media treatment. Calculation and preparation of growth regulators solution for foliar sprays. Extraction of seeds, procurement of root stocks etc
11. Explain Seed treatments for breaking seed dormancy, soil sterilization (fungicides, sterilizers) and solarization, preparation of potting mixture (FYM, sand, coco peat, vermiculite, perlite), filling of potting mixture, preparation of seed and nursery beds; sowing of seeds on nursery beds, transplanting of seedlings, Preparation of potting mixtures for propagation of plants, role of planting board, methods for layout. Application of manure & fertilizers in Horticultural crops.
12. Layout of drip, sprinkler, check basin, surface and sub surface irrigation methods.
13. Estimate the water and irrigation for Horticultural crops.
14. Maintain the mother trees, collection of scion wood, certification and nursery registration Act.
15. Practice and raise the different types of cuttings methods in the nursery in different Horticultural crops.

16. Practice and raise of different type of layering and budding methods in the nursery in different Horticultural crops.
17. Practice and raise of different types of grafting methods in the nursery in different Horticultural crops.
18. Propagate through corms, runners, suckers etc in different Horticultural crops
19. Uprooting/digging/labeling and packing of nursery plants. Maintenance of nursery and orchard records..
20. Demonstration and application of nutrients, insecticides, weedicides and fungicides in fruit nursery/orchards with spray equipment/pumps. Identification of insects and diseases in fruit crops. Study of IPM model in horticultural crops
21. Training and pruning of evergreen and deciduous fruit crops.
22. Prevent and periodic maintenance of tractor and Implements. Project preparation for establishing commercial orchards.
23. Maturity indices, harvesting, grading, packaging and storage of different fruit crops. Waxing, grading and packing of fruit crops. Ripening techniques in various Horticultural crops. Visit to post harvest Lab, waxing, grading and pack houses in the state.

Block – II (On-the-Job Training) (9 Months)

24. Identify the important vegetables seeds/varieties, ornamental trees, shrubs, climbers, palms, seasonal flowers, creepers, indoor plants, foliage plants, grasses, cacti and succulents.
25. Identify the horticultural tools and their practical utilization
26. Identify the farm power machinery and their uses
27. Identify the nutritional disorders in Horticultural crops
28. Identify the Rabi and Kharif weeds.
29. Draw the Layout of special types of gardens, rock garden, preparation of land and planting for lawn and their maintenance. Seed production for seasonal ornamental flowers.
30. Plan and design the garden structures – boundary, hedges, flower beds, flower beds, carpet garden; house garden etc.
31. Practice the flower arrangement, dry flower and bouquet, bonsai creation.
32. Prepare the seed beds, raising of nurseries of different types of seasonal and vegetables crops in trays, seed beds under open and protected conditions. Growing vegetables and flowers under protected cultivation (low tunnel, polyhouse, net house. Protection of horticultural crops against adverse weather conditions.
33. Produce hybrid seeds of chilli, brinjal, tomato and muskmelon. Techniques for selfing and crossing, bagging emaculation, pollen collection and storage, seed extraction, seed plot techniques.
34. Maturity indices, harvesting, grading, packaging and storage of different vegetable crops. Visit to post harvest Lab, waxing, grading and pack houses in the state. Value added

products from horticultural crops like jam, pickles, RTS, marmalades, squashes, vinegar, tomato ketch up, sauces, French fries, candies, puree, chutneys etc.

40. Demonstration and application of nutrients, insecticides, weedicides and fungicides in fruit nursery/orchards with spray equipments/pumps. Identification of insects and diseases in fruit crops.
41. Study of IPM model in horticultural crops.
42. Visit to commercial vegetable farms. Intercultural operations in vegetable plots. Seed production in vegetable crops.
43. Prevent and periodic maintenance of tractor and Implements.
44. Sale of raised nurseries of vegetable crops and ornamental seasonal flowers, recording keeping for nurseries etc.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.

2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE-I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

HORTICULTURE ASSISTANT

LIST OF TOOLS AND EQUIPMENT for Basic Training

A. TRAINEES TOOL KIT

Sl. no.	Name of the Tool &Equipments	Specification	Quantity
1.	Apron		20
2.	Zindra		05
3.	Spade		20
4.	Sickle		20
5.	Khurpa		20
6.	Kasola		20
7.	Trifali		20
8.	Wheel hand hoe		05
9.	Dori (nylon rope)		100 m
10.	Measuring tape		04
11.	Horticultural tool kit		02
12.	Shovel		01
13.	Ladders		02
14.	Power pruner		01
15.	Secateurs		20
16.	Girdling knife		02
17.	Plant lifter		04
18.	Pruning saw		20
19.	Tree pruner		04
20.	Budding knives		20
21.	Planting board		01
22.	Rakes		05
23.	Watering Can		05
24.	Plastic irrigation pipes		200 m
B. TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS			
25.	pH meter		02
26.	Electrical conductivity meter		02
27.	Sieves		10
28.	Ordinary physical balance		02
29.	Sampling tools (augers)		05

C. GENERAL INSTALLATION/MACHINERY			
30.	Orchard tractor		01
31.	Seed cum fertilizer drill		01
32.	Manual seed drill		01
33.	Manual multi crop planter		01
34.	Bed planter		01
35.	Ridger		01
36.	Tractor		01
37.	Cultivator		01
38.	Disc harrow		01
39.	Planker		01
40.	Kanapsack sprayer		05
41.	Foot operated sprayer		02
42.	Drip irrigation system		01
43.	Sprinkler system		01
44.	Harvesting tools		01
45.	Post hole digger		01
46.	Tractor Power mounted sprayer		01
47.	Field for raising Horticultural crops		3.0 to 5.0 acres
48.	Diesel engine (Running condition) Stationary type with generator set 4 Cylinder.		1
49.	Multi Scan Tool with oscilloscope		1
50.	Working Condition of Diesel Engine – CRDI - 4 stroke Engine Assembly with fault simulation board (vehicular model)		1
51.	Drilling machine (general purpose)		1
52.	Fuel Injection pump Test bench (in-line and Rotary pumps)		1
53.	Fuel Injection pump Test bench (CRDI)		1
D. LIST OF CONSUMABLE			
54.	Seeds/ orchard plants (different Rabi and Kharif crops)		As per requirement
55.	Fertilizers (FYM, Urea,DAP,SSP,MOPetc)		-do-
56.	Spraying chemicals		-do-
E. WORKSHOP FURNITURE			
57.	Computer Chair		1+1
58.	Computer Table		1+1
59.	Desktop computer and related MS office software		1+1
60.	Fire Extinguishers, first- aid box		One each
61.	Internet connection with all accessories		As required
62.	Laser printer		1

63.	LCD projector/ LED /LCD TV (42")		1
64.	Stools		20
65.	Suitable class room furniture		As required
66.	Suitable Work Tables with vices		As required
67.	Trainees locker 6½ ' x 3' x 1½'		2 Nos. to accommodate 20 Lockers
F. FURNITURE REQUIRED			
68.	Drawing Board		20
69.	Models : Solid & cut section		as required
70.	Drawing Table for trainees		as required
71.	Stool for trainees		as required
72.	Cupboard (big)		01
73.	White Board (size: 8ft. x 4ft.)		01
74.	Trainer's Table		01
75.	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														