Qualification Pack

Professional in Gardening and Nursery Management

QP Code: AGR/Q0815

Version: 1.0

NSQF Level: 4.5

Agriculture Skill Council of India || 6th Floor, GNG Tower, Plot No. 10, Sector -44, Gurgaon Haryana-122004 || email:priyanka@asci-india.com

Contents

Qualification Pack

AGR/Q0815: Professional in Gardening and Nursery Management

Brief Job Description

This is a specialized education, designed to develop or strengthen specific career skills in gardening, nursery and horticulture trades. This course is designed to provide participants/students with the skills and knowledge they need to work in a variety of gardening-related occupations, such as Gardener, Landscaper, Nursery manager/worker, Green/Poly house manager, etc.

Personal Attributes

The individual should be physically fit to work for long durations. The person should be able to work independently and have decision-making and problem-solving skills. The individual should have basic written and verbal communication skills.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. AGR/N0801: Raise saplings in the nursery for transplanting in the garden
2. AGR/N0820: Raise, maintain, transplant and harvest seedlings
3. AGR/N0821: Assist in managing plant health and nursery operations
4. AGR/N0802: Prepare to set up the garden
5. AGR/N0803: Set up the garden as per the plan
6. AGR/N0843: Design, set up and maintain a rooftop garden
7. AGR/N0847: Carry out vertical gardening
8. AGR/N0848: Grow a bonsai tree
9. AGR/N1008: Carry out greenhouse operations and maintain the greenhouse
10. AGR/N0822: Set up and maintain the hydroponic system and plants/ crop
11. AGR/N0846: Set up and maintain the aeroponic farm
12. AGR/N0823: Carry out harvesting, post-harvest management and marketing activities
13. AGR/N8102: Prepare for plant tissue culture
14. AGR/N8103: Carry out plant tissue culture
15. AGR/N8115: Transplant the tissue cultured plants and maintain records

16. AGR/N1011: Set up and maintain nursery under protected condition
17. AGR/N1013: Carry out protected cultivation of flower crops
18. AGR/N9908: Undertake basic entrepreneurial activities for small enterprise
19. AGR/N9903: Maintain health and safety at the workplace
20. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening and Urban Farming
Country	India
NSQF Level	4.5
Credits	40
Aligned to NCO/ISCO/ISIC Code	NCO-2015/6113.9900
Minimum Educational Qualification & Experience	12th grade Pass (or equivalent)
Minimum Level of Education for Training in School	Not Applicable
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	31/08/2026
NSQC Approval Date	31/08/2023
Version	1.0
Reference code on NQR	QG-4.5-AG-00777-2023-V1-ASCI
NQR Version	1

AGR/N0801: Raise saplings in the nursery for transplanting in the garden

Description

This OS unit is about propagating plants in a nursery using a variety of propagation methods.

Scope

The scope covers the following :

- Prepare for nursery operations
- Prepare the nursery bed
- Propagate saplings through seeds
- Propagate plants through cutting, root division, layering and budding

Elements and Performance Criteria

Prepare for nursery operations

To be competent, the user/individual on the job must be able to:

PC1. select the relevant varieties of plants to grow in the garden as per the season and client preferences

PC2. arrange the plant seeds, fertilizer, insecticides/ pesticides and poly bags/ containers to raise saplings

PC3. ensure the availability of water and electricity for nursery operations

PC4. organise the necessary tools, implements and Personal Protective Equipment (PPE) for nursery operations

PC5. construct the shade net house, store-room, compost area, etc.

PC6. erect framed structures such as poly-tunnels, hardening chamber, mist chamber for plant propagation

PC7. prepare farmyard manure or compost as per the Standard Operating Procedure (SOP)

PC8. conduct a soil test to identify the soil treatment requirements

PC9. apply the necessary treatment on the soil as per the requirement

Prepare the nursery bed

To be competent, the user/individual on the job must be able to:

PC10. dry plough the nursery field as required

PC11. apply fertilizers, farmyard manure or compost uniformly on the field in the recommended quantity

PC12. water the field with the recommended quantity of water

PC13. puddle the field for the recommended duration of time

PC14. level the field using an appropriate implement

Propagate saplings through seeds

To be competent, the user/individual on the job must be able to:

PC15. sort out the poor-quality/ damaged seeds

PC16. fill in the poly bags and containers with the recommended quantity of treated soil

PC17. carry out pre-sowing treatment of the seeds
PC18. create raised, level or sunken seedbed according to the local conditions
PC19. sow seeds in the seedbed, poly bags and containers at the recommended depth
PC20. apply the recommended quantity of water and manure/ fertilizer on the sown seeds as per the SOP
PC21. maintain saplings in the seedbed/ poly bags/ containers for the recommended period
PC22. acclimatise the saplings before transplanting

Propagate plants through cutting, root division, layering and budding

To be competent, the user/individual on the job must be able to:

PC23. select a healthy plant to take cutting from
PC24. extract stems of the recommended specifications from the plant
PC25. use the stems to propagate plants maintaining the required level of moisture and sunlight exposure
PC26. select a healthy and grown plant for root division
PC27. create root divisions from the plant's root
PC28. use the root divisions to propagate plants maintaining the recommended environment
PC29. select an appropriate method of layering according to the type of plant
PC30. cover the stem / tip / trunk of the plant with soil according to the selected method
PC31. apply the recommended quantity of water and fertilizer to support the growth of roots
PC32. prepare a rootstock for budding
PC33. cut a bud-stick from a healthy and disease-free plant with the required characteristics
PC34. prepare and use bud-scion to propagate plants
PC35. apply the approved pesticides/ insecticides to protect the plants from pests and diseases
PC36. maintain the record of nursery operations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. applicable record-keeping requirements in the job role
KU2. resources required for setting up a nursery
KU3. construction of the nursery infrastructure such as shade net house, store-room, compost area, etc.
KU4. how to erect and use poly-tunnels, hardening chamber, mist chamber, etc.
KU5. propagation of plants using seeds
KU6. different methods of plant propagation such as root division, seeding, cutting, layering, etc.
KU7. how to conduct a soil test to identify soil treatment requirements
KU8. types of seedbed such as raised/ level/ sunken
KU9. the process of preparing a nursery bed and seedbed
KU10. variety of material required for propagating plants in a nursery
KU11. relevant tools and equipment and their correct use

KU12. safe use of fertilizers, pesticides and insecticides
KU13. water requirements of different types of saplings

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related records
GS2. read and follow the health and safety instructions
GS3. listen attentively to understand the information/ instructions being shared by the speaker
GS4. communicate clearly and politely with co-workers and clients
GS5. plan and prioritise tasks to ensure timely completion
GS6. identify possible disruptions to work and take appropriate preventive measures
GS7. take quick decisions to deal with workplace emergencies/ accidents
GS8. evaluate all possible solutions to a problem to select the best one
GS9. co-ordinate with the co-workers to achieve the work objectives

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for nursery operations	**6**	**8**	**-**	**8**
PC1. select the relevant varieties of plants to grow in the garden as per the season and client preferences	-	-	-	-
PC2. arrange the plant seeds, fertilizer, insecticides/ pesticides and poly bags/ containers to raise saplings	-	-	-	-
PC3. ensure the availability of water and electricity for nursery operations	-	-	-	-
PC4. organise the necessary tools, implements and Personal Protective Equipment (PPE) for nursery operations	-	-	-	-
PC5. construct the shade net house, store-room, compost area, etc.	-	-	-	-
PC6. erect framed structures such as poly-tunnels, hardening chamber, mist chamber for plant propagation	-	-	-	-
PC7. prepare farmyard manure or compost as per the Standard Operating Procedure (SOP)	-	-	-	-
PC8. conduct a soil test to identify the soil treatment requirements	-	-	-	-
PC9. apply the necessary treatment on the soil as per the requirement	-	-	-	-
Prepare the nursery bed	**8**	**12**	**-**	**8**
PC10. dry plough the nursery field as required	-	-	-	-
PC11. apply fertilizers, farmyard manure or compost uniformly on the field in the recommended quantity	-	-	-	-
PC12. water the field with the recommended quantity of water	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. puddle the field for the recommended duration of time	-	-	-	-
PC14. level the field using an appropriate implement	-	-	-	-
Propagate saplings through seeds	**8**	**10**	**-**	**8**
PC15. sort out the poor-quality/ damaged seeds	-	-	-	-
PC16. fill in the poly bags and containers with the recommended quantity of treated soil	-	-	-	-
PC17. carry out pre-sowing treatment of the seeds	-	-	-	-
PC18. create raised, level or sunken seedbed according to the local conditions	-	-	-	-
PC19. sow seeds in the seedbed, poly bags and containers at the recommended depth	-	-	-	-
PC20. apply the recommended quantity of water and manure/ fertilizer on the sown seeds as per the SOP	-	-	-	-
PC21. maintain saplings in the seedbed/ poly bags/ containers for the recommended period	-	-	-	-
PC22. acclimatise the saplings before transplanting	-	-	-	-
Propagate plants through cutting, root division, layering and budding	**8**	**10**	**-**	**6**
PC23. select a healthy plant to take cutting from	-	-	-	-
PC24. extract stems of the recommended specifications from the plant	-	-	-	-
PC25. use the stems to propagate plants maintaining the required level of moisture and sunlight exposure	-	-	-	-
PC26. select a healthy and grown plant for root division	-	-	-	-
PC27. create root divisions from the plant's root	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC28. use the root divisions to propagate plants maintaining the recommended environment	-	-	-	-
PC29. select an appropriate method of layering according to the type of plant	-	-	-	-
PC30. cover the stem / tip / trunk of the plant with soil according to the selected method	-	-	-	-
PC31. apply the recommended quantity of water and fertilizer to support the growth of roots	-	-	-	-
PC32. prepare a rootstock for budding	-	-	-	-
PC33. cut a bud-stick from a healthy and disease-free plant with the required characteristics	-	-	-	-
PC34. prepare and use bud-scion to propagate plants	-	-	-	-
PC35. apply the approved pesticides/ insecticides to protect the plants from pests and diseases	-	-	-	-
PC36. maintain the record of nursery operations	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0801
NOS Name	Raise saplings in the nursery for transplanting in the garden
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening & Urban Farming
NSQF Level	4
Credits	3
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0820: Raise, maintain, transplant and harvest seedlings

Description

This OS unit is about preparing for and raising seedlings in a nursery along with their transplantation.

Scope

The scope covers the following :

- Prepare to raise seedlings
- Raise seedlings for transplantation
- Carry out harvesting and post-harvesting activities
- Transplant the seedlings

Elements and Performance Criteria

Prepare to raise seedlings

To be competent, the user/individual on the job must be able to:

PC1. identify the plants and their varieties to be grown according to the season

PC2. obtain the seeds of the relevant varieties, fertilizer and other inputs such as poly bags and containers from an authorised seller

PC3. sort out the seeds of poor quality

PC4. store all the inputs in a safe storage area

PC5. organise the necessary tools, implements and Personal Protective Equipment (PPE) for nursery operations

Raise seedlings for transplantation

To be competent, the user/individual on the job must be able to:

PC6. prepare the correct mixture of soil and manure/ fertilizer

PC7. prepare the containers/ poly bags/ germination beds of the appropriate size for planting seeds

PC8. fill in the containers/ poly bags with the prepared soil

PC9. plant seeds in containers/ poly bags/ germination beds at the depth recommended for the seed variety

PC10. water the planted seeds as per the recommended quantity

PC11. maintain an appropriate level of moisture and temperature to aid germination of seeds

PC12. apply the recommended quantity of fertilizers and insecticides on seedlings while protecting them from damage

PC13. arrange for protection of seedlings from excessive heat/ cold and strong winds

PC14. store the seedlings in an area with good air circulation

PC15. remove dead and unhealthy seedlings as per the Standard Operating Procedure (SOP)

PC16. maintain seedlings until they are ready to be transplanted

Carry out harvesting and post-harvesting activities

To be competent, the user/individual on the job must be able to:

PC17. harvest seedlings at their appropriate stage of growth
PC18. pot the seedlings and label them
PC19. dip the cut flowers into a disinfectant appropriately
PC20. count the cut flowers into bunches
PC21. pack the flowers appropriately in cardboard boxes for being transported

Transplant the seedlings

To be competent, the user/individual on the job must be able to:

PC22. prepare the appropriate type of nursery bed such as sunken bed, level bed, raised bed for transplantation of seedlings
PC23. check that the soil is well-fertilized and aerated
PC24. create holes of the recommended dimensions in the soil
PC25. retrieve the seedlings from containers/ poly bags while protecting them from damage
PC26. plant the seedlings in the holes and fill them with soil
PC27. apply mulch or compost around the seedlings
PC28. water the transplanted seedlings as per the recommended quantity
PC29. maintain the record of seedlings transplanted in the nursery

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. applicable record-keeping requirements
KU2. correct use of the relevant nursery tools, implements and PPE
KU3. various inputs required in nursery operations such as different types of fertilizers, pesticides, containers, poly bags, etc.
KU4. safe storage of planting material
KU5. preparation of the germination bed and correct mixture of soil and manure/ fertilizer
KU6. the depth recommended for planting different varieties of plant seeds in containers/ poly bags/ germination beds
KU7. various inputs required in nursery operations such as different types of fertilizers, pesticides, containers, poly bags, etc.
KU8. the appropriate level of moisture and temperature to aid germination of seeds
KU9. the recommended quantity and correct way of applying insecticides/ pesticides on seedlings
KU10. different practices to protect seedlings from excessive heat/ cold and strong winds
KU11. conditions required for the healthy growth of seedlings
KU12. various inputs required in nursery operations such as different types of fertilizers, pesticides, containers, poly bags, etc.
KU13. preparation of soil and nursery bed for transplanting seedlings
KU14. the correct method of harvesting and transplanting seedlings
KU15. post-harvest processing of flowers

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write work-related notes and records
GS2. read the relevant literature to get information about new developments in the field of work
GS3. communicate politely and professionally
GS4. listen attentively and comprehend the information given by the speaker
GS5. identify possible disruptions to work and take preventive measures
GS6. evaluate all possible solutions to a problem to select the best solution
GS7. plan and prioritise tasks to ensure timely completion
GS8. co-ordinate with the co-workers to achieve the work objectives

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare to raise seedlings	**5**	**10**	**-**	**10**
PC1. identify the plants and their varieties to be grown according to the season	-	-	-	-
PC2. obtain the seeds of the relevant varieties, fertilizer and other inputs such as poly bags and containers from an authorised seller	-	-	-	-
PC3. sort out the seeds of poor quality	-	-	-	-
PC4. store all the inputs in a safe storage area	-	-	-	-
PC5. organise the necessary tools, implements and Personal Protective Equipment (PPE) for nursery operations	-	-	-	-
Raise seedlings for transplantation	**10**	**10**	**-**	**5**
PC6. prepare the correct mixture of soil and manure/ fertilizer	-	-	-	-
PC7. prepare the containers/ poly bags/ germination beds of the appropriate size for planting seeds	-	-	-	-
PC8. fill in the containers/ poly bags with the prepared soil	-	-	-	-
PC9. plant seeds in containers/ poly bags/ germination beds at the depth recommended for the seed variety	-	-	-	-
PC10. water the planted seeds as per the recommended quantity	-	-	-	-
PC11. maintain an appropriate level of moisture and temperature to aid germination of seeds	-	-	-	-
PC12. apply the recommended quantity of fertilizers and insecticides on seedlings while protecting them from damage	-	-	-	-
PC13. arrange for protection of seedlings from excessive heat/ cold and strong winds	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. store the seedlings in an area with good air circulation	-	-	-	-
PC15. remove dead and unhealthy seedlings as per the Standard Operating Procedure (SOP)	-	-	-	-
PC16. maintain seedlings until they are ready to be transplanted	-	-	-	-
Carry out harvesting and post-harvesting activities	**10**	**10**	**-**	**5**
PC17. harvest seedlings at their appropriate stage of growth	-	-	-	-
PC18. pot the seedlings and label them	-	-	-	-
PC19. dip the cut flowers into a disinfectant appropriately	-	-	-	-
PC20. count the cut flowers into bunches	-	-	-	-
PC21. pack the flowers appropriately in cardboard boxes for being transported	-	-	-	-
Transplant the seedlings	**5**	**10**	**-**	**10**
PC22. prepare the appropriate type of nursery bed such as sunken bed, level bed, raised bed for transplantation of seedlings	-	-	-	-
PC23. check that the soil is well-fertilized and aerated	-	-	-	-
PC24. create holes of the recommended dimensions in the soil	-	-	-	-
PC25. retrieve the seedlings from containers/ poly bags while protecting them from damage	-	-	-	-
PC26. plant the seedlings in the holes and fill them with soil	-	-	-	-
PC27. apply mulch or compost around the seedlings	-	-	-	-
PC28. water the transplanted seedlings as per the recommended quantity	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC29. maintain the record of seedlings transplanted in the nursery	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0820
NOS Name	Raise, maintain, transplant and harvest seedlings
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, gardening and urban farming
NSQF Level	3
Credits	2
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0821: Assist in managing plant health and nursery operations

Description

This OS unit is about monitoring plant health and performing general upkeep of the nursery

Scope

The scope covers the following :

- Manage the nutrient requirements of plants
- Protect plants from pests and diseases
- Assist in managing nursery operations
- Optimise resource utilisation
- Maintain effective communication and co-ordination at work

Elements and Performance Criteria

Manage the nutrient requirements of plants

To be competent, the user/individual on the job must be able to:

PC1. identify the nutrient requirements of different types of plants in the nursery

PC2. use the appropriate growth medium for the plants such as loamy soil mixed with sand, peat, sawdust etc.

PC3. apply the appropriate plant growth regulators such as absicisic acid, gibberellins, cytokinins, ethylene using the recommended application method

PC4. apply fertilizers and water on the plants with the recommended quantity at appropriate intervals

PC5. carry out trimming and pruning of the plants as per the instructions received

PC6. monitor the growth of plants as per the SOP

Protect plants from pests and diseases

To be competent, the user/individual on the job must be able to:

PC7. identify the pests and diseases that may affect the nursery plants

PC8. implement the relevant preventive measures to control pests and diseases

PC9. examine the plants regularly to identify any disease and pest infestation

PC10. apply the relevant treatment to free the plants from the identified pests/ diseases

PC11. maintain the record of the insecticides/ pesticides used on plants

Assist in managing nursery operations

To be competent, the user/individual on the job must be able to:

PC12. maintain the cleanliness of nursery infrastructure

PC13. remove the sources of mosquito breeding

PC14. monitor water drainage in the nursery

PC15. carry out treatment of waste water as per instructions from the supervisor

PC16. use the nursery waste material for composting/ vermi-composting

PC17. follow the planting and maintenance schedules
PC18. carry out basic repair and maintenance of the nursery infrastructure, tools and implements
PC19. manage the stock of nursery operation inputs
PC20. sell the raised seedlings/ plants to customers
PC21. maintain various records such as use of plant growth regulators/ fertilizers/ pesticides, plant growth, sales and payments

Optimise resource utilisation

To be competent, the user/individual on the job must be able to:

PC22. optimise usage of water/ electricity/ energy in various tasks/ activities/ processes
PC23. connect electrical tools and equipment safely and turn off when not in use
PC24. segregate waste into different categories
PC25. dispose the non-recyclable waste appropriately
PC26. deposit the recyclable and reusable material at the identified location

Maintain effective communication and co-ordination at work

To be competent, the user/individual on the job must be able to:

PC27. co-ordinate with co-workers to achieve organisational goals and deal with emergencies/accidents
PC28. maintain work-related information in the prescribed format
PC29. report out of authority issues to the supervisor

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant documentation and record-keeping requirements
KU2. importance of customer-centric approach and customer-service skills
KU3. various plant health and pest/ disease management practices
KU4. different types of plant growth regulators and their correct use
KU5. basic repair and maintenance process of nursery infrastructure
KU6. importance of following environmental and ecological best practices to minimise the impact on the environment
KU7. benefits and methods of resource optimisation
KU8. ways of efficiently managing various materials used in greenhouse operations
KU9. common practices of conserving electricity
KU10. different methods of recycling and disposing waste
KU11. common sources of pollution and ways to minimise it
KU12. procedure for seeking guidance and work-related information and clarification
KU13. available means of communication at the workplace
KU14. importance of information sharing

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. note the information communicated
GS2. read and understand the relevant guides and manuals
GS3. communicate politely and professionally
GS4. listen attentively to understand the information/ instructions being shared
GS5. take quick decision to deal with work-related emergencies/ accidents
GS6. plan and prioritise tasks for effective time-management
GS7. listen attentively to understand the information/ instructions being shared

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Manage the nutrient requirements of plants	**4**	**8**	**-**	**4**
PC1. identify the nutrient requirements of different types of plants in the nursery	-	-	-	-
PC2. use the appropriate growth medium for the plants such as loamy soil mixed with sand, peat, sawdust etc.	-	-	-	-
PC3. apply the appropriate plant growth regulators such as absicisic acid, gibberellins, cytokinins, ethylene using the recommended application method	-	-	-	-
PC4. apply fertilizers and water on the plants with the recommended quantity at appropriate intervals	-	-	-	-
PC5. carry out trimming and pruning of the plants as per the instructions received	-	-	-	-
PC6. monitor the growth of plants as per the SOP	-	-	-	-
Protect plants from pests and diseases	**6**	**10**	**-**	**10**
PC7. identify the pests and diseases that may affect the nursery plants	-	-	-	-
PC8. implement the relevant preventive measures to control pests and diseases	-	-	-	-
PC9. examine the plants regularly to identify any disease and pest infestation	-	-	-	-
PC10. apply the relevant treatment to free the plants from the identified pests/ diseases	-	-	-	-
PC11. maintain the record of the insecticides/ pesticides used on plants	-	-	-	-
Assist in managing nursery operations	**6**	**10**	**-**	**10**
PC12. maintain the cleanliness of nursery infrastructure	-	-	-	-
PC13. remove the sources of mosquito breeding	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. monitor water drainage in the nursery	-	-	-	-
PC15. carry out treatment of waste water as per instructions from the supervisor	-	-	-	-
PC16. use the nursery waste material for composting/ vermi-composting	-	-	-	-
PC17. follow the planting and maintenance schedules	-	-	-	-
PC18. carry out basic repair and maintenance of the nursery infrastructure, tools and implements	-	-	-	-
PC19. manage the stock of nursery operation inputs	-	-	-	-
PC20. sell the raised seedlings/ plants to customers	-	-	-	-
PC21. maintain various records such as use of plant growth regulators/ fertilizers/ pesticides, plant growth, sales and payments	-	-	-	-
Optimise resource utilisation	**6**	**6**	**-**	**2**
PC22. optimise usage of water/ electricity/ energy in various tasks/ activities/ processes	-	-	-	-
PC23. connect electrical tools and equipment safely and turn off when not in use	-	-	-	-
PC24. segregate waste into different categories	-	-	-	-
PC25. dispose the non-recyclable waste appropriately	-	-	-	-
PC26. deposit the recyclable and reusable material at the identified location	-	-	-	-
Maintain effective communication and co-ordination at work	**8**	**6**	**-**	**4**
PC27. co-ordinate with co-workers to achieve organisational goals and deal with emergencies/accidents	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC28. maintain work-related information in the prescribed format	-	-	-	-
PC29. report out of authority issues to the supervisor	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0821
NOS Name	Assist in managing plant health and nursery operations
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, gardening and urban farming
NSQF Level	3
Credits	1
Version	3.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0802: Prepare to set up the garden

Description

This OS unit is about conducting a site survey to plan a garden and arranging the relevant material to plant the garden.

Scope

The scope covers the following :

- Plan to set up the garden
- Arrange the necessary resources

Elements and Performance Criteria

Plan to set up the garden

To be competent, the user/individual on the job must be able to:

PC1. conduct a survey of the site proposed for setting up the garden

PC2. assess the soil and climate characteristics at the site to establish suitability for planting a garden

PC3. co-ordinate with an authorised lab to identify the soil's micro and macro-nutrient requirements

PC4. select the relevant soil treatment method to improve the quality of soil

PC5. check if the site has adequate exposure to sunlight

PC6. identify the varieties of plants, trees, grass, shrubs, hedges and edges suitable for growing in the climate

PC7. measure the land area for preparing the layout of the garden

PC8. calculate the spacing between plants/ trees/ shrubs and rows as per their variety and available land area

PC9. select a pattern for planting the plants, trees, grass, shrubs, hedges and edges for aesthetics

PC10. check the availability of water, electricity and other inputs at the site

PC11. select the type of garden to be established as per the client's requirements

PC12. plan relevant garden features as per the client requirements such as walkways, steps, statues, fountain, pond, etc.

PC13. estimate the requirement of various material for establishing the garden

PC14. prepare the layout of the garden based on the assessment of client requirements

Arrange the necessary resources

To be competent, the user/individual on the job must be able to:

PC15. estimate the cost of purchasing the required material

PC16. arrange the funds required for purchasing the material

PC17. identify multiple vendors of the material required for establishing the garden

PC18. select a vendor based on the quality and price of the material available with them

PC19. purchase the material as per the requirement
PC20. store the material appropriately as per its storage requirements
PC21. maintain the record of purchase

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. various parameters to assess while conducting a site survey before establishing a garden
KU2. suitable soil and climate conditions for setting up a garden
KU3. varieties of trees, plants, grass, shrubs, hedges and edges used in gardens
KU4. different types of garden such as vegetable garden, herb garden, flower garden, woodland garden, water garden, rock garden, etc.
KU5. various garden features such as flower beds, carpet beds, borders, paths, steps, statues, foundations, streams, pools, arches, hanging pots etc.
KU6. variety of material required for setting up a garden such as plants, shrubs, fertilizers, pesticides, tools, equipment, Personal Protective Equipment (PPE), etc.
KU7. importance of conducting a soil test before planting a garden and applying the necessary soil treatment to improve the quality of soil
KU8. the process of preparing a layout for setting up a garden
KU9. basic practices related to maintaining the record of purchase and payments

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. perform basic calculations
GS2. write work-related notes and maintain relevant records
GS3. read the relevant literature to get latest updates about the field of work
GS4. listen attentively to understand the information/ instructions being shared by the speaker
GS5. communicate clearly and politely with co-workers and clients
GS6. plan and prioritise tasks to ensure timely completion
GS7. evaluate all possible solutions to a problem to select the best one
GS8. co-ordinate with co-workers to achieve work objectives
GS9. identify possible disruptions to work and take appropriate preventive measures
GS10. take quick decisions to deal with workplace emergencies/ accidents

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Plan to set up the garden	**10**	**12**	**-**	**8**
PC1. conduct a survey of the site proposed for setting up the garden	-	-	-	-
PC2. assess the soil and climate characteristics at the site to establish suitability for planting a garden	-	-	-	-
PC3. co-ordinate with an authorised lab to identify the soil's micro and macro-nutrient requirements	-	-	-	-
PC4. select the relevant soil treatment method to improve the quality of soil	-	-	-	-
PC5. check if the site has adequate exposure to sunlight	-	-	-	-
PC6. identify the varieties of plants, trees, grass, shrubs, hedges and edges suitable for growing in the climate	-	-	-	-
PC7. measure the land area for preparing the layout of the garden	-	-	-	-
PC8. calculate the spacing between plants/ trees/ shrubs and rows as per their variety and available land area	-	-	-	-
PC9. select a pattern for planting the plants, trees, grass, shrubs, hedges and edges for aesthetics	-	-	-	-
PC10. check the availability of water, electricity and other inputs at the site	-	-	-	-
PC11. select the type of garden to be established as per the client's requirements	-	-	-	-
PC12. plan relevant garden features as per the client requirements such as walkways, steps, statues, fountain, pond, etc.	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. estimate the requirement of various material for establishing the garden	-	-	-	-
PC14. prepare the layout of the garden based on the assessment of client requirements	-	-	-	-
Arrange the necessary resources	**20**	**28**	**-**	**22**
PC15. estimate the cost of purchasing the required material	-	-	-	-
PC16. arrange the funds required for purchasing the material	-	-	-	-
PC17. identify multiple vendors of the material required for establishing the garden	-	-	-	-
PC18. select a vendor based on the quality and price of the material available with them	-	-	-	-
PC19. purchase the material as per the requirement	-	-	-	-
PC20. store the material appropriately as per its storage requirements	-	-	-	-
PC21. maintain the record of purchase	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0802
NOS Name	Prepare to set up the garden
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening & Urban Farming
NSQF Level	4
Credits	1
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0803: Set up the garden as per the plan

Description

This OS unit about setting up a garden as per the client requirements.

Scope

The scope covers the following :

- Prepare the field for planting
- Plant the garden
- Set up garden features and irrigation or fertigation system
- Prepare the flower bed
- Optimise resource utilisation

Elements and Performance Criteria

Prepare the field for planting

To be competent, the user/individual on the job must be able to:

PC1. remove all roots, debris and waste material from the land

PC2. examine the soil for an appropriate level of moisture for tilling

PC3. till the land to the required depth

PC4. apply the necessary treatment on the soil such as relevant chemicals, peat, lime, manure, compost, etc.

PC5. identify and remove weeds from the land

PC6. ensure the soil is well-drained and there is no accumulation of water in the land

PC7. prepare rows and holes for planting seeds/ plants as per the planned layout

PC8. ensure the holes are deep and wide enough to support healthy plant growth

PC9. arrange for drainage of water from the garden

Plant the garden

To be competent, the user/individual on the job must be able to:

PC10. plant trees/ plants/ shrubs/ grass/ hedges and edges in the selected pattern maintaining the required spacing

PC11. apply soil cover on the planted roots of the trees/ plants/ shrubs/ grass/ hedges and edges

PC12. water the trees/ plants/ shrubs/ grass/ hedges and edges with the recommended quantity of water

PC13. apply an appropriate type of fertilizer/ manure/ mulch on the roots of the hedges and edges

PC14. install supports for the relevant types of plants to help them grow as intended

PC15. erect fences around the garden to protect it from animals

PC16. identify the types of annual plants to grow

PC17. obtain the seeds of the selected plants

PC18. sort out damaged and unhealthy seeds

PC19. plant the seeds as per the SOP
PC20. water the planted seeds with the recommended quantity
PC21. install support to allow tender plants to grow straight
PC22. identify the appropriate vegetable, fruits and indoor plants to grow
PC23. prepare potting mixture using the recommended ingredients
PC24. plant the vegetables and fruit plants
PC25. plant bonsai trees in pots of the appropriate size
PC26. carry out potting and repotting for the optimum growth of potted plants

Set up garden features and irrigation or fertigation system

To be competent, the user/individual on the job must be able to:

PC27. set up an appropriate irrigation system such as drip irrigation, sprinkler irrigation, subsurface irrigation
PC28. install a fertigation system as per the requirement
PC29. install various garden features such as walkways, statues, fountain as per the layout

Prepare the flower bed

To be competent, the user/individual on the job must be able to:

PC30. identify a spot with sufficient exposure to sunlight
PC31. remove any existing grass/ plants/ debris from the spot
PC32. drain out any water accumulated in the spot
PC33. ensure the soil has the correct level of moisture
PC34. till the soil to the recommended depth
PC35. prepare the flower bed as per the Standard Operating Procedure (SOP)
PC36. plant flowering plants such as bulbs, orchids, succulents, cacti in combination with bedding plants
PC37. maintain the recommended spacing between plants

Optimise resource utilisation

To be competent, the user/individual on the job must be able to:

PC38. optimise the usage of various material in different tasks / processes
PC39. optimise the usage of water/ electricity/ relevant materials in various tasks / processes
PC40. connect electrical tools and equipment safely and turn off when not in use

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. correct method and depth of tilling a field for gardening
KU2. various material used for treating garden soil such as relevant chemicals, peat, lime, manure, compost, etc.
KU3. planting of various types of trees/ plants/ shrubs/ hedges and edges in a garden
KU4. importance of having effective drainage in the garden
KU5. safe handling of planting material
KU6. the process of preparing a nursery bed

KU7. installation of different types of irrigation systems such as drip irrigation, sprinkler irrigation, subsurface irrigation, etc.

KU8. different garden features and their installation process

KU9. the installation process of a fertigation system and its advantages

KU10. process of preparing a flower bed

KU11. method of growing annual plants, fruits, vegetables and indoor plants

KU12. importance of following environmental and ecological best practices to minimise the impact on the environment

KU13. benefits of resource optimisation

KU14. ways of efficiently managing various materials used in greenhouse operations

KU15. common practices of conserving electricity

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read relevant literature to get updated information about the field of work

GS2. write work-related notes

GS3. listen attentively to understand the client requirements

GS4. communicate professionally and politely

GS5. plan and schedule tasks for effective time management

GS6. co-ordinate with the co-workers and supervisor to achieve work objectives

GS7. evaluate all possible solutions to a problem before choosing the best one

GS8. take quick decisions to deal with any emergencies/ accidents

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare the field for planting	**6**	**8**	**-**	**6**
PC1. remove all roots, debris and waste material from the land	-	-	-	-
PC2. examine the soil for an appropriate level of moisture for tilling	-	-	-	-
PC3. till the land to the required depth	-	-	-	-
PC4. apply the necessary treatment on the soil such as relevant chemicals, peat, lime, manure, compost, etc.	-	-	-	-
PC5. identify and remove weeds from the land	-	-	-	-
PC6. ensure the soil is well-drained and there is no accumulation of water in the land	-	-	-	-
PC7. prepare rows and holes for planting seeds/ plants as per the planned layout	-	-	-	-
PC8. ensure the holes are deep and wide enough to support healthy plant growth	-	-	-	-
PC9. arrange for drainage of water from the garden	-	-	-	-
Plant the garden	**10**	**14**	**-**	**10**
PC10. plant trees/ plants/ shrubs/ grass/ hedges and edges in the selected pattern maintaining the required spacing	-	-	-	-
PC11. apply soil cover on the planted roots of the trees/ plants/ shrubs/ grass/ hedges and edges	-	-	-	-
PC12. water the trees/ plants/ shrubs/ grass/ hedges and edges with the recommended quantity of water	-	-	-	-
PC13. apply an appropriate type of fertilizer/ manure/ mulch on the roots of the hedges and edges	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. install supports for the relevant types of plants to help them grow as intended	-	-	-	-
PC15. erect fences around the garden to protect it from animals	-	-	-	-
PC16. identify the types of annual plants to grow	-	-	-	-
PC17. obtain the seeds of the selected plants	-	-	-	-
PC18. sort out damaged and unhealthy seeds	-	-	-	-
PC19. plant the seeds as per the SOP	-	-	-	-
PC20. water the planted seeds with the recommended quantity	-	-	-	-
PC21. install support to allow tender plants to grow straight	-	-	-	-
PC22. identify the appropriate vegetable, fruits and indoor plants to grow	-	-	-	-
PC23. prepare potting mixture using the recommended ingredients	-	-	-	-
PC24. plant the vegetables and fruit plants	-	-	-	-
PC25. plant bonsai trees in pots of the appropriate size	-	-	-	-
PC26. carry out potting and repotting for the optimum growth of potted plants	-	-	-	-
Set up garden features and irrigation or fertigation system	**5**	**7**	**-**	**5**
PC27. set up an appropriate irrigation system such as drip irrigation, sprinkler irrigation, subsurface irrigation	-	-	-	-
PC28. install a fertigation system as per the requirement	-	-	-	-
PC29. install various garden features such as walkways, statues, fountain as per the layout	-	-	-	-
Prepare the flower bed	**5**	**8**	**-**	**5**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC30. identify a spot with sufficient exposure to sunlight	-	-	-	-
PC31. remove any existing grass/ plants/ debris from the spot	-	-	-	-
PC32. drain out any water accumulated in the spot	-	-	-	-
PC33. ensure the soil has the correct level of moisture	-	-	-	-
PC34. till the soil to the recommended depth	-	-	-	-
PC35. prepare the flower bed as per the Standard Operating Procedure (SOP)	-	-	-	-
PC36. plant flowering plants such as bulbs, orchids, succulents, cacti in combination with bedding plants	-	-	-	-
PC37. maintain the recommended spacing between plants	-	-	-	-
Optimise resource utilisation	**4**	**3**	**-**	**4**
PC38. optimise the usage of various material in different tasks / processes	-	-	-	-
PC39. optimise the usage of water/ electricity/ relevant materials in various tasks / processes	-	-	-	-
PC40. connect electrical tools and equipment safely and turn off when not in use	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0803
NOS Name	Set up the garden as per the plan
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening & Urban Farming
NSQF Level	4
Credits	1
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0843: Design, set up and maintain a rooftop garden

Description

This OS unit is about designing, setting up and maintaining a rooftop garden.

Scope

The scope covers the following :

- Plan the rooftop garden
- Set up the rooftop garden
- Maintain the rooftop garden

Elements and Performance Criteria

Plan the rooftop garden

To be competent, the user/individual on the job must be able to:

PC1. check if a rooftop garden is permitted as per the local legislation in the proposed area

PC2. assess the roof's loading capacity with the help of a structural engineer/ architect

PC3. ensure that there are no major installations or structures on the roof that may cause obstruction

PC4. assess the climatic conditions at the site to establish suitability for planting a rooftop garden

PC5. obtain the necessary approvals for the rooftop garden design

PC6. check that the building has an effective drainage system

PC7. assess the sunlight and wind exposure at the roof

PC8. check for adequate availability of water at the roof

PC9. measure the available space for the purpose of designing the rooftop garden

PC10. plan the placement of plants, furniture and garden features

PC11. select heat and drought tolerant plants, trees and shrubs of appropriate weight and size for the rooftop garden

PC12. select the appropriate material such as plastic, fiberglass or foam planting containers according to the roof's loading capacity

PC13. prepare a detailed plan through discussion with the client

PC14. estimate the cost of setting up the rooftop garden

Set up the rooftop garden

To be competent, the user/individual on the job must be able to:

PC15. arrange the necessary plants/ shrubs, material, tools and equipment for setting up the rooftop garden

PC16. prepare lightweight potting soil for planting plants, trees and shrubs

PC17. plant the trees, plants and shrubs as per the SOP

PC18. water the plants and shrubs with the recommended quantity of water

PC19. install windbreaks, appropriate support and shading for the plants, trees and shrubs

PC20. apply fertilizers in the recommended quantity
PC21. install an irrigation system for watering the plants
PC22. carry out waterproofing of the roof garden
PC23. arrange for safe drainage of water from the garden
PC24. install garden features and furniture of appropriate weight and size as per the garden plan

Maintain the rooftop garden

To be competent, the user/individual on the job must be able to:

PC25. apply mulch on the plants to stabilise evaporation and control weed
PC26. examine plants, trees and shrubs for healthy growth and pest and disease infestation
PC27. apply fertilizers, manure and pesticides/ insecticides in the recommended quantity at appropriate intervals
PC28. train plants and shrubs as per the requirement
PC29. prune plants, trees and shrubs to ensure their healthy growth and aesthetics
PC30. remove weeds as per the SOP
PC31. carry out repair and maintenance of the garden pots, features, irrigation and drainage system
PC32. maintain record of the maintenance activities

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. applicable documentation and record-keeping requirements
KU2. various parameters to assess while planning a rooftop a garden
KU3. importance of evaluating loading capacity of the roof before setting up the rooftop garden
KU4. how to assess the roof's loading capacity with the help of a structural engineer/ architect.
KU5. different ways of waterproofing a rooftop garden
KU6. various landscaping practices for the beautification of rooftop gardens including garden furniture and features
KU7. various material of appropriate size and weight for rooftop gardens
KU8. varieties of trees, plants, and shrubs suitable for a rooftop garden and their maintenance
KU9. the process of preparing lightweight potting soil for use in rooftop garden plant pots
KU10. the process of installing windbreaks and other appropriate support to provide shading for the plants, trees and shrubs

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. prepare work-plan and related notes
GS2. read relevant literature to learn about advancements in the field of work
GS3. co-ordinate with co-workers and clients to achieve work objectives

GS4. identify possible disruptions to work and take preventive measures
GS5. perform basic calculations
GS6. plan and schedule tasks for effective time-management
GS7. communicate politely and professionally
GS8. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Plan the rooftop garden	**10**	**12**	**-**	**8**
PC1. check if a rooftop garden is permitted as per the local legislation in the proposed area	-	-	-	-
PC2. assess the roof's loading capacity with the help of a structural engineer/ architect	-	-	-	-
PC3. ensure that there are no major installations or structures on the roof that may cause obstruction	-	-	-	-
PC4. assess the climatic conditions at the site to establish suitability for planting a rooftop garden	-	-	-	-
PC5. obtain the necessary approvals for the rooftop garden design	-	-	-	-
PC6. check that the building has an effective drainage system	-	-	-	-
PC7. assess the sunlight and wind exposure at the roof	-	-	-	-
PC8. check for adequate availability of water at the roof	-	-	-	-
PC9. measure the available space for the purpose of designing the rooftop garden	-	-	-	-
PC10. plan the placement of plants, furniture and garden features	-	-	-	-
PC11. select heat and drought tolerant plants, trees and shrubs of appropriate weight and size for the rooftop garden	-	-	-	-
PC12. select the appropriate material such as plastic, fiberglass or foam planting containers according to the roof's loading capacity	-	-	-	-
PC13. prepare a detailed plan through discussion with the client	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. estimate the cost of setting up the rooftop garden	-	-	-	-
Set up the rooftop garden	**12**	**12**	**-**	**12**
PC15. arrange the necessary plants/ shrubs, material, tools and equipment for setting up the rooftop garden	-	-	-	-
PC16. prepare lightweight potting soil for planting plants, trees and shrubs	-	-	-	-
PC17. plant the trees, plants and shrubs as per the SOP	-	-	-	-
PC18. water the plants and shrubs with the recommended quantity of water	-	-	-	-
PC19. install windbreaks, appropriate support and shading for the plants, trees and shrubs	-	-	-	-
PC20. apply fertilizers in the recommended quantity	-	-	-	-
PC21. install an irrigation system for watering the plants	-	-	-	-
PC22. carry out waterproofing of the roof garden	-	-	-	-
PC23. arrange for safe drainage of water from the garden	-	-	-	-
PC24. install garden features and furniture of appropriate weight and size as per the garden plan	-	-	-	-
Maintain the rooftop garden	**8**	**16**	**-**	**10**
PC25. apply mulch on the plants to stabilise evaporation and control weed	-	-	-	-
PC26. examine plants, trees and shrubs for healthy growth and pest and disease infestation	-	-	-	-
PC27. apply fertilizers, manure and pesticides/ insecticides in the recommended quantity at appropriate intervals	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC28. train plants and shrubs as per the requirement	-	-	-	-
PC29. prune plants, trees and shrubs to ensure their healthy growth and aesthetics	-	-	-	-
PC30. remove weeds as per the SOP	-	-	-	-
PC31. carry out repair and maintenance of the garden pots, features, irrigation and drainage system	-	-	-	-
PC32. maintain record of the maintenance activities	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0843
NOS Name	Design, set up and maintain a rooftop garden
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening and Urban Farming
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0847: Carry out vertical gardening

Description

This OS unit is about selecting plants for vertical gardening, planting, caring and managing vertical gardens.

Scope

The scope covers the following :

- Assess the structure of the vertical garden
- Select appropriate plant species for planting in a vertical garden
- Maintain the vertical garden

Elements and Performance Criteria

Assess the structure of the vertical garden

To be competent, the user/individual on the job must be able to:

PC1. ensure that the vertical garden structure is securely anchored to a wall or other stable support.

PC2. ensure that the structure supporting the plants is strong enough to hold their weight

PC3. check the irrigation system with drip emitters or sprinklers to make sure the plants receive water in a constant, consistent manner

PC4. ensure proper light arrangement as per the light demand of the selected plant species

PC5. clear drainage areas and outlets

PC6. check tools and equipment for serviceability, and rectify and report faults

PC7. select and use Personal Protective Equipment (PPE) appropriate for the task

Select appropriate plant species for planting in a vertical garden

To be competent, the user/individual on the job must be able to:

PC8. carefully select plants for creating a sustainable, visually appealing, and functional vertical garden assessing their weight and size

PC9. choose plant species as per the climatic conditions, season and exposure to the wall and garden structure

PC10. plant seeds or seedlings in planters/holes spaced around the base of the trellis, pole or other structure

Maintain the vertical garden

To be competent, the user/individual on the job must be able to:

PC11. monitor the vertical garden regularly

PC12. evaluate the condition of soil or growing media

PC13. apply fertilizers and ameliorants/additives regularly to supplement the soil

PC14. water the plants adequately at the required frequency

PC15. carry out regular pruning and trimming to ensure plant shape and healthy growth

PC16. train the plants appropriately as per the requirement

PC17. employ various strategies to control and prevent pest infestations in vertical gardens.
PC18. replace/change the plants according to season
PC19. clean the plants regularly to maintain their health and vitality
PC20. carry out all the maintenance and gardening tasks safely while working at height and in areas of difficult access
PC21. clean and store the tools and equipment safely in the designated place
PC22. clear work area and dispose of, reuse or recycle materials according to workplace and environmental requirements
PC23. record maintenance activities as per the workplace procedures

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. scope and importance of vertical gardening
KU2. features, benefits and risks of vertical gardens
KU3. difference between traditional and vertical garden
KU4. types of vertical garden
KU5. factors essential for creating a sustainable, visually appealing, and functional garden that thrives in its specific environment while minimizing negative environmental impact
KU6. importance of selection of plants for different seasons for vertical garden
KU7. factors to be considered while selecting plant species for vertical garden
KU8. characteristics, properties and limitations of plants used for vertical gardens
KU9. list of species which are suitable for vertical gardening- indoor green walls/for shaded areas and outdoors/exterior green walls
KU10. light requirement of different plant species
KU11. importance of artificial lights for indoor plants
KU12. growing media
KU13. structure of the vertical garden
KU14. different types of planters
KU15. drainage and irrigation systems
KU16. care and maintenance practices
KU17. importance of regular monitoring
KU18. importance of adequate watering
KU19. scheduling of irrigation water
KU20. appropriate fertilizers and their forms for fertilization
KU21. method of application of fertilizers
KU22. pests affecting vertical gardens
KU23. Integrated Pest Management (IPM) practices to manage pest infestation
KU24. importance of pruning and trimming
KU25. importance of timely change/replacement of the plants
KU26. method of cleaning of plants

KU27. safety precautions to be taken while working at height and areas of difficult access
KU28. use of PPE for different activities
KU29. safe method of waste disposal
KU30. workplace processes, practices and procedures
KU31. workplace safety and environmental requirements

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. prepare work-plan and related notes
GS2. read relevant literature to learn about advancements in the field of work
GS3. co-ordinate with co-workers and clients to achieve work objectives
GS4. identify possible disruptions to work and take preventive measures
GS5. perform basic calculations
GS6. plan and schedule tasks for effective time-management
GS7. communicate politely and professionally
GS8. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Assess the structure of the vertical garden	**5**	**5**	**-**	**5**
PC1. ensure that the vertical garden structure is securely anchored to a wall or other stable support.	-	-	-	-
PC2. ensure that the structure supporting the plants is strong enough to hold their weight	-	-	-	-
PC3. check the irrigation system with drip emitters or sprinklers to make sure the plants receive water in a constant, consistent manner	-	-	-	-
PC4. ensure proper light arrangement as per the light demand of the selected plant species	-	-	-	-
PC5. clear drainage areas and outlets	-	-	-	-
PC6. check tools and equipment for serviceability, and rectify and report faults	-	-	-	-
PC7. select and use Personal Protective Equipment (PPE) appropriate for the task	-	-	-	-
Select appropriate plant species for planting in a vertical garden	**10**	**10**	**-**	**5**
PC8. carefully select plants for creating a sustainable, visually appealing, and functional vertical garden assessing their weight and size	-	-	-	-
PC9. choose plant species as per the climatic conditions, season and exposure to the wall and garden structure	-	-	-	-
PC10. plant seeds or seedlings in planters/holes spaced around the base of the trellis, pole or other structure	-	-	-	-
Maintain the vertical garden	**15**	**25**	**-**	**20**
PC11. monitor the vertical garden regularly	-	-	-	-
PC12. evaluate the condition of soil or growing media	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. apply fertilizers and ameliorants/additives regularly to supplement the soil	-	-	-	-
PC14. water the plants adequately at the required frequency	-	-	-	-
PC15. carry out regular pruning and trimming to ensure plant shape and healthy growth	-	-	-	-
PC16. train the plants appropriately as per the requirement	-	-	-	-
PC17. employ various strategies to control and prevent pest infestations in vertical gardens.	-	-	-	-
PC18. replace/change the plants according to season	-	-	-	-
PC19. clean the plants regularly to maintain their health and vitality	-	-	-	-
PC20. carry out all the maintenance and gardening tasks safely while working at height and in areas of difficult access	-	-	-	-
PC21. clean and store the tools and equipment safely in the designated place	-	-	-	-
PC22. clear work area and dispose of, reuse or recycle materials according to workplace and environmental requirements	-	-	-	-
PC23. record maintenance activities as per the workplace procedures	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0847
NOS Name	Carry out vertical gardening
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening and Urban Farming, Floriculture Farming
NSQF Level	4.5
Credits	1
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0848: Grow a bonsai tree

Description

This OS unit is about selection of plant species and employing techniques to cultivate and maintain miniature trees.

Scope

The scope covers the following :

- Select appropriate plant species and container for bonsai making
- Carry out planting, post-planting care and maintenance of bonsai
- Decorate and display bonsai specimens

Elements and Performance Criteria

Select appropriate plant species and container for bonsai making

To be competent, the user/individual on the job must be able to:

PC1. carefully select plant species for making a bonsai considering various factors.

PC2. select the size and style appropriate for the chosen specimen considering its artistic appeal to create a harmonious balance between the tree's natural growth and the desired shape.

PC3. select a container/tray of suitable size, shape and material considering the required environment for the tree and the overall aesthetic appeal.

Carry out planting, care and maintenance of bonsai

To be competent, the user/individual on the job must be able to:

PC4. prepare a suitable potting mixture.

PC5. choose the plants, preferably raised from seeds/cuttings except some natural grown species.

PC6. plant the bonsai at a suitable location within the container at a suitable time.

PC7. provide the required care to the plants for the proper establishment of the roots and vegetative growth

PC8. carry out regular pinching, pruning and trimming to ensure plant shape and healthy growth

PC9. carry out wiring and training of plants to provide adequate support and shape

PC10. uproot weeds proactively without harming the bonsai, as and when required.

PC11. water the plants adequately at the required frequency

PC12. apply fertilizers regularly to supplement the soil

PC13. employ various plant protection measures to control and prevent pest infestations.

PC14. clean the soil surface underneath the bonsai trees.

PC15. carry out repotting of well-established bonsai once a year at a suitable time to maintain their health

PC16. clean and store the tools and equipment safely in the designated place.

PC17. clear work area and dispose of, reuse or recycle materials according to environmental requirements.

Decorate and Display bonsai specimens

To be competent, the user/individual on the job must be able to:

PC18. decorate the bonsai for display.

PC19. inspect the interiors and select a suitable location for the display of the bonsai.

PC20. enhance the presentation of the bonsai, using an appropriate pedestal or stand.

PC21. periodically shift or rotate the bonsai specimens from one location to another to ensure proper light and growth.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. scope and importance of bonsai

KU2. history of bonsai

KU3. classification of bonsai

KU4. basic principles of bonsai making

KU5. different styles of bonsai and their characteristics

KU6. different types of bonsai containers/trays

KU7. different shapes of container

KU8. factors on which the selection of containers depends

KU9. how to grow plants in a container

KU10. plant species suitable for bonsai making

KU11. factors on which selection of plant species depends

KU12. specific characteristics of different plant species

KU13. specific requirement of different plant species for their healthy growth and development as bonsai

KU14. potting mixture

KU15. different tools used for bonsai making and their uses

KU16. best time for planting bonsai

KU17. training, pruning and trimming techniques

KU18. wiring and tying in bonsai

KU19. importance and technique of pinching in bonsai

KU20. ideal season and time of pruning

KU21. canopy size of bonsai trees

KU22. method of trimming of roots

KU23. method of weeding in bonsai

KU24. importance of repotting in bonsai trees

KU25. method and time for repotting

KU26. watering in bonsai

KU27. plant protection measures in bonsai

KU28. decoration of the bonsai

KU29. safe method of waste disposal

KU30. factors considered while choosing a location for bonsai display

KU31. importance of periodically shifting or rotating the bonsai specimens from one location to another

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. prepare work-plan and related notes

GS2. read relevant literature to learn about advancements in the field of work

GS3. co-ordinate with co-workers and clients to achieve work objectives

GS4. identify possible disruptions to work and take preventive measures

GS5. perform basic calculations

GS6. plan and schedule tasks for effective time-management

GS7. communicate politely and professionally

GS8. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Select appropriate plant species and container for bonsai making	**10**	**10**	**-**	**5**
PC1. carefully select plant species for making a bonsai considering various factors.	-	-	-	-
PC2. select the size and style appropriate for the chosen specimen considering its artistic appeal to create a harmonious balance between the tree's natural growth and the desired shape.	-	-	-	-
PC3. select a container/tray of suitable size, shape and material considering the required environment for the tree and the overall aesthetic appeal.	-	-	-	-
Carry out planting, care and maintenance of bonsai	**15**	**30**	**-**	**15**
PC4. prepare a suitable potting mixture.	-	-	-	-
PC5. choose the plants, preferably raised from seeds/cuttings except some natural grown species.	-	-	-	-
PC6. plant the bonsai at a suitable location within the container at a suitable time.	-	-	-	-
PC7. provide the required care to the plants for the proper establishment of the roots and vegetative growth	-	-	-	-
PC8. carry out regular pinching, pruning and trimming to ensure plant shape and healthy growth	-	-	-	-
PC9. carry out wiring and training of plants to provide adequate support and shape	-	-	-	-
PC10. uproot weeds proactively without harming the bonsai, as and when required.	-	-	-	-
PC11. water the plants adequately at the required frequency	-	-	-	-
PC12. apply fertilizers regularly to supplement the soil	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. employ various plant protection measures to control and prevent pest infestations.	-	-	-	-
PC14. clean the soil surface underneath the bonsai trees.	-	-	-	-
PC15. carry out repotting of well-established bonsai once a year at a suitable time to maintain their health	-	-	-	-
PC16. clean and store the tools and equipment safely in the designated place.	-	-	-	-
PC17. clear work area and dispose of, reuse or recycle materials according to environmental requirements.	-	-	-	-
Decorate and Display bonsai specimens	**5**	**5**	**-**	**5**
PC18. decorate the bonsai for display.	-	-	-	-
PC19. inspect the interiors and select a suitable location for the display of the bonsai.	-	-	-	-
PC20. enhance the presentation of the bonsai, using an appropriate pedestal or stand.	-	-	-	-
PC21. periodically shift or rotate the bonsai specimens from one location to another to ensure proper light and growth.	-	-	-	-
NOS Total	**30**	**45**	**-**	**25**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0848
NOS Name	Grow a bonsai tree
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening and Urban Farming, Floriculture Farming
NSQF Level	4.5
Credits	1
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N1008: Carry out greenhouse operations and maintain the greenhouse

Description

This OS unit is about carrying out various greenhouse operations such as planting, maintaining, harvesting and marketing seeds, flowers, vegetables and plants. It also covers maintenance of the greenhouse and waste management practices.

Scope

The scope covers the following :

- Plant and maintain seeds, vegetables and plants
- Harvest, acclimatise and transplant seedlings and plants
- Harvest the flowers and vegetables
- Carry out post-harvest processing and marketing of flowers and vegetables
- Maintain the greenhouse
- Perform waste management

Elements and Performance Criteria

Plant and maintain seeds, vegetables and plants

To be competent, the user/individual on the job must be able to:

PC1. ensure the availability of required planting material

PC2. prepare the raised, flat or sunken bed in the greenhouse as per the requirement

PC3. plant seeds, vegetables and different types of plants in the greenhouse

PC4. water the planted seeds, vegetables, flowers and plants with the recommended quantity

PC5. apply relevant fertilizers in the recommended quantity to promote the healthy growth of seedlings, vegetables and plants

PC6. check the seedlings, vegetables, flowers and plants to identify the signs of pests and disease

PC7. apply the recommended pesticides and insecticides to control pest and disease infestation

PC8. remove the dead and damaged seedlings, vegetables, flowers and plants

PC9. apply herbicides and weedicides and carry out manual weeding to prevent unwanted growth in the greenhouse

PC10. maintain the recommended temperature, humidity and sunlight exposure in the greenhouse

PC11. carry out regular repair and maintenance of the irrigation or fertigation system

PC12. maintain the manual and/ or electronic record of herbicides, weedicides fertilizers, pesticides and insecticides used in the greenhouse

Harvest, acclimatise and transplant seedlings and plants

To be competent, the user/individual on the job must be able to:

PC13. check the readiness of the seedlings and plants for being transplanted

PC14. harvest the seedlings and plants ensuring no damage to them

PC15. acclimatise the seedlings and plants under the recommended temperature, protecting them from harsh conditions

PC16. transplant the acclimatised seedlings and plants in the garden

Harvest the flowers and vegetables

To be competent, the user/individual on the job must be able to:

PC17. check the maturity of flowers and vegetables grown in the greenhouse

PC18. harvest the flowers and vegetables using the appropriate tools and collect them in appropriate baskets and/ or containers

PC19. store the harvested flowers and vegetables at the recommended temperature, humidity and hygienic conditions

Carry out post-harvest processing and marketing of flowers and vegetables

To be competent, the user/individual on the job must be able to:

PC20. carry out sorting and grading of the flowers and vegetables

PC21. clean the vegetables using clean water and recommended cleaning agents

PC22. prepare the hydration solution and apply it to the flowers to maintain their freshness

PC23. market the flowers and vegetables to the customers visiting the greenhouse or to the regular market buyers

PC24. process the payments using the appropriate e-payment methods

PC25. maintain the record of sales and payments manually and/or electronically using the physical registers and/ or the relevant computer application

Maintain the greenhouse

To be competent, the user/individual on the job must be able to:

PC26. maintain cleanliness in the greenhouse through regular sweeping and removal of trash

PC27. check the greenhouse structure regularly to identify the repair and maintenance needs

PC28. carry out regular repair and maintenance of the greenhouse structure and co-ordinate with an expert for complex repairs

Perform waste management

To be competent, the user/individual on the job must be able to:

PC29. segregate waste into appropriate categories

PC30. dispose or recycle different types of wastes following the recommended practices

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the process to prepare raised, flat or sunken bed in the greenhouse

KU2. how to plant seeds, vegetables and different types of plants in the greenhouse

KU3. water requirements of different types of seeds, vegetables, flowers and plants

KU4. how to apply fertilizers, herbicides, weedicides, pesticides and insecticides in a greenhouse

KU5. signs of pests and disease in the seedlings, vegetables, flowers and plants

KU6. the importance of maintaining the recommended temperature, humidity and sunlight exposure in the greenhouse

KU7. the process of carrying out regular repair and maintenance of the irrigation or fertigation system

KU8. applicable documentation and record-keeping requirements

KU9. the process of harvest, acclimatising and transplanting seedlings and plants

KU10. the process of harvesting flowers and vegetables, and the use of relevant tools

KU11. the importance of storing the harvested flowers and vegetables at the recommended temperature, humidity and hygienic conditions

KU12. post-harvest processing and marketing of flowers and vegetables i.e. sorting and grading, cleaning and marketing

KU13. how to prepare the hydration solution and apply it on flowers to maintain their freshness

KU14. use of relevant e-payment methods

KU15. use of physical registers and/ or the relevant computer application to maintain manual or electronic record of sales and payments

KU16. the importance of maintaining cleanliness in the greenhouse

KU17. how to carry out regular repair and maintenance of the greenhouse

KU18. the criteria for segregating waste into different categories

KU19. the process of recycling and disposing different types of waste

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related notes and records

GS2. read the relevant guides and manuals

GS3. communicate politely and professionally

GS4. listen attentively to understand the information/instructions being shared

GS5. plan and schedule various tasks for effective time-management

GS6. identify possible disruptions to work and take appropriate preventive measures

GS7. evaluate all the possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Plant and maintain seeds, vegetables and plants	**10**	**12**	**-**	**8**
PC1. ensure the availability of required planting material	-	-	-	-
PC2. prepare the raised, flat or sunken bed in the greenhouse as per the requirement	-	-	-	-
PC3. plant seeds, vegetables and different types of plants in the greenhouse	-	-	-	-
PC4. water the planted seeds, vegetables, flowers and plants with the recommended quantity	-	-	-	-
PC5. apply relevant fertilizers in the recommended quantity to promote the healthy growth of seedlings, vegetables and plants	-	-	-	-
PC6. check the seedlings, vegetables, flowers and plants to identify the signs of pests and disease	-	-	-	-
PC7. apply the recommended pesticides and insecticides to control pest and disease infestation	-	-	-	-
PC8. remove the dead and damaged seedlings, vegetables, flowers and plants	-	-	-	-
PC9. apply herbicides and weedicides and carry out manual weeding to prevent unwanted growth in the greenhouse	-	-	-	-
PC10. maintain the recommended temperature, humidity and sunlight exposure in the greenhouse	-	-	-	-
PC11. carry out regular repair and maintenance of the irrigation or fertigation system	-	-	-	-
PC12. maintain the manual and/ or electronic record of herbicides, weedicides fertilizers, pesticides and insecticides used in the greenhouse	-	-	-	-
Harvest, acclimatise and transplant seedlings and plants	**6**	**8**	**-**	**4**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. check the readiness of the seedlings and plants for being transplanted	-	-	-	-
PC14. harvest the seedlings and plants ensuring no damage to them	-	-	-	-
PC15. acclimatise the seedlings and plants under the recommended temperature, protecting them from harsh conditions	-	-	-	-
PC16. transplant the acclimatised seedlings and plants in the garden	-	-	-	-
Harvest the flowers and vegetables	**4**	**6**	**-**	**4**
PC17. check the maturity of flowers and vegetables grown in the greenhouse	-	-	-	-
PC18. harvest the flowers and vegetables using the appropriate tools and collect them in appropriate baskets and/ or containers	-	-	-	-
PC19. store the harvested flowers and vegetables at the recommended temperature, humidity and hygienic conditions	-	-	-	-
Carry out post-harvest processing and marketing of flowers and vegetables	**4**	**8**	**-**	**6**
PC20. carry out sorting and grading of the flowers and vegetables	-	-	-	-
PC21. clean the vegetables using clean water and recommended cleaning agents	-	-	-	-
PC22. prepare the hydration solution and apply it to the flowers to maintain their freshness	-	-	-	-
PC23. market the flowers and vegetables to the customers visiting the greenhouse or to the regular market buyers	-	-	-	-
PC24. process the payments using the appropriate e-payment methods	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC25. maintain the record of sales and payments manually and/or electronically using the physical registers and/ or the relevant computer application	-	-	-	-
Maintain the greenhouse	**2**	**4**	**-**	**4**
PC26. maintain cleanliness in the greenhouse through regular sweeping and removal of trash	-	-	-	-
PC27. check the greenhouse structure regularly to identify the repair and maintenance needs	-	-	-	-
PC28. carry out regular repair and maintenance of the greenhouse structure and co-ordinate with an expert for complex repairs	-	-	-	-
Perform waste management	**4**	**2**	**-**	**4**
PC29. segregate waste into appropriate categories	-	-	-	-
PC30. dispose or recycle different types of wastes following the recommended practices	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N1008
NOS Name	Carry out greenhouse operations and maintain the greenhouse
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Precision Farming
NSQF Level	3
Credits	3
Version	3.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0822: Set up and maintain the hydroponic system and plants/ crop

Description

This OS unit is about setting up the hydroponic system and maintaining it along with the plants/ crop in the system.

Scope

The scope covers the following :

- Select the crop/ plant and site for hydroponic farming
- Propagate seedlings for hydroponic farming
- Set up the hydroponic system
- Maintain the hydroponic system and plants/ crop
- Carry out irrigation and fertigation

Elements and Performance Criteria

Select the crop/ plant and site for hydroponic farming

To be competent, the user/individual on the job must be able to:

PC1. select the appropriate crops/ plants suitable for hydroponics farming based on priority and market demand

PC2. select a location with the required temperature and sunlight exposure, suitable to the selected plant/ crop variety

PC3. ensure the availability of various inputs such as water, electricity, fertilisers and labour for hydroponic farming

PC4. prepare the tabulation of the crop, following the recommended process

Propagate seedlings for hydroponic farming

To be competent, the user/individual on the job must be able to:

PC5. select the appropriate growth medium for seed germination, ensuring the medium has the required characteristics such as moderate fertility, water holding capacity, good aeration capacity, etc.

PC6. use coco peat, rice husk, and sand peat to raise seedlings, avoiding the use of any medium to grow agronomical crops such as wheat, paddy, maize, barley, oat, etc. for nursery and fodder purposes

PC7. sterilise the growing medium before use, according to the applicable sterilisation limit

PC8. select nursery containers for the growth of plants such as clay pots, plastic pots, or trays, as required

PC9. clean and sterilise the pots and trays before sowing seeds

PC10. apply the nutrient solution in the recommended quantity to the trays and pots and sow the seeds

PC11. maintain seedlings in the trays and pots for the recommended duration, protecting them from pests and disease and ensuring effective nutrient management

PC12. harvest the seedlings at the appropriate stage of their growth to be transplanted in the appropriate hydroponic system

Set up the hydroponic system

To be competent, the user/individual on the job must be able to:

PC13. select the appropriate hydroponic technique for growing quality medium to obtain quality produce with the required colour, appearance, etc.

PC14. select different kinds of substrates to be used for the cultivation of vegetables and fruits, such as lava rocks, clay pebbles, coco peat, ensuring the substrate does not contain excess salt or other elements that are harmful to plants

PC15. select an appropriate nutrient circulation method such as the Nutrient Film Technique, Deep Flow Technique (DFT), wick system, water culture, EBB and Flow, drip system, etc.

PC16. create holes in Polyvinyl Chloride (PVC) pipes for the Deep Flow Technique (DFT) and insert plants placed in plastic net pots, in the holes made in PVC pipes

PC17. use the recommended flooring material in the hydroponic farm, that is capable of soaking in any spillage and leakages

PC18. adopt the Nutrient Film Technique (NFT) for leafy plants for their faster growth

PC19. sterilise the growing medium before use

PC20. place plants in growing tubes and suspend them into water

PC21. use pest and disease-free seedlings, and planting material for the establishment of hydroponic crops

PC22. maintain a reservoir to hold the nutrient solution and pump it as per the requirement to the tubes of growing plants

PC23. automate the nutrient flow system using the cyclic monitoring application, as required

PC24. use non-circulating methods for nutrient application, where applicable, such as root dipping technique, floating technique, capillary action technique, etc.

PC25. ensure the availability of adequate lighting for the optimum growth of plants in the hydroponic system through the use of a relevant lighting system, such as the solar lighting system

Maintain the hydroponic system and plants/ crop

To be competent, the user/individual on the job must be able to:

PC26. check the pipes for any salt deposits and remove it safely to prevent choking and ensure the nutrient solution flows without obstruction through the pipes

PC27. check and ensure that the roots of plants get an appropriate quantity of nutrient solution for healthy growth

PC28. drain out the rainwater from the site to ensure no waterlogging

PC29. clean and monitor the condition of motors controlling water tanks, pumps, and growing trays

PC30. use clean water in the hydroponic system and maintain the pH level of the water by using the recommended treatment

PC31. clean the floor and maintain it dry in the hydroponic system

PC32. detect pests and diseases and take appropriate remedial measures

PC33. position the grains appropriately on growing trays to prevent waterlogging in them

PC34. soak good quality grains as per the requirement and use an appropriate time-management technique to avoid over-soaking of grains

PC35. use mesh filters for regular cleaning

PC36. carry out manual or auto-misting of the crop and plants with water to prevent the harmful effects of temperature

PC37. use nets for aeration and to prevent birds and animals from preying on the plants/ crop

PC38. check the pH using a pH meter regularly and follow the recommended practices to adjust it to the required level in the hydroponic system and nutrient solution, as required

PC39. maintain the recommended nutrient solution temperature, and take appropriate measures to control the temperature

PC40. use the oxygen meter with mobile application support and alarm to monitor the level of dissolved oxygen in the nutrient solution and follow the recommended practices to maintain or adjust it

PC41. maintain the recommended air space between the nutrient solution and the roots of plants

PC42. clean the hydroponic system regularly using chlorine or other recommended treatment, and flush the system with clean water before replanting

PC43. use auto-cleaning systems for cleaning in large-scale hydroponic systems to save time and achieve better productivity

PC44. ensure the required macro and micronutrients are available to plants and crops according to different stages of their growth

PC45. maintain hygiene along with the recommended temperature and Relative Humidity (RH) at the site of hydroponic farming by following the recommended practices, such as the use of exhaust fans

PC46. carry out artificial pollination using blowers, and use mechanical vibrators to improve air quality within the protected hydroponic system structures

PC47. install artificial supporting structures and train tall-growing intermediate crop varieties such as tomatoes and cucumber, and crops bearing heavy produce such as bell pepper, eggplant, etc.

PC48. tie strings at the base of each plant with an appropriate material such as polythene

PC49. carry out pruning of plants using the appropriate tools and implements, when required

Carry out irrigation and fertigation

To be competent, the user/individual on the job must be able to:

PC50. carry out irrigation of plants either manually or using the drip irrigation system, as per the irrigation schedule

PC51. determine the amount of fertilisers to be used for fertigation based on the selected crop, its stages of growth, and the type of selected hydroponics technique

PC52. select the relevant fertigation technique for use, as appropriate

PC53. mix the appropriate fertilisers with the daily water requirement and apply it manually or by using a fertigation system/nutrient tank, according to the selected fertigation technique

PC54. maintain the record of irrigation and fertigation of crop

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. applicable work modalities and requirements for hydroponic farming

KU2. different types of hydroponics systems
KU3. the process of testing seed/ grain for germination
KU4. the seed treatment process
KU5. process of hydroponic cultivation using the relevant automated systems
KU6. various substrates used in hydroponic farming
KU7. the application of Deep Flow Technique (DFT) and Nutrient Film Technique (NFT)
KU8. operations of the greenhouse and its efficiency
KU9. different types of nutrient solutions, their composition and application
KU10. the impact of different climatic conditions on hydroponic farming
KU11. use of hydroponics kits and home hydroponic unit
KU12. the indoor hydroponic system and relevant plants
KU13. the criteria for selecting the location, plant varieties and substrate/ growth medium for hydroponic farming
KU14. the benefits and process of setting up different types of hydroponic systems such as Deep Water Culture (DWC) system, wick system, drip system, Ebb and Flow (Flood and Drain), and Nutrient Film Technique (NFT)
KU15. different types of materials, tools and equipment required for setting up different types of hydroponic systems
KU16. different types of materials used for preparing the substrate/ growth medium such as coco coir, coco chips, perlite, vermiculite, peat moss, lava rock, river rock, etc.
KU17. the process of preparing the nutrient solution and different types of nutrients used in it
KU18. the criteria for selecting a suitable cultivar for hydroponic propagation
KU19. the root architecture and surface chemistry of different plant species and their role in water and nutrient uptake
KU20. the essential plant nutrient elements and the criteria for essentiality
KU21. the symptoms of plant nutrient element deficiency and excess
KU22. the frequency and rate of nutrient solution dosing of plant roots
KU23. the common compounds and elements, their permissible levels to be maintained in water for general hydroponic use
KU24. the characteristics of high-quality irrigation water
KU25. the process of filtering and sterilising the water and nutrient solution
KU26. the need of making appropriate adjustments to the nutrient solution according to plant species
KU27. the appropriate nutrient solution temperature to be maintained
KU28. the Electrical conductivity (EC) of a nutrient solution and how to maintain it in the rooting medium
KU29. the important electrical, electronic and environmental parameters to be maintained in a hydroponic system such as air, wind, humidity, temperature and water quality parameters
KU30. the process of raising seedlings for hydroponics farming
KU31. the appropriate pH levels to be maintained in the hydroponics system
KU32. the process to be followed for the production of contamination-free crop

KU33. the appropriate method and timing for the application of nutrient solutions to plants and crops in hydroponics systems

KU34. the relevant medium-less hydroponic systems, their advantages and limitations

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related notes and records

GS2. read the relevant literature to learn about the latest developments in the field of work

GS3. communicate politely and professionally

GS4. take quick decisions to resolve work-related issues and minimise the impact on productivity

GS5. listen attentively to understand the information being shared

GS6. plan and prioritise tasks to ensure timely completion

GS7. evaluate all possible solutions to a problem to select the best one

GS8. co-ordinate with the co-workers to achieve the work objectives

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Select the crop/ plant and site for hydroponic farming	**4**	**6**	**-**	**4**
PC1. select the appropriate crops/ plants suitable for hydroponics farming based on priority and market demand	-	-	-	-
PC2. select a location with the required temperature and sunlight exposure, suitable to the selected plant/ crop variety	-	-	-	-
PC3. ensure the availability of various inputs such as water, electricity, fertilisers and labour for hydroponic farming	-	-	-	-
PC4. prepare the tabulation of the crop, following the recommended process	-	-	-	-
Propagate seedlings for hydroponic farming	**6**	**8**	**-**	**6**
PC5. select the appropriate growth medium for seed germination, ensuring the medium has the required characteristics such as moderate fertility, water holding capacity, good aeration capacity, etc.	-	-	-	-
PC6. use coco peat, rice husk, and sand peat to raise seedlings, avoiding the use of any medium to grow agronomical crops such as wheat, paddy, maize, barley, oat, etc. for nursery and fodder purposes	-	-	-	-
PC7. sterilise the growing medium before use, according to the applicable sterilisation limit	-	-	-	-
PC8. select nursery containers for the growth of plants such as clay pots, plastic pots, or trays, as required	-	-	-	-
PC9. clean and sterilise the pots and trays before sowing seeds	-	-	-	-
PC10. apply the nutrient solution in the recommended quantity to the trays and pots and sow the seeds	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. maintain seedlings in the trays and pots for the recommended duration, protecting them from pests and disease and ensuring effective nutrient management	-	-	-	-
PC12. harvest the seedlings at the appropriate stage of their growth to be transplanted in the appropriate hydroponic system	-	-	-	-
Set up the hydroponic system	**6**	**8**	**-**	**6**
PC13. select the appropriate hydroponic technique for growing quality medium to obtain quality produce with the required colour, appearance, etc.	-	-	-	-
PC14. select different kinds of substrates to be used for the cultivation of vegetables and fruits, such as lava rocks, clay pebbles, coco peat, ensuring the substrate does not contain excess salt or other elements that are harmful to plants	-	-	-	-
PC15. select an appropriate nutrient circulation method such as the Nutrient Film Technique, Deep Flow Technique (DFT), wick system, water culture, EBB and Flow, drip system, etc.	-	-	-	-
PC16. create holes in Polyvinyl Chloride (PVC) pipes for the Deep Flow Technique (DFT) and insert plants placed in plastic net pots, in the holes made in PVC pipes	-	-	-	-
PC17. use the recommended flooring material in the hydroponic farm, that is capable of soaking in any spillage and leakages	-	-	-	-
PC18. adopt the Nutrient Film Technique (NFT) for leafy plants for their faster growth	-	-	-	-
PC19. sterilise the growing medium before use	-	-	-	-
PC20. place plants in growing tubes and suspend them into water	-	-	-	-
PC21. use pest and disease-free seedlings, and planting material for the establishment of hydroponic crops	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. maintain a reservoir to hold the nutrient solution and pump it as per the requirement to the tubes of growing plants	-	-	-	-
PC23. automate the nutrient flow system using the cyclic monitoring application, as required	-	-	-	-
PC24. use non-circulating methods for nutrient application, where applicable, such as root dipping technique, floating technique, capillary action technique, etc.	-	-	-	-
PC25. ensure the availability of adequate lighting for the optimum growth of plants in the hydroponic system through the use of a relevant lighting system, such as the solar lighting system	-	-	-	-
Maintain the hydroponic system and plants/ crop	**8**	**10**	**-**	**8**
PC26. check the pipes for any salt deposits and remove it safely to prevent choking and ensure the nutrient solution flows without obstruction through the pipes	-	-	-	-
PC27. check and ensure that the roots of plants get an appropriate quantity of nutrient solution for healthy growth	-	-	-	-
PC28. drain out the rainwater from the site to ensure no waterlogging	-	-	-	-
PC29. clean and monitor the condition of motors controlling water tanks, pumps, and growing trays	-	-	-	-
PC30. use clean water in the hydroponic system and maintain the pH level of the water by using the recommended treatment	-	-	-	-
PC31. clean the floor and maintain it dry in the hydroponic system	-	-	-	-
PC32. detect pests and diseases and take appropriate remedial measures	-	-	-	-
PC33. position the grains appropriately on growing trays to prevent waterlogging in them	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC34. soak good quality grains as per the requirement and use an appropriate time-management technique to avoid over-soaking of grains	-	-	-	-
PC35. use mesh filters for regular cleaning	-	-	-	-
PC36. carry out manual or auto-misting of the crop and plants with water to prevent the harmful effects of temperature	-	-	-	-
PC37. use nets for aeration and to prevent birds and animals from preying on the plants/ crop	-	-	-	-
PC38. check the pH using a pH meter regularly and follow the recommended practices to adjust it to the required level in the hydroponic system and nutrient solution, as required	-	-	-	-
PC39. maintain the recommended nutrient solution temperature, and take appropriate measures to control the temperature	-	-	-	-
PC40. use the oxygen meter with mobile application support and alarm to monitor the level of dissolved oxygen in the nutrient solution and follow the recommended practices to maintain or adjust it	-	-	-	-
PC41. maintain the recommended air space between the nutrient solution and the roots of plants	-	-	-	-
PC42. clean the hydroponic system regularly using chlorine or other recommended treatment, and flush the system with clean water before replanting	-	-	-	-
PC43. use auto-cleaning systems for cleaning in large-scale hydroponic systems to save time and achieve better productivity	-	-	-	-
PC44. ensure the required macro and micronutrients are available to plants and crops according to different stages of their growth	-	-	-	-
PC45. maintain hygiene along with the recommended temperature and Relative Humidity (RH) at the site of hydroponic farming by following the recommended practices, such as the use of exhaust fans	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC46. carry out artificial pollination using blowers, and use mechanical vibrators to improve air quality within the protected hydroponic system structures	-	-	-	-
PC47. install artificial supporting structures and train tall-growing intermediate crop varieties such as tomatoes and cucumber, and crops bearing heavy produce such as bell pepper, eggplant, etc.	-	-	-	-
PC48. tie strings at the base of each plant with an appropriate material such as polythene	-	-	-	-
PC49. carry out pruning of plants using the appropriate tools and implements, when required	-	-	-	-
Carry out irrigation and fertigation	**6**	**8**	**-**	**6**
PC50. carry out irrigation of plants either manually or using the drip irrigation system, as per the irrigation schedule	-	-	-	-
PC51. determine the amount of fertilisers to be used for fertigation based on the selected crop, its stages of growth, and the type of selected hydroponics technique	-	-	-	-
PC52. select the relevant fertigation technique for use, as appropriate	-	-	-	-
PC53. mix the appropriate fertilisers with the daily water requirement and apply it manually or by using a fertigation system/nutrient tank, according to the selected fertigation technique	-	-	-	-
PC54. maintain the record of irrigation and fertigation of crop	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0822
NOS Name	Set up and maintain the hydroponic system and plants/ crop
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, gardening and urban farming
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0846: Set up and maintain the aeroponic farm

Description

This OS unit is about setting up and maintaining an aeroponic farm to produce a variety of crops and plants.

Scope

The scope covers the following :

- Set up the aeroponic farm
- Maintain the aeroponic farm
- Optimise resource utilisation
- Perform waste management

Elements and Performance Criteria

Set up the aeroponic farm

To be competent, the user/individual on the job must be able to:

PC1. prepare the root chamber for growing plants

PC2. ensure the growth chamber is light-proof, with good air circulation and an ability to hold humidity

PC3. set up a reservoir to store the nutrient spray solution

PC4. install a submersible pump and PVC pipes to deliver nutrient spray solution to the sprinklers

PC5. install sprinkler heads for spraying the nutrient spray solution on plants

PC6. prepare the nutrient solution maintaining the recommended ratio of water, nutrients and hormones required for the growth of selected plants

PC7. fill in the reservoir with the nutrient spray solution in the recommended quantity

PC8. set up an automatic controller to automate the release of nutrient spray solution

PC9. test the automatic controller to ensure it triggers the spray at the set interval of time

PC10. place the vegetative cuttings on the top of the growing chamber maintaining the stems of the plants in the root chamber

Maintain the aeroponic farm

To be competent, the user/individual on the job must be able to:

PC11. identify the common repair and maintenance needs of the submersible pump, sprinklers, root chamber, etc.

PC12. carry out regular repair and maintenance and co-ordinate with an expert for complex repair and maintenance needs

PC13. apply the recommended disinfectant such as Hydrogen peroxide in the root chambers at appropriate intervals to prevent contamination

PC14. maintain the recommended temperature and humidity in the root chamber for the optimum growth of plants

PC15. maintain the recommended quantity of various nutrients in the nutrient spray solution in an appropriate quantity

PC16. identify the signs of rotting, wilting, pests and disease in the plants and apply the appropriate treatment as per the prescription

PC17. maintain the record of any treatments and disinfectants used in the aeroponic farm

Optimise resource utilisation

To be competent, the user/individual on the job must be able to:

PC18. optimise the usage of water, electricity and other resources in relevant tasks and processes

PC19. connect electrical tools and equipment safely and turn them off when not in use

PC20. plug water leakages to prevent its wastage

Perform waste management

To be competent, the user/individual on the job must be able to:

PC21. segregate waste into appropriate categories

PC22. recycle the recyclable waste appropriately and dispose the non-recyclable waste in an environment-friendly manner

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the process of preparing the root chamber for growing plants under the aeroponic system

KU2. the importance of ensuring the growth chamber is light-proof, with good air circulation and an ability to hold humidity

KU3. the process of setting up a nutrient spray solution reservoir, submersible pump, PVC pipes and sprinklers

KU4. the recommended ratio of water, nutrients and hormones to be maintained in the nutrient spray solution

KU5. the importance and process of setting up and testing an automatic controller to automate the release of nutrient spray solution

KU6. the process of planting different types of plants in an aeroponic farm

KU7. how to carry out common repair and maintenance of the submersible pump, sprinklers, root chamber, etc.

KU8. the importance and process of disinfecting the root chambers with the use of relevant disinfectant

KU9. the importance and process of maintaining the recommended temperature and humidity in the root chamber and recommended quantity of various nutrients in the nutrient spray solution

KU10. the signs of rotting, wilting, pests and disease in plants

KU11. the process of applying various treatments to plants to treat pests and disease

KU12. the benefits and ways of resource optimisation

KU13. the segregation of waste into appropriate categories

KU14. how to recycle and dispose different types of waste

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write work-related notes and records
GS2. read the relevant guides and manuals
GS3. communicate professionally and politely
GS4. listen attentively to comprehend the information being shared by the speaker
GS5. plan and schedule daily activities to achieve work efficiency
GS6. identify possible disruptions to work and take preventive measures
GS7. take quick decisions to deal with any emergencies/ accidents
GS8. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Set up the aeroponic farm	**12**	**20**	**-**	**12**
PC1. prepare the root chamber for growing plants	-	-	-	-
PC2. ensure the growth chamber is light-proof, with good air circulation and an ability to hold humidity	-	-	-	-
PC3. set up a reservoir to store the nutrient spray solution	-	-	-	-
PC4. install a submersible pump and PVC pipes to deliver nutrient spray solution to the sprinklers	-	-	-	-
PC5. install sprinkler heads for spraying the nutrient spray solution on plants	-	-	-	-
PC6. prepare the nutrient solution maintaining the recommended ratio of water, nutrients and hormones required for the growth of selected plants	-	-	-	-
PC7. fill in the reservoir with the nutrient spray solution in the recommended quantity	-	-	-	-
PC8. set up an automatic controller to automate the release of nutrient spray solution	-	-	-	-
PC9. test the automatic controller to ensure it triggers the spray at the set interval of time	-	-	-	-
PC10. place the vegetative cuttings on the top of the growing chamber maintaining the stems of the plants in the root chamber	-	-	-	-
Maintain the aeroponic farm	**10**	**8**	**-**	**10**
PC11. identify the common repair and maintenance needs of the submersible pump, sprinklers, root chamber, etc.	-	-	-	-
PC12. carry out regular repair and maintenance and co-ordinate with an expert for complex repair and maintenance needs	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. apply the recommended disinfectant such as Hydrogen peroxide in the root chambers at appropriate intervals to prevent contamination	-	-	-	-
PC14. maintain the recommended temperature and humidity in the root chamber for the optimum growth of plants	-	-	-	-
PC15. maintain the recommended quantity of various nutrients in the nutrient spray solution in an appropriate quantity	-	-	-	-
PC16. identify the signs of rotting, wilting, pests and disease in the plants and apply the appropriate treatment as per the prescription	-	-	-	-
PC17. maintain the record of any treatments and disinfectants used in the aeroponic farm	-	-	-	-
Optimise resource utilisation	**4**	**6**	**-**	**4**
PC18. optimise the usage of water, electricity and other resources in relevant tasks and processes	-	-	-	-
PC19. connect electrical tools and equipment safely and turn them off when not in use	-	-	-	-
PC20. plug water leakages to prevent its wastage	-	-	-	-
Perform waste management	**4**	**6**	**-**	**4**
PC21. segregate waste into appropriate categories	-	-	-	-
PC22. recycle the recyclable waste appropriately and dispose the non-recyclable waste in an environment-friendly manner	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0846
NOS Name	Set up and maintain the aeroponic farm
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, Gardening and Urban Farming
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N0823: Carry out harvesting, post-harvest management and marketing activities

Description

This OS unit is about carrying out harvesting, post-harvest management and marketing of produce grown in hydroponic farming.

Scope

The scope covers the following :

- Carry out harvesting activities
- Perform post-harvest management
- Market the produce

Elements and Performance Criteria

Carry out harvesting activities

To be competent, the user/individual on the job must be able to:

PC1. check the maturity of plants and crops for harvesting

PC2. carry out harvesting using the relevant tools and implements, ensuring minimum damage to crops/plants during harvesting

PC3. discard any damaged or disfigured plants

PC4. carry out sorting and grading on the basis of applicable parameters such as colour, appearance, ripeness, etc.

PC5. tag the harvested plants/ crop for identification

PC6. maintain the record of harvesting schedule and period of cultivation of crops/plants

Perform post-harvest management

To be competent, the user/individual on the job must be able to:

PC7. store the harvested plants/crops in a dry storage area with the recommended temperature and humidity, ensuring hygiene and aeration

PC8. use humidity monitors to monitor the humidity

Market the produce

To be competent, the user/individual on the job must be able to:

PC9. track and analyse the information related to the wholesale and retail price of the produce

PC10. identify the market and buyers of the produce such as e-trading platforms, cooperatives, local traders, exporters, etc.

PC11. coordinate and negotiate with the potential buyers to secure a profitable price for the produce

PC12. pack the produce in the appropriate packing material and label it with the relevant information

PC13. arrange an appropriate mode of transport for safe and hygienic delivery of produce, ensuring optimum aeration during transit

PC14. coordinate with the transporter for safe and timely delivery to the buyer
PC15. process the payment using the buyer-preferred e-payment method
PC16. maintain the manual and/ or electronic record of sales and payments using the physical registers and/ or the relevant computer system
PC17. ensure compliance with the applicable regulations in the marketing of produce

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the relevant government schemes with the provision of subsidies for the promotion and marketing of hydroponic farming
KU2. the relevant state units and other financial institutions to be approached to avail the relevant government schemes
KU3. the appropriate marketing channels for selling the produce from hydroponic farms, and their constraints
KU4. the applicable procedures used for harvesting, storage, and logistics
KU5. the applicable harvesting schedules and techniques
KU6. the relevant aeration techniques
KU7. the applicable packaging techniques and labelling requirements
KU8. the signs of maturity in different types of crops and plants
KU9. use of the relevant tools, equipment and accessories for harvesting and collecting the produce
KU10. the recommended practices to protect the produce from damage and contamination
KU11. relevant parameters to sort and grade the harvested produce on
KU12. the importance of storing the harvested produce under the recommended temperature, humidity and hygienic conditions
KU13. how to identify, connect and negotiate with potential buyers
KU14. appropriate material to pack the produce and the relevant labelling requirements
KU15. use of different types of e-payment methods
KU16. the importance of maintaining the record of sales and payments
KU17. how to maintain manual and electronic records using the physical registers and the relevant computer application respectively
KU18. basic accounting practices such as calculating the expenditure and cost of production, and benefit-cost (B:C) ratio, etc.

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related notes and records
GS2. read the relevant literature to get the latest updates about the field of work
GS3. listen attentively to understand the information being shared

GS4. communicate clearly and politely
GS5. plan and prioritise tasks for effective time management
GS6. take quick decisions to deal with any emergencies/ accidents or disruptions to work
GS7. co-ordinate with co-workers to achieve work objectives
GS8. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Carry out harvesting activities	**12**	**14**	**-**	**12**
PC1. check the maturity of plants and crops for harvesting	-	-	-	-
PC2. carry out harvesting using the relevant tools and implements, ensuring minimum damage to crops/plants during harvesting	-	-	-	-
PC3. discard any damaged or disfigured plants	-	-	-	-
PC4. carry out sorting and grading on the basis of applicable parameters such as colour, appearance, ripeness, etc.	-	-	-	-
PC5. tag the harvested plants/ crop for identification	-	-	-	-
PC6. maintain the record of harvesting schedule and period of cultivation of crops/plants	-	-	-	-
Perform post-harvest management	**6**	**8**	**-**	**4**
PC7. store the harvested plants/crops in a dry storage area with the recommended temperature and humidity, ensuring hygiene and aeration	-	-	-	-
PC8. use humidity monitors to monitor the humidity	-	-	-	-
Market the produce	**12**	**18**	**-**	**14**
PC9. track and analyse the information related to the wholesale and retail price of the produce	-	-	-	-
PC10. identify the market and buyers of the produce such as e-trading platforms, cooperatives, local traders, exporters, etc.	-	-	-	-
PC11. coordinate and negotiate with the potential buyers to secure a profitable price for the produce	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. pack the produce in the appropriate packing material and label it with the relevant information	-	-	-	-
PC13. arrange an appropriate mode of transport for safe and hygienic delivery of produce, ensuring optimum aeration during transit	-	-	-	-
PC14. coordinate with the transporter for safe and timely delivery to the buyer	-	-	-	-
PC15. process the payment using the buyer-preferred e-payment method	-	-	-	-
PC16. maintain the manual and/ or electronic record of sales and payments using the physical registers and/ or the relevant computer system	-	-	-	-
PC17. ensure compliance with the applicable regulations in the marketing of produce	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N0823
NOS Name	Carry out harvesting, post-harvest management and marketing activities
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Landscaping, gardening and urban farming
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N8102: Prepare for plant tissue culture

Description

This OS unit is about preparing the lab, lab equipment and an appropriate culture medium for carrying out plant tissue culture.

Scope

The scope covers the following :

- Prepare for lab experiments
- Calibrate and maintain the lab equipment
- Maintain the lab inventory
- Prepare the plant tissue culture medium
- Sterilise and store the culture medium

Elements and Performance Criteria

Prepare for lab experiments

To be competent, the user/individual on the job must be able to:

PC1. arrange the necessary lab equipment, personal protective equipment (PPE)

PC2. set up laboratory with the required instructional materials and supplies for the research project

PC3. examine the PPE and clothing for any wear and tear or damage

PC4. apply disinfectant on the relevant lab areas to remove all bacteria/ micro-organisms

PC5. ensure the room for incubating cultures has the relevant equipment to control temperature, light and humidity

PC6. test the computer system for correct functioning to record the relevant data

PC7. ensure the availability of washing area, workbenches and safe storage of lab equipment

PC8. dispose any expired chemicals as per the Standard Operating Procedure (SOP)

PC9. remove all consumables and flammable items from the lab

Calibrate and maintain the lab equipment

To be competent, the user/individual on the job must be able to:

PC10. identify the relevant lab equipment to be used in the plant tissue culture activities

PC11. follow the laboratory procedures while handling lab tools, equipment, dead weights, calibrated measuring jars and reagents

PC12. calibrate equipment in accordance with the tolerances prescribed by the manufacturer

PC13. apply label on the lab equipment to identify the calibrated equipment

PC14. co-ordinate with the manufacturer for the calibration of equipment requiring expert assistance

PC15. check the working and performance of all equipment on a regular basis

PC16. report any malfunctions/ repair needs to the supervisor

PC17. co-ordinate with the maintenance service provider to ensure maintenance of all lab equipment

PC18. maintain the relevant lab-equipment records such as their performance, faults, repair, annual maintenance, etc.

Maintain the lab inventory

To be competent, the user/individual on the job must be able to:

PC19. maintain the inventory of lab supplies by checking the stock regularly

PC20. order the lab supplies when required

PC21. verify the receipt of lab supplies

PC22. maintain stock buffer of reagents and microbiological media

Prepare the plant tissue culture medium

To be competent, the user/individual on the job must be able to:

PC23. identify the appropriate culture medium along with its nature, composition and suitability for the selected explants

PC24. use the recommended grade of lab chemicals and agar for the preparation of culture medium

PC25. use double glass distilled, Reverse Osmosis (RO) or demineralised water in culture medium

PC26. prepare different stock solutions as nutrient medium with the required constituents, strength and volume

PC27. ensure the availability of deep freezer to store stock solutions; refrigerator to store chemicals, short-term storage for stock solutions; storage tank for distilled water and other equipment such as electronic weighing balance, hot plates, Potential of Hydrogen (pH) meter, etc.

PC28. store or refrigerate the stock solutions at the recommended temperature after applying appropriate labels on them

PC29. prepare culture medium such as MS, B5, N6, Nitsch and Whites using the recommended quantity of sucrose, agar, water and stock solution with the help of hot plate and magnetic stirrer

PC30. adjust the pH of the culture medium to the required level using HCl and NaOH (hydrochloric acid and sodium hydroxide) solution

PC31. dispense medium uniformly into culture bottles/ tubes manually or with the help of automatic media dispenser

PC32. apply label with the relevant information on the culture bottles/ tubes

PC33. maintain the record of prepared culture medium in the media register or relevant computer system

Sterilise and store the culture medium

To be competent, the user/individual on the job must be able to:

PC34. sterilise the media at the prescribed temperature and pressure for an appropriate duration in an autoclave

PC35. sterilise the syntax filters before use

PC36. carry out filtration sterilisation of the stock solutions through a syntax filter

PC37. dispense the filter sterilised solution in the autoclaved media after cooling under aseptic conditions

PC38. transfer the culture bottles to media storage room immediately after autoclaving

PC39. check the culture medium for microbial contamination after autoclaving and discard the entire lot along with the culture bottles in case contamination is found to be above the prescribed limit

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. layout of a plant tissue culture lab
KU2. importance and the process of plant tissue culture
KU3. various lab equipment required for plant tissue culture
KU4. different methods of sterilising the lab equipment
KU5. relevant adjustments required in lab equipment before use
KU6. maintenance schedule for various lab equipment
KU7. safe use of recommended disinfectants in a lab environment
KU8. the use of culture medium in plant tissue culture and various ingredients used in preparing it
KU9. the process of preparing culture medium
KU10. various ingredients used in the medium such as macronutrients, micronutrients, vitamins, amino acids, sugar, sucrose, organic supplements, solidifying agents, etc.
KU11. different types of media such as whites, Murshaige and Skoog (MS). Linsmaeir and Skoog (MS), Gamborg (B5), Nitsch and Nitsch (NN), etc.
KU12. sterilization and storage of the medium
KU13. different types of plant growth regulators and their correct use
KU14. the SOP for various lab equipment and their maintenance
KU15. safe use of an autoclave
KU16. safe storage of plant tissue culture medium
KU17. method of adjusting the plant tissue culture medium's Potential of Hydrogen (pH)

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write work-related notes
GS2. read the relevant guides and manuals
GS3. communicate clearly and politely
GS4. listen attentively to understand the information/ instructions being given
GS5. plan and prioritise tasks to ensure timely completion
GS6. take quick decisions to deal with workplace emergencies/ accidents
GS7. identify possible disruptions to work and take preventive measures
GS8. co-ordinate with co-workers to achieve the work objectives

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for lab experiments	**4**	**8**	**-**	**10**
PC1. arrange the necessary lab equipment, personal protective equipment (PPE)	-	-	-	-
PC2. set up laboratory with the required instructional materials and supplies for the research project	-	-	-	-
PC3. examine the PPE and clothing for any wear and tear or damage	-	-	-	-
PC4. apply disinfectant on the relevant lab areas to remove all bacteria/ micro-organisms	-	-	-	-
PC5. ensure the room for incubating cultures has the relevant equipment to control temperature, light and humidity	-	-	-	-
PC6. test the computer system for correct functioning to record the relevant data	-	-	-	-
PC7. ensure the availability of washing area, workbenches and safe storage of lab equipment	-	-	-	-
PC8. dispose any expired chemicals as per the Standard Operating Procedure (SOP)	-	-	-	-
PC9. remove all consumables and flammable items from the lab	-	-	-	-
Calibrate and maintain the lab equipment	**4**	**8**	**-**	**4**
PC10. identify the relevant lab equipment to be used in the plant tissue culture activities	-	-	-	-
PC11. follow the laboratory procedures while handling lab tools, equipment, dead weights, calibrated measuring jars and reagents	-	-	-	-
PC12. calibrate equipment in accordance with the tolerances prescribed by the manufacturer	-	-	-	-
PC13. apply label on the lab equipment to identify the calibrated equipment	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. co-ordinate with the manufacturer for the calibration of equipment requiring expert assistance	-	-	-	-
PC15. check the working and performance of all equipment on a regular basis	-	-	-	-
PC16. report any malfunctions/ repair needs to the supervisor	-	-	-	-
PC17. co-ordinate with the maintenance service provider to ensure maintenance of all lab equipment	-	-	-	-
PC18. maintain the relevant lab-equipment records such as their performance, faults, repair, annual maintenance, etc.	-	-	-	-
Maintain the lab inventory	**6**	**8**	**-**	**4**
PC19. maintain the inventory of lab supplies by checking the stock regularly	-	-	-	-
PC20. order the lab supplies when required	-	-	-	-
PC21. verify the receipt of lab supplies	-	-	-	-
PC22. maintain stock buffer of reagents and microbiological media	-	-	-	-
Prepare the plant tissue culture medium	**6**	**8**	**-**	**6**
PC23. identify the appropriate culture medium along with its nature, composition and suitability for the selected explants	-	-	-	-
PC24. use the recommended grade of lab chemicals and agar for the preparation of culture medium	-	-	-	-
PC25. use double glass distilled, Reverse Osmosis (RO) or demineralised water in culture medium	-	-	-	-
PC26. prepare different stock solutions as nutrient medium with the required constituents, strength and volume	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC27. ensure the availability of deep freezer to store stock solutions; refrigerator to store chemicals, short-term storage for stock solutions; storage tank for distilled water and other equipment such as electronic weighing balance, hot plates, Potential of Hydrogen (pH) meter, etc.	-	-	-	-
PC28. store or refrigerate the stock solutions at the recommended temperature after applying appropriate labels on them	-	-	-	-
PC29. prepare culture medium such as MS, B5, N6, Nitsch and Whites using the recommended quantity of sucrose, agar, water and stock solution with the help of hot plate and magnetic stirrer	-	-	-	-
PC30. adjust the pH of the culture medium to the required level using HCl and NaOH (hydrochloric acid and sodium hydroxide) solution	-	-	-	-
PC31. dispense medium uniformly into culture bottles/ tubes manually or with the help of automatic media dispenser	-	-	-	-
PC32. apply label with the relevant information on the culture bottles/ tubes	-	-	-	-
PC33. maintain the record of prepared culture medium in the media register or relevant computer system	-	-	-	-
Sterilise and store the culture medium	**10**	**8**	**-**	**6**
PC34. sterilise the media at the prescribed temperature and pressure for an appropriate duration in an autoclave	-	-	-	-
PC35. sterilise the syntax filters before use	-	-	-	-
PC36. carry out filtration sterilisation of the stock solutions through a syntax filter	-	-	-	-
PC37. dispense the filter sterilised solution in the autoclaved media after cooling under aseptic conditions	-	-	-	-
PC38. transfer the culture bottles to media storage room immediately after autoclaving	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC39. check the culture medium for microbial contamination after autoclaving and discard the entire lot along with the culture bottles in case contamination is found to be above the prescribed limit	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N8102
NOS Name	Prepare for plant tissue culture
Sector	Agriculture
Sub-Sector	Agriculture Industries
Occupation	Research & Development
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N8103: Carry out plant tissue culture

Description

This OS unit is about carrying out various activities in the process of propagating plants through plant tissue culture.

Scope

The scope covers the following :

- Prepare the mother plant and explant
- Prepare for transferring the explant to culture medium
- Transfer the explant to culture medium
- Acclimatise the tissue cultured plants

Elements and Performance Criteria

Prepare the mother plant and explant

To be competent, the user/individual on the job must be able to:

PC1. identify the crops and plants that can undergo micro-propagation such as fruits, vegetables, food grain crops, ornamental plants, etc.

PC2. select the mother plant which appear healthy and are free from pests, diseases and bacterial infections

PC3. ensure that the mother plants are grown in a greenhouse wherever possible

PC4. expose the mother plants to recommended temperature and sunlight to improve the quality of explants

PC5. pre-treat the mother plant with recommended fungicides where possible to prevent bacterial contamination

PC6. water the plants with the recommended quantity of filtered water

PC7. apply a label on the mother plant container with the relevant details such as the name and type of the plant, the location and date of extraction, etc.

PC8. pack the mother plant appropriately in cardboard cartons or immersed water

PC9. transport the mother plant to the culture laboratory safely under the recommended temperature

PC10. maintain the plant in a sterilised environment prior to use

PC11. use the relevant tools to extract the explant from the sterilised mother plant

PC12. sterilise the explant using the prescribed sterilisation solution

Prepare for transferring the explant to culture medium

To be competent, the user/individual on the job must be able to:

PC13. cut the explant into pieces of the prescribed length

PC14. wash the plant pieces using the recommended cleaning agent

PC15. transfer the plant parts into containers with Clorox solution and soak them for the recommended duration

PC16. discard the Clorox solution as per the SOP

PC17. maintain the plant parts in the container under the recommended temperature

Transfer the explant to culture medium

To be competent, the user/individual on the job must be able to:

PC18. sterilise the relevant equipment and containers using an alcohol-based disinfectant

PC19. pour sterile water into the container with the plant parts

PC20. shake the container gently after placing a sterile lid to wash the tissue and remove the sterilising solution

PC21. place the plant parts using sterilised gloves on a sterile petri dish after removing from the container

PC22. cut the plant parts into smaller pieces of the recommended length using a sterilised blade

PC23. discard the damaged plant parts safely

PC24. place the plant pieces into the culture bottles/ tubes containing culture medium using sterile forceps

PC25. place cap on the culture bottles/ tubes tightly

PC26. store the culture bottles/ tubes in trays or storage racks safely

PC27. maintain the appropriate conditions in the lab such as temperature, humidity and illumination for the multiplication of plant tissues

PC28. add cytokinin to the culture medium as per the requirement to regulate the growth of plant shoots

PC29. monitor the plant shoots regularly for the correct growth and any contaminations

PC30. discard the contaminated plant shoots as per the SOP

PC31. transfer the proliferated shoots to fresh culture medium for mass multiplication

PC32. place the shoots in another nutrient culture medium specific for root development

PC33. add auxins in the recommended quantity to promote root formation

PC34. monitor the development of roots

PC35. apply the necessary treatment to resolve any issues with root development

PC36. maintain the record of observations in the register or the relevant computer system

Acclimatise the tissue cultured plants

To be competent, the user/individual on the job must be able to:

PC37. select a facility with the appropriate temperature and humidity favourable for the plants

PC38. remove the plantlets from culture bottles/ tubes after they achieve adequate growth and rooting

PC39. wash the plantlets gently to remove any traces of culture media

PC40. plant the tissue cultured plants in micro-pots filled with soil/ soilrite/ sand for primary hardening

PC41. label the plants with the necessary information

PC42. apply water and fertilizers in the recommended quantity as per the schedule

PC43. maintain the plants in the facility for the recommended duration before hardening off

Harden off the plants

To be competent, the user/individual on the job must be able to:

PC44. place the plants in a greenhouse or shade net facility with controlled micro-climatic conditions such as relative humidity, temperature, light intensity and air circulation

PC45. transfer the plants to larger pots for secondary hardening after they develop new leaves and roots

PC46. maintain the level of nutrients for the optimum growth of plants

PC47. conduct routine checks on the plantlets to ensure their healthy growth and detect presence of any infections

PC48. remove the dead and decaying plants

PC49. maintain the plants in the environment for the recommended period before transplanting

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. different types of crops, fruits and vegetables suitable for plant propagation

KU2. criteria for selecting a mother plant

KU3. the process of preparing the mother plant to extract explants

KU4. various techniques in plant tissue culture and their applications

KU5. best practices to maintain hygiene in a lab and prevent contamination of plants

KU6. required characteristics of a plant used to extract the explant

KU7. process of sterilising an explant

KU8. the importance of using sterilised tools and equipment in plant tissue culture

KU9. safe method of transporting an explant

KU10. relevant labelling requirements

KU11. the process of preparing and transferring an explant to the medium

KU12. use of relevant plant growth regulators to enhance the effectiveness of a medium

KU13. use of different types of sanitisers

KU14. relevant temperature, humidity and illumination requirements for the multiplication of plant tissues in a lab environment

KU15. the transfer of plant shoots from one medium to the other

KU16. use and safe handling of culture bottles/ tubes

KU17. importance and the process of acclimatising the plants

KU18. relevant precautions to be taken while acclimatising plants

KU19. appropriate plant growth conditions and micro-climate maintenance

KU20. physical screening of contaminants

KU21. operation and maintenance of various lab equipment

KU22. the importance of maintaining a controlled growth environment in the lab

KU23. safe handling of hazardous chemicals

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write work-related notes and maintain records

GS2. communicate clearly and politely with co-workers and clients

GS3. read the relevant literature to get information about the latest developments in the field of work

GS4. plan and prioritise tasks to ensure timely completion

GS5. take quick decisions to deal with workplace emergencies/ accidents

GS6. listen attentively to understand the information/ instructions being shared by the speaker

GS7. identify possible disruptions to work and take appropriate preventive measures

GS8. co-ordinate with co-workers to achieve work objectives

GS9. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare the mother plant and explant	**6**	**8**	**-**	**10**
PC1. identify the crops and plants that can undergo micro-propagation such as fruits, vegetables, food grain crops, ornamental plants, etc.	-	-	-	-
PC2. select the mother plant which appear healthy and are free from pests, diseases and bacterial infections	-	-	-	-
PC3. ensure that the mother plants are grown in a greenhouse wherever possible	-	-	-	-
PC4. expose the mother plants to recommended temperature and sunlight to improve the quality of explants	-	-	-	-
PC5. pre-treat the mother plant with recommended fungicides where possible to prevent bacterial contamination	-	-	-	-
PC6. water the plants with the recommended quantity of filtered water	-	-	-	-
PC7. apply a label on the mother plant container with the relevant details such as the name and type of the plant, the location and date of extraction, etc.	-	-	-	-
PC8. pack the mother plant appropriately in cardboard cartons or immersed water	-	-	-	-
PC9. transport the mother plant to the culture laboratory safely under the recommended temperature	-	-	-	-
PC10. maintain the plant in a sterilised environment prior to use	-	-	-	-
PC11. use the relevant tools to extract the explant from the sterilised mother plant	-	-	-	-
PC12. sterilise the explant using the prescribed sterilisation solution	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for transferring the explant to culture medium	**4**	**8**	**-**	**10**
PC13. cut the explant into pieces of the prescribed length	-	-	-	-
PC14. wash the plant pieces using the recommended cleaning agent	-	-	-	-
PC15. transfer the plant parts into containers with Clorox solution and soak them for the recommended duration	-	-	-	-
PC16. discard the Clorox solution as per the SOP	-	-	-	-
PC17. maintain the plant parts in the container under the recommended temperature	-	-	-	-
Transfer the explant to culture medium	**8**	**4**	**-**	**2**
PC18. sterilise the relevant equipment and containers using an alcohol-based disinfectant	-	-	-	-
PC19. pour sterile water into the container with the plant parts	-	-	-	-
PC20. shake the container gently after placing a sterile lid to wash the tissue and remove the sterilising solution	-	-	-	-
PC21. place the plant parts using sterilised gloves on a sterile petri dish after removing from the container	-	-	-	-
PC22. cut the plant parts into smaller pieces of the recommended length using a sterilised blade	-	-	-	-
PC23. discard the damaged plant parts safely	-	-	-	-
PC24. place the plant pieces into the culture bottles/ tubes containing culture medium using sterile forceps	-	-	-	-
PC25. place cap on the culture bottles/ tubes tightly	-	-	-	-
PC26. store the culture bottles/ tubes in trays or storage racks safely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC27. maintain the appropriate conditions in the lab such as temperature, humidity and illumination for the multiplication of plant tissues	-	-	-	-
PC28. add cytokinin to the culture medium as per the requirement to regulate the growth of plant shoots	-	-	-	-
PC29. monitor the plant shoots regularly for the correct growth and any contaminations	-	-	-	-
PC30. discard the contaminated plant shoots as per the SOP	-	-	-	-
PC31. transfer the proliferated shoots to fresh culture medium for mass multiplication	-	-	-	-
PC32. place the shoots in another nutrient culture medium specific for root development	-	-	-	-
PC33. add auxins in the recommended quantity to promote root formation	-	-	-	-
PC34. monitor the development of roots	-	-	-	-
PC35. apply the necessary treatment to resolve any issues with root development	-	-	-	-
PC36. maintain the record of observations in the register or the relevant computer system	-	-	-	-
Acclimatise the tissue cultured plants	**4**	**10**	**-**	**4**
PC37. select a facility with the appropriate temperature and humidity favourable for the plants	-	-	-	-
PC38. remove the plantlets from culture bottles/ tubes after they achieve adequate growth and rooting	-	-	-	-
PC39. wash the plantlets gently to remove any traces of culture media	-	-	-	-
PC40. plant the tissue cultured plants in micro-pots filled with soil/ soilrite/ sand for primary hardening	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC41. label the plants with the necessary information	-	-	-	-
PC42. apply water and fertilizers in the recommended quantity as per the schedule	-	-	-	-
PC43. maintain the plants in the facility for the recommended duration before hardening off	-	-	-	-
Harden off the plants	**8**	**10**	**-**	**4**
PC44. place the plants in a greenhouse or shade net facility with controlled micro-climatic conditions such as relative humidity, temperature, light intensity and air circulation	-	-	-	-
PC45. transfer the plants to larger pots for secondary hardening after they develop new leaves and roots	-	-	-	-
PC46. maintain the level of nutrients for the optimum growth of plants	-	-	-	-
PC47. conduct routine checks on the plantlets to ensure their healthy growth and detect presence of any infections	-	-	-	-
PC48. remove the dead and decaying plants	-	-	-	-
PC49. maintain the plants in the environment for the recommended period before transplanting	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N8103
NOS Name	Carry out plant tissue culture
Sector	Agriculture
Sub-Sector	Agriculture Industries
Occupation	Research & Development
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N8115: Transplant the tissue cultured plants and maintain records

Description

This OS unit is about transplanting the tissue cultured plants and maintaining the record of lab operations.

Scope

The scope covers the following :

- Transplant the plants
- Maintain the record of lab operations
- Optimise resource utilisation
- Perform waste management

Elements and Performance Criteria

Transplant the plants

To be competent, the user/individual on the job must be able to:

PC1. select a spot with adequate exposure to sunlight

PC2. prepare the planting bed in a greenhouse or select larger pots of appropriate size for transplanting the plants

PC3. create holes of the recommended width and depth to place the plants

PC4. water the potted plants to loosen the soil around their roots

PC5. extract the plants from the pots ensuring no damage to plants and their roots

PC6. place the plants in the holes and cover the roots with the soil

PC7. apply the recommended amount of fertilizers and water

PC8. arrange to protect the transplanted plants from excessive heat and cold

PC9. maintain the plants in the recommended temperature and humidity

PC10. apply necessary treatment if the transplanted plants show signs of wilting, pests and disease

Maintain the record of lab operations

To be competent, the user/individual on the job must be able to:

PC11. use the appropriate computer application to maintain the record of lab operations in the prescribed format

PC12. review the data regularly to ensure accuracy

PC13. comply with the applicable regulatory record keeping requirements

Optimise resource utilisation

To be competent, the user/individual on the job must be able to:

PC14. optimise the usage of various material in different tasks/ activities/ processes

PC15. optimise the usage of electricity/ water/ energy in various tasks/ activities/ processes

PC16. connect the electrical tools and equipment safely and turn off when not in use

Perform waste management

To be competent, the user/individual on the job must be able to:

PC17. segregate waste into different categories
PC18. dispose the non-recyclable waste appropriately
PC19. deposit the recyclable and reusable material at the identified location

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the process of transplanting the tissue cultured plants
KU2. preparation of a planting bed to transplant plants
KU3. various material required for transplanting tissue cultured plants
KU4. the temperature and humidity required for acclimatising plants in a greenhouse/ open environment
KU5. water and macro/ micro-nutrient requirements of tissue cultured plants
KU6. appropriate conditions for transplanting the acclimatised and established plants to larger pots or greenhouse conditions
KU7. importance of following environmental and ecological best practices to minimise the impact on the environment
KU8. benefits of resource optimisation
KU9. ways of efficiently managing various materials used in different operations
KU10. common practices of conserving electricity
KU11. different methods of recycling and disposing waste
KU12. common sources of pollution and ways to minimise it

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write work-related notes
GS2. communicate politely and professionally
GS3. read the relevant literature to learn about the latest developments in the field of work
GS4. listen attentively to understand the information/ instructions being shared by the speaker
GS5. plan and prioritise tasks to ensure timely completion
GS6. co-ordinate with co-workers to achieve work objectives
GS7. evaluate all possible solutions to a problem to select the best one
GS8. identify possible disruptions to work and take appropriate preventive measures
GS9. take quick decisions to deal with workplace emergencies/ accidents

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Transplant the plants	**10**	**8**	**-**	**10**
PC1. select a spot with adequate exposure to sunlight	-	-	-	-
PC2. prepare the planting bed in a greenhouse or select larger pots of appropriate size for transplanting the plants	-	-	-	-
PC3. create holes of the recommended width and depth to place the plants	-	-	-	-
PC4. water the potted plants to loosen the soil around their roots	-	-	-	-
PC5. extract the plants from the pots ensuring no damage to plants and their roots	-	-	-	-
PC6. place the plants in the holes and cover the roots with the soil	-	-	-	-
PC7. apply the recommended amount of fertilizers and water	-	-	-	-
PC8. arrange to protect the transplanted plants from excessive heat and cold	-	-	-	-
PC9. maintain the plants in the recommended temperature and humidity	-	-	-	-
PC10. apply necessary treatment if the transplanted plants show signs of wilting, pests and disease	-	-	-	-
Maintain the record of lab operations	**6**	**8**	**-**	**4**
PC11. use the appropriate computer application to maintain the record of lab operations in the prescribed format	-	-	-	-
PC12. review the data regularly to ensure accuracy	-	-	-	-
PC13. comply with the applicable regulatory record keeping requirements	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Optimise resource utilisation	**8**	**12**	**-**	**8**
PC14. optimise the usage of various material in different tasks/ activities/ processes	-	-	-	-
PC15. optimise the usage of electricity/ water/ energy in various tasks/ activities/ processes	-	-	-	-
PC16. connect the electrical tools and equipment safely and turn off when not in use	-	-	-	-
Perform waste management	**6**	**12**	**-**	**8**
PC17. segregate waste into different categories	-	-	-	-
PC18. dispose the non-recyclable waste appropriately	-	-	-	-
PC19. deposit the recyclable and reusable material at the identified location	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N8115
NOS Name	Transplant the tissue cultured plants and maintain records
Sector	Agriculture
Sub-Sector	Agriculture Industries
Occupation	Research and Development
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N1011: Set up and maintain nursery under protected condition

Description

This unit is about establishing and maintaining a nursery under protected cultivation condition

Scope

The scope covers the following :

- Establish nursery under protected condition
- Maintain nursery under protected condition

Elements and Performance Criteria

Establish nursery under protected cultivation

To be competent, the user/individual on the job must be able to:

PC1. evaluate the suitability of the site conditions for Hi-tech nursery establishment

PC2. ensure the availability of seeds, seedlings, compost/ manure and other related resources

PC3. measure the dimensions to plan the space allocation for nursery establishment

PC4. check the growth media for the desired characteristics and quality as per the requirement of the crop

PC5. prepare and treat soil and soilless media as per the requirement of crop/plants/flowers to be grown

PC6. prepare nursery beds according to the season and the crop/fruit/flower

PC7. use relevant sowing technique depending upon the nature and season in the nursery bed lines

PC8. arrange necessary implements and materials for nursery management

PC9. allot space for storing registers, notebooks, etc.

PC10. instruct the team about the standard work practices, proper care, maintenance activities etc.

Maintain nursery under protected cultivation

To be competent, the user/individual on the job must be able to:

PC11. carry out hardening of the nursery plants by adjusting and acclimatizing the environment of the protected cultivation structure

PC12. check the stocks and required resources for nursery management

PC13. maintain records pertaining to mother plants, progeny, stock of plants etc. as per the standard work practices

PC14. label the plants as per the standard working procedures

PC15. perform irrigation, nutrition management and infestation control as per the need and crop requirements

PC16. carry out the recommended intercultural operations

PC17. harvest the seedlings for transplantation/sale

PC18. transplant seedlings and cuttings into pots correctly

PC19. select and organise the seedlings that must be kept on display with minimum damage or disturbance to the seedlings

PC20. pack the plants properly in a polybag/container for transport/sale

PC21. suppress growth of seedlings that are not bought by pruning the tips in order to postpone planting

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. own role and responsibilities, terms of employment and related documentation

KU2. team and reporting relationships, division of responsibilities

KU3. safety and security processes and its importance

KU4. impact of not following the health, hygiene, safety and quality standards on consumers and the business

KU5. types of protected cultivation structures such as naturally ventilated polyhouse/greenhouse, fan and pad polyhouse, shade net polyhouse,etc

KU6. site conditions to evaluate the suitability for Hi-tech nursery

KU7. methods used in Hi-tech nursery for growing healthy seedlings and saplings

KU8. various operations in the nursery

KU9. need for environment and climatic control for nursery plants

KU10. importance of planning and calendarizing nursery operations

KU11. how to protect the nursery from environmental threats such as frost, drought, water logging, humidity, heat, etc.

KU12. selection and preparation of soil and soil-less media

KU13. the types of seed, seedling and plant anatomy, morphology, physiology

KU14. nursery hygiene and protection

KU15. need for root pruning, its process and precautions

KU16. various hardening activities and precautions to be taken

KU17. environment and climate adjustment considerations in a nursery

KU18. precautions to be taken while pruning the tips of seedlings

KU19. labelling of the seedlings to indicate their plant type and age

KU20. seedling display considerations

KU21. transplantation procedure for seedlings and cuttings

KU22. pest, disease and disorder and symptom recognition of host stress

KU23. how to recognise signs of damage or threats to seedlings

KU24. basic principles of integrated pest management

KU25. how to recognise nutritional deficiency/excess

KU26. chemical, biological and cultural methods and treatments available for seedlings health and protection

KU27. irrigation and nutrition management of seedlings

KU28. range and use of tools, implements and powered and non-powered machinery used in nursery management

KU29. correct use, maintenance and storage of equipment and materials

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write common words/signs and set phrases used in the work

GS2. prepare checklists for reference

GS3. fill out forms, make lists of materials required, and write simple reports in local language or Hindi about work specifications, requirements and status etc.

GS4. measure all dimensions in metric scale

GS5. perform arithmetic calculations of addition, subtraction, multiplication and division processes

GS6. read and interpret information from various written sources of work-related information in local language or Hindi

GS7. communicate effectively with the co-workers and other stakeholders

GS8. spot discrepancies or errors and select the most efficient solution

GS9. plan one's daily tasks to achieve maximum productivity

GS10. establish priorities and deadlines in consultation with others and record them

GS11. be punctual and work as per agreed priorities

GS12. manage distractions and maintain workplace discipline

GS13. listen to concerns and doubts of employees, vendors and clients carefully and address them

GS14. be courteous and polite in communications

GS15. establish workable solutions for problems in hand in consultation with others and record them

GS16. breakdown relevant work process into its constituent activities for ease of analysis

GS17. identify ways to increase productivity and reduce errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Establish nursery under protected cultivation	**15**	**25**	**-**	**10**
PC1. evaluate the suitability of the site conditions for Hi-tech nursery establishment	-	-	-	-
PC2. ensure the availability of seeds, seedlings, compost/ manure and other related resources	-	-	-	-
PC3. measure the dimensions to plan the space allocation for nursery establishment	-	-	-	-
PC4. check the growth media for the desired characteristics and quality as per the requirement of the crop	-	-	-	-
PC5. prepare and treat soil and soilless media as per the requirement of crop/plants/flowers to be grown	-	-	-	-
PC6. prepare nursery beds according to the season and the crop/fruit/flower	-	-	-	-
PC7. use relevant sowing technique depending upon the nature and season in the nursery bed lines	-	-	-	-
PC8. arrange necessary implements and materials for nursery management	-	-	-	-
PC9. allot space for storing registers, notebooks, etc.	-	-	-	-
PC10. instruct the team about the standard work practices, proper care, maintenance activities etc.	-	-	-	-
Maintain nursery under protected cultivation	**15**	**25**	**-**	**10**
PC11. carry out hardening of the nursery plants by adjusting and acclimatizing the environment of the protected cultivation structure	-	-	-	-
PC12. check the stocks and required resources for nursery management	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. maintain records pertaining to mother plants, progeny, stock of plants etc. as per the standard work practices	-	-	-	-
PC14. label the plants as per the standard working procedures	-	-	-	-
PC15. perform irrigation, nutrition management and infestation control as per the need and crop requirements	-	-	-	-
PC16. carry out the recommended intercultural operations	-	-	-	-
PC17. harvest the seedlings for transplantation/sale	-	-	-	-
PC18. transplant seedlings and cuttings into pots correctly	-	-	-	-
PC19. select and organise the seedlings that must be kept on display with minimum damage or disturbance to the seedlings	-	-	-	-
PC20. pack the plants properly in a polybag/container for transport/sale	-	-	-	-
PC21. suppress growth of seedlings that are not bought by pruning the tips in order to postpone planting	-	-	-	-
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N1011
NOS Name	Set up and maintain nursery under protected condition
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Precision Farming
NSQF Level	4
Credits	3
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N1013: Carry out protected cultivation of flower crops

Description

This unit describes the key considerations and methods of growing flower crops under protected cultivation

Scope

The scope covers the following :

- Prepare for cultivation
- Prepare media and planting material
- Plant a flower crop
- Nurture a flower crop
- Harvest a flower crop

Elements and Performance Criteria

Prepare for cultivation

To be competent, the user/individual on the job must be able to:

PC1. select a site with ample sunlight, distant from low lying area and suitable environmental conditions for flower crop under protected cultivation

PC2. select commercially viable varieties of flowers that can be grown under protected cultivation in the selected site such as rose, gerbera, carnation, anthurium, lilium, orchids, chrysanthemum, etc.

PC3. set up structure for protected cultivation based on types of flower crop, conditions to be altered, output volumes, budgets and resources available, etc.

PC4. apply measures to test and alter the environmental conditions within the protected cultivation structure based on the requirements of the flower crop

Prepare the growth media

To be competent, the user/individual on the job must be able to:

PC5. select appropriate soil or soilless medium for the flower crop

PC6. prepare the media to have appropriate pH, porosity, moisture retention, salinity, organic content and anchorage as required for the flower crop

PC7. decontaminate the media using methods such as chemical drenching/ fumigation, steaming, pasteurization and solarization

Plant a flower crop

To be competent, the user/individual on the job must be able to:

PC8. ensure flat planting bed for flowers

PC9. select planting material like, seeds or saplings, tissue cultured plantlets based on the flower variety and planting medium

PC10. apply appropriate propagation method for the flower crop such as shield or T-budding, stenting method, cuttings, micro-propagation

PC11. prepare the planting material such as seeds, seedlings or cuttings

PC12. plant the planting material maintaining the right spacing to ensure optimum planting density

Nurture a flower crop

To be competent, the user/individual on the job must be able to:

PC13. prepare daily/weekly irrigation and fertigation schedule as per the requirement of the crop

PC14. apply appropriate micro-irrigation techniques including use of fertigation equipment, spraying system, exhaust fan and cooling pads as per the stage of growth of the flower crop

PC15. ensure good quality of filtered water for flower crop

PC16. manage weeds using appropriate method

PC17. prepare and apply appropriate dose of manure fertilizer as per crop requirement

PC18. apply micro-nutrients by foliar spray

PC19. carry out centering (or decentering), to promote the growth of auxiliary buds and lateral branches as per the requirement of the plant using wired nets

PC20. trim the growing branches for further lateral branch formation, good spread and budding surface

PC21. prune and trim the terminal of the plants as per their cycle

PC22. carry out the plant management practices of pinching, disbudding, de-shooting, defoliation, removal of faded flowers and bending of shoots as per plant requirement

PC23. identify indicators of disease, infestation, disorder and damage to the flower crop

PC24. apply appropriate measures for prevention and treatment of disease, infestation, disorder and damage to the flower crop

Harvest a flower crop

To be competent, the user/individual on the job must be able to:

PC25. select appropriate harvesting practices of loose and cut flower

PC26. harvest the flowers as per the market requirement in terms of stage of harvest, stem length, bud size, quality and quantity of produce, type of packaging, etc.

PC27. pack the flowers for temporary storage

PC28. use weighing machine to accurately weigh the produce

PC29. sort and grade the harvested produce based on quality, colour, stem strength and size

PC30. process the segregated produce which are not meeting the quality standards

PC31. pack, store and transport the marketable produce, ensuring that the produce remains fresh and damage free for a long time

PC32. record the details of harvest and post-harvest activities in the desired format

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. own role and responsibilities, terms of employment and related documentation

KU2. team and reporting relationships

KU3. organisational communication protocols, including formal and informal

KU4. safety and security processes and their importance

KU5. impact of not following the health, hygiene, safety and quality standards on consumers and the business

KU6. advantages of growing flower crops in greenhouses
KU7. favorable conditions for flower cultivation under protected cultivation
KU8. major flower crops and their varieties that are grown under protected cultivation
KU9. types of protected cultivation structures used for various commercially viable flower crops
KU10. measures for providing favorable environmental or growth conditions with respect to light intensity, temperature, humidity and oxygen/carbon dioxide levels
KU11. growing systems for flower crops under protected cultivation
KU12. soil and soilless growing mediums, their composition and characteristics
KU13. types of planting materials used for flower crops, and their treatment
KU14. planting practices used for common commercially viable flower crops and the required tools
KU15. growth regulation practices used for common commercially viable flower crops, their purpose, tools and correct procedures
KU16. nutrition and irrigation management of common commercially viable flower crops under protected cultivations
KU17. common irrigation and drainage systems and techniques used for growing flower crops under different types of protected cultivation structures
KU18. pests, weeds and diseases in common commercially viable flower crops and their indications, prevention and mitigation procedures
KU19. yield enhancement and harvesting practices used for flower crops
KU20. market requirement for various commercial flowers produce in terms of stage of harvest, stem length, bud size, quality and quantity of produce, type of packaging, etc.
KU21. sorting and grading of flower crop
KU22. methods of temporary storage of produce and precautions to be taken
KU23. records required for harvest and post-harvest processing
KU24. packing methods, processes and materials used for harvested flowers
KU25. methods of post-harvest storage of flowers
KU26. safe and efficient methods for loading and unloading, and stacking of bags/crates in and off the transport

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. write common words/signs and set phrases used in the work
GS2. prepare checklists for reference
GS3. fill out forms, make lists of materials required, and write simple reports in local language or Hindi about work specifications, requirements and status etc.
GS4. measure all dimensions in metric scale
GS5. perform basic arithmetic calculations
GS6. read and interpret information from various written sources of work-related information in local language or Hindi
GS7. communicate effectively with co-workers and other stakeholders
GS8. spot discrepancies or errors and select the most efficient solution

GS9. plan one's daily tasks to achieve maximum productivity

GS10. establish priorities and deadlines in consultation with others and record them

GS11. manage distractions and maintain workplace discipline

GS12. listen to concerns and doubts of employees, vendors and clients carefully and address them

GS13. be courteous and polite in communications

GS14. establish workable solutions for problems in hand in consultation with others and record them

GS15. breakdown relevant work process into its constituent activities for ease of analysis

GS16. identify ways to increase productivity and reduce errors

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for cultivation	**4**	**4**	**-**	**4**
PC1. select a site with ample sunlight, distant from low lying area and suitable environmental conditions for flower crop under protected cultivation	-	-	-	-
PC2. select commercially viable varieties of flowers that can be grown under protected cultivation in the selected site such as rose, gerbera, carnation, anthurium, lilium, orchids, chrysanthemum, etc.	-	-	-	-
PC3. set up structure for protected cultivation based on types of flower crop, conditions to be altered, output volumes, budgets and resources available, etc.	-	-	-	-
PC4. apply measures to test and alter the environmental conditions within the protected cultivation structure based on the requirements of the flower crop	-	-	-	-
Prepare the growth media	**4**	**8**	**-**	**5**
PC5. select appropriate soil or soilless medium for the flower crop	-	-	-	-
PC6. prepare the media to have appropriate pH, porosity, moisture retention, salinity, organic content and anchorage as required for the flower crop	-	-	-	-
PC7. decontaminate the media using methods such as chemical drenching/ fumigation, steaming, pasteurization and solarization	-	-	-	-
Plant a flower crop	**5**	**8**	**-**	**3**
PC8. ensure flat planting bed for flowers	-	-	-	-
PC9. select planting material like, seeds or saplings, tissue cultured plantlets based on the flower variety and planting medium	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. apply appropriate propagation method for the flower crop such as shield or T-budding, stenting method, cuttings, micro-propagation	-	-	-	-
PC11. prepare the planting material such as seeds, seedlings or cuttings	-	-	-	-
PC12. plant the planting material maintaining the right spacing to ensure optimum planting density	-	-	-	-
Nurture a flower crop	**10**	**15**	**-**	**7**
PC13. prepare daily/weekly irrigation and fertigation schedule as per the requirement of the crop	-	-	-	-
PC14. apply appropriate micro-irrigation techniques including use of fertigation equipment, spraying system, exhaust fan and cooling pads as per the stage of growth of the flower crop	-	-	-	-
PC15. ensure good quality of filtered water for flower crop	-	-	-	-
PC16. manage weeds using appropriate method	-	-	-	-
PC17. prepare and apply appropriate dose of manure fertilizer as per crop requirement	-	-	-	-
PC18. apply micro-nutrients by foliar spray	-	-	-	-
PC19. carry out centering (or decentering), to promote the growth of auxiliary buds and lateral branches as per the requirement of the plant using wired nets	-	-	-	-
PC20. trim the growing branches for further lateral branch formation, good spread and budding surface	-	-	-	-
PC21. prune and trim the terminal of the plants as per their cycle	-	-	-	-
PC22. carry out the plant management practices of pinching, disbudding, de-shooting, defoliation, removal of faded flowers and bending of shoots as per plant requirement	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. identify indicators of disease, infestation, disorder and damage to the flower crop	-	-	-	-
PC24. apply appropriate measures for prevention and treatment of disease, infestation, disorder and damage to the flower crop	-	-	-	-
Harvest a flower crop	**7**	**10**	**-**	**6**
PC25. select appropriate harvesting practices of loose and cut flower	-	-	-	-
PC26. harvest the flowers as per the market requirement in terms of stage of harvest, stem length, bud size, quality and quantity of produce, type of packaging, etc.	-	-	-	-
PC27. pack the flowers for temporary storage	-	-	-	-
PC28. use weighing machine to accurately weigh the produce	-	-	-	-
PC29. sort and grade the harvested produce based on quality, colour, stem strength and size	-	-	-	-
PC30. process the segregated produce which are not meeting the quality standards	-	-	-	-
PC31. pack, store and transport the marketable produce, ensuring that the produce remains fresh and damage free for a long time	-	-	-	-
PC32. record the details of harvest and post-harvest activities in the desired format	-	-	-	-
NOS Total	**30**	**45**	**-**	**25**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N1013
NOS Name	Carry out protected cultivation of flower crops
Sector	Agriculture
Sub-Sector	Agriculture Crop Production
Occupation	Precision Farming
NSQF Level	4
Credits	3
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N9908: Undertake basic entrepreneurial activities for small enterprise

Description

This OS unit is about undertaking basic entrepreneurial or business activities in the agriculture sector.

Scope

The scope covers the following :

- Plan the agricultural enterprise/ business
- Manage the agricultural production process
- Manage the post-production and marketing processes

Elements and Performance Criteria

Plan the agricultural enterprise/ business

To be competent, the user/individual on the job must be able to:

PC1. analyse the demand and supply of the relevant agricultural produce in the market

PC2. identify the target customers and assess their needs and expectations with respect to the quality and price of the produce

PC3. identify various types of agricultural entrepreneurship/ business opportunities

PC4. plan agricultural production with the use of relevant and efficient technologies for availing funds

PC5. identify appropriate and authentic advisory services/Government authority for skill upgradation to successfully plan and implement business activities

PC6. prepare a basic business plan for the agricultural entrepreneurship/business activities

PC7. identify appropriate sources of funding for the agricultural entrepreneurship/ business

PC8. coordinate with the relevant government authorities to subscribe to the relevant government schemes and programs to benefit from them

PC9. ensure compliance with the government structural reforms and framework along with the applicable rules and regulations while setting up the agricultural enterprise/ business

Manage the agricultural production process

To be competent, the user/individual on the job must be able to:

PC10. select and arrange the necessary resources for the business operations

PC11. ensure the use of relevant and efficient production technologies as per planning and availability of funds

PC12. follow the recommended practices for efficient input resource management

PC13. optimise the production processes and output through the amalgamation of existing practices with smart technologies

PC14. follow the recommended sustainability practices during agricultural production to prevent adverse impacts on the environment and produce viz. deforestation, loss of biodiversity, soil degradation, etc.

Manage the post-production and marketing processes

To be competent, the user/individual on the job must be able to:

PC15. ensure the availability of proper storage infrastructures and facilities post-production of the produce as per the industry quality standards

PC16. collect information related to the wholesale and retail price of produce

PC17. calculate the costs incurred and determine the price of the produce for profitability

PC18. ensure that the cost of production, transportation, and marketing are considered while calculating the cost and setting the price for the produce

PC19. collect information related to various subsidies/funds offered by the government, authorised state units and other financial institutions involved with the promotion of the produce

PC20. select appropriate marketing channels for the produce, considering the relevant requirements and constraints

PC21. identify various risks to production and post-production processes and manage them appropriately

PC22. undertake outreach programs to promote agricultural products and services, and expand agri-business

PC23. prepare and execute a marketing plan considering the 4Ps i.e. product, price, promotion, and place and 4As i.e. acceptability, affordability, accessibility, and awareness

PC24. use the relevant digital services such as e-commerce, e-payments, electronic record-keeping, etc.

PC25. use efficient post-production logistics means to improve the supply quantity, reduce the cost to the consumer, and increase demand consequently

PC26. ensure all the relevant information such as quality and quantity of produce, date of manufacture, batch number, and sale is recorded electronically and/ or manually

PC27. coordinate with the various stakeholders for efficient and sustainable agri-business growth and development

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. how to analyse the demand and supply of the relevant agricultural produce in the market

KU2. the process of identifying the target customers and assess their needs and expectations with respect to the quality and price of the produce

KU3. how to identify various types of agricultural entrepreneurship/ business opportunities

KU4. how to prepare a basic business plan for the agricultural entrepreneurship/business activities

KU5. appropriate sources of funding for the agricultural entrepreneurship/ businesses

KU6. the relevant government schemes and programs

KU7. the importance of ensuring compliance with the government structural reforms and framework, along with the applicable rules and regulations

KU8. various resources required for agricultural production

KU9. the process of planning agricultural production and the use of relevant technologies to enhance production

KU10. the importance of ensuring no cause adverse impact on the environment and produce during production

KU11. the recommended practices to be followed for efficient input resource management

KU12. the process of optimising the production processes and output through the amalgamation of existing practices with smart technologies

KU13. the recommended sustainability practices to be followed during agricultural production to prevent and deal with deforestation, loss of biodiversity, soil degradation, etc.

KU14. how to collect information related to the wholesale and retail price of agricultural produce

KU15. how to calculate the economics of the produce viz. production cost, price of the produce, B:C Ratio etc.

KU16. relevant government schemes with the provision of subsidies/funds for the promotion of agricultural produce

KU17. the process of selecting appropriate marketing channels for marketing agricultural produce, and the applicable requirements and constraints

KU18. the relevant buyers of different types of agricultural produce such as co-operatives, retailers, local vendors, wholesalers, e-trading portals, marketing companies, exporters, etc.

KU19. how to identify and manage various risks to production and post-production processes

KU20. how to undertake outreach programs to promote agricultural products and services, and expand agri-business

KU21. the 4Ps i.e. product, price, promotion, and place and 4As i.e. acceptability, affordability, accessibility, and awareness considered while preparing and executing a marketing plan

KU22. use of the relevant digital services such as e-commerce, e-payments, electronic record-keeping, etc.

KU23. the importance of using efficient post-production logistics

KU24. the importance of maintaining various records accurately

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. maintain work-related notes and records

GS2. read the relevant literature to get the latest updates about the field work

GS3. communicate politely and professionally

GS4. listen attentively to understand the information being shared

GS5. plan and schedule tasks for efficient time management

GS6. identify possible disruptions to work and take appropriate preventive measures

GS7. take quick decisions to deal with workplace emergencies/ accident

GS8. evaluate all possible solutions to a problem to select the best one

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Plan the agricultural enterprise/ business	**10**	**14**	**-**	**10**
PC1. analyse the demand and supply of the relevant agricultural produce in the market	-	-	-	-
PC2. identify the target customers and assess their needs and expectations with respect to the quality and price of the produce	-	-	-	-
PC3. identify various types of agricultural entrepreneurship/ business opportunities	-	-	-	-
PC4. plan agricultural production with the use of relevant and efficient technologies for availing funds	-	-	-	-
PC5. identify appropriate and authentic advisory services/Government authority for skill upgradation to successfully plan and implement business activities	-	-	-	-
PC6. prepare a basic business plan for the agricultural entrepreneurship/business activities	-	-	-	-
PC7. identify appropriate sources of funding for the agricultural entrepreneurship/ business	-	-	-	-
PC8. coordinate with the relevant government authorities to subscribe to the relevant government schemes and programs to benefit from them	-	-	-	-
PC9. ensure compliance with the government structural reforms and framework along with the applicable rules and regulations while setting up the agricultural enterprise/ business	-	-	-	-
Manage the agricultural production process	**8**	**10**	**-**	**8**
PC10. select and arrange the necessary resources for the business operations	-	-	-	-
PC11. ensure the use of relevant and efficient production technologies as per planning and availability of funds	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. follow the recommended practices for efficient input resource management	-	-	-	-
PC13. optimise the production processes and output through the amalgamation of existing practices with smart technologies	-	-	-	-
PC14. follow the recommended sustainability practices during agricultural production to prevent adverse impacts on the environment and produce viz. deforestation, loss of biodiversity, soil degradation, etc.	-	-	-	-
Manage the post-production and marketing processes	**12**	**16**	**-**	**12**
PC15. ensure the availability of proper storage infrastructures and facilities post-production of the produce as per the industry quality standards	-	-	-	-
PC16. collect information related to the wholesale and retail price of produce	-	-	-	-
PC17. calculate the costs incurred and determine the price of the produce for profitability	-	-	-	-
PC18. ensure that the cost of production, transportation, and marketing are considered while calculating the cost and setting the price for the produce	-	-	-	-
PC19. collect information related to various subsidies/funds offered by the government, authorised state units and other financial institutions involved with the promotion of the produce	-	-	-	-
PC20. select appropriate marketing channels for the produce, considering the relevant requirements and constraints	-	-	-	-
PC21. identify various risks to production and post-production processes and manage them appropriately	-	-	-	-
PC22. undertake outreach programs to promote agricultural products and services, and expand agri-business	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. prepare and execute a marketing plan considering the 4Ps i.e. product, price, promotion, and place and 4As i.e. acceptability, affordability, accessibility, and awareness	-	-	-	-
PC24. use the relevant digital services such as e-commerce, e-payments, electronic record-keeping, etc.	-	-	-	-
PC25. use efficient post-production logistics means to improve the supply quantity, reduce the cost to the consumer, and increase demand consequently	-	-	-	-
PC26. ensure all the relevant information such as quality and quantity of produce, date of manufacture, batch number, and sale is recorded electronically and/ or manually	-	-	-	-
PC27. coordinate with the various stakeholders for efficient and sustainable agri-business growth and development	-	-	-	-
NOS Total	**30**	**40**	**-**	**30**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N9908
NOS Name	Undertake basic entrepreneurial activities for small enterprise
Sector	Agriculture
Sub-Sector	Generic
Occupation	Generic
NSQF Level	4
Credits	1
Version	3.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

AGR/N9903: Maintain health and safety at the workplace

Description

This OS is about maintaining health and safety of self and other co-workers at the workplace

Scope

The scope covers the following :

- Maintain personal hygiene
- Maintain clean and safe workplace
- Administer appropriate emergency procedures

Elements and Performance Criteria

Maintain personal hygiene

To be competent, the user/individual on the job must be able to:

PC1. wash hands, legs and face with soap/alcohol based sanitizer at reasonable intervals

PC2. wash the worn clothes with soap and sun dry before use next time

PC3. ensure the face is covered with mask or three layers of cloth-piece

PC4. follow the workplace sanitization norms including distancing from sick people

Maintain clean and safe workplace

To be competent, the user/individual on the job must be able to:

PC5. carry out basic safety checks before operation of all tools, implements, and machinery and report identified hazards to the supervisor

PC6. wear appropriate Personal Protective Equipment (PPE) while performing work in accordance with the workplace policy

PC7. follow the instructions mentioned on the labels of chemicals/pesticides/fumigants etc to avoid hazards

PC8. assess risks prior to performing manual handling jobs, and work according to currently recommended safe practices

PC9. sanitize equipment, tools and machinery before and after use

PC10. use equipment and materials safely and correctly and return the same to designated storage after use

PC11. dispose waste safely and correctly in the designated area

PC12. recognize risks to bystanders and take required action to reduce the risks

PC13. work in a manner which minimizes environmental damage, ensuring all procedures and instructions for controlling risks are followed

PC14. report any accidents, incidents or problems without delay to an appropriate person and take necessary immediate action to reduce further danger

PC15. follow government / workplace advisories incase of outbreak of any disease/disaster

Administer appropriate emergency procedures

To be competent, the user/individual on the job must be able to:

PC16. follow procedures for dealing with accidents, fires and emergencies, including communicating location and directions to the location of emergency, as per the workplace requirements

PC17. use emergency equipment in accordance with manufacturer's specifications and workplace requirements

PC18. provide treatment appropriate to the patient's injuries in accordance with recognized first aid techniques

PC19. recover (if practical), clean, inspect/test, refurbish, replace and store the first aid equipment as appropriate

PC20. report details of first aid administered in accordance with workplace procedures

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant legislation, standards, policies, and procedures at work

KU2. relevant health and safety requirements applicable to the work environment

KU3. own job role and responsibilities and sources of information pertaining to work

KU4. who to approach for support in order to obtain work related information, clarifications and support

KU5. importance of following health, hygiene, safety and quality standards and the impact of not following the standards on consumers and the business

KU6. personal hygiene and fitness requirement

KU7. importance of sanitization of the workplace

KU8. types of Personal Protective Equipment (PPE) required at the workplace and their importance

KU9. the correct and safe way to use materials and equipment required for the work

KU10. the importance of good housekeeping at the workplace

KU11. safe waste disposal methods

KU12. methods for minimizing environmental damage during work

KU13. the risks to health and safety including contagious diseases and the measures to be taken to control those risks in the area of work

KU14. workplace procedures and requirements for the prevention and treatment of workplace injuries/illnesses.

KU15. basic emergency first aid procedure

KU16. local emergency services

KU17. why accidents, incidents and problems should be reported and the appropriate actions to be taken

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. record the data as per the requirement

GS2. report problems to the appropriate personnel in a timely manner

GS3. read instruction manual for hand tool and equipments
GS4. communicate clearly and effectively with co-workers, and other stakeholders
GS5. comprehend information shared by senior people and experts
GS6. make decisions pertaining to personal hygiene and safety
GS7. schedule daily activities and draw up priorities
GS8. manage relationships with co-workers, manager and other stakeholders
GS9. assess situation and identify appropriate control measures

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Maintain personal hygiene	**10**	**5**	**-**	**10**
PC1. wash hands, legs and face with soap/alcohol based sanitizer at reasonable intervals	-	-	-	-
PC2. wash the worn clothes with soap and sun dry before use next time	-	-	-	-
PC3. ensure the face is covered with mask or three layers of cloth-piece	-	-	-	-
PC4. follow the workplace sanitization norms including distancing from sick people	-	-	-	-
Maintain clean and safe workplace	**15**	**15**	**-**	**15**
PC5. carry out basic safety checks before operation of all tools, implements, and machinery and report identified hazards to the supervisor	-	-	-	-
PC6. wear appropriate Personal Protective Equipment (PPE) while performing work in accordance with the workplace policy	-	-	-	-
PC7. follow the instructions mentioned on the labels of chemicals/pesticides/fumigants etc to avoid hazards	-	-	-	-
PC8. assess risks prior to performing manual handling jobs, and work according to currently recommended safe practices	-	-	-	-
PC9. sanitize equipment, tools and machinery before and after use	-	-	-	-
PC10. use equipment and materials safely and correctly and return the same to designated storage after use	-	-	-	-
PC11. dispose waste safely and correctly in the designated area	-	-	-	-
PC12. recognize risks to bystanders and take required action to reduce the risks	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. work in a manner which minimizes environmental damage, ensuring all procedures and instructions for controlling risks are followed	-	-	-	-
PC14. report any accidents, incidents or problems without delay to an appropriate person and take necessary immediate action to reduce further danger	-	-	-	-
PC15. follow government / workplace advisories incase of outbreak of any disease/disaster	-	-	-	-
Administer appropriate emergency procedures	**15**	**5**	**-**	**10**
PC16. follow procedures for dealing with accidents, fires and emergencies, including communicating location and directions to the location of emergency, as per the workplace requirements	-	-	-	-
PC17. use emergency equipment in accordance with manufacturer's specifications and workplace requirements	-	-	-	-
PC18. provide treatment appropriate to the patient's injuries in accordance with recognized first aid techniques	-	-	-	-
PC19. recover (if practical), clean, inspect/test, refurbish, replace and store the first aid equipment as appropriate	-	-	-	-
PC20. report details of first aid administered in accordance with workplace procedures	-	-	-	-
NOS Total	**40**	**25**	**-**	**35**

National Occupational Standards (NOS) Parameters

NOS Code	AGR/N9903
NOS Name	Maintain health and safety at the workplace
Sector	Agriculture
Sub-Sector	Generic
Occupation	Generic
NSQF Level	4
Credits	1
Version	4.0
Last Reviewed Date	22/10/2024
Next Review Date	22/10/2027
NSQC Clearance Date	22/10/2024

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. identify employability skills required for jobs in various industries

PC2. identify and explore learning and employability portals

Constitutional values – Citizenship

To be competent, the user/individual on the job must be able to:

PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.

PC4. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC5. recognize the significance of 21st Century Skills for employment

PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC7. use basic English for everyday conversation in different contexts, in person and over the telephone

PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC9. write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

To be competent, the user/individual on the job must be able to:

PC10. understand the difference between job and career

PC11. prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

To be competent, the user/individual on the job must be able to:

PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings

PC13. work collaboratively with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

PC14. communicate and behave appropriately with all genders and PwD

PC15. escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

PC16. select financial institutions, products and services as per requirement

PC17. carry out offline and online financial transactions, safely and securely

PC18. identify common components of salary and compute income, expenses, taxes, investments etc

PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

PC20. operate digital devices and carry out basic internet operations securely and safely

PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively

PC22. use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

To be competent, the user/individual on the job must be able to:

PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research

PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

To be competent, the user/individual on the job must be able to:

PC26. identify different types of customers

PC27. identify and respond to customer requests and needs in a professional manner.

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings

GS3. behave politely and appropriately with all
GS4. how to work in a virtual mode
GS5. perform calculations efficiently
GS6. solve problems effectively
GS7. pay attention to details
GS8. manage time efficiently
GS9. maintain hygiene and sanitization to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**2**	**4**	**-**	**-**
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
Career Development & Goal Setting	**1**	**2**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
Communication Skills	**2**	**2**	**-**	**-**
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**2**	**-**	**-**
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
Financial and Legal Literacy	**2**	**3**	**-**	**-**
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
Essential Digital Skills	**3**	**4**	**-**	**-**
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Entrepreneurship	**2**	**3**	**-**	**-**
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	**1**	**2**	**-**	**-**
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**3**	**-**	**-**
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	18/02/2025
Next Review Date	18/02/2028
NSQC Clearance Date	18/02/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.

3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/optional set of NOS.

4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).

5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.

6. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of % aggregate marks to successfully clear the assessment.

7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
AGR/N0801.Raise saplings in the nursery for transplanting in the garden	30	40	-	30	100	5
AGR/N0820.Raise, maintain, transplant and harvest seedlings	30	40	-	30	100	5
AGR/N0821.Assist in managing plant health and nursery operations	30	40	-	30	100	5
AGR/N0802.Prepare to set up the garden	30	40	-	30	100	5
AGR/N0803.Set up the garden as per the plan	30	40	-	30	100	5
AGR/N0843.Design, set up and maintain a rooftop garden	30	40	-	30	100	5
AGR/N0847.Carry out vertical gardening	30	40	-	30	100	5
AGR/N0848.Grow a bonsai tree	30	45	-	25	100	5
AGR/N1008.Carry out greenhouse operations and maintain the greenhouse	30	40	-	30	100	5

Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
AGR/N0822.Set up and maintain the hydroponic system and plants/ crop	30	40	-	30	100	5
AGR/N0846.Set up and maintain the aeroponic farm	30	40	-	30	100	5
AGR/N0823.Carry out harvesting, post-harvest management and marketing activities	30	40	-	30	100	5
AGR/N8102.Prepare for plant tissue culture	30	40	-	30	100	5
AGR/N8103.Carry out plant tissue culture	30	40	-	30	100	5
AGR/N8115.Transplant the tissue cultured plants and maintain records	30	40	-	30	100	5
AGR/N1011.Set up and maintain nursery under protected condition	30	50	-	20	100	5
AGR/N1013.Carry out protected cultivation of flower crops	30	45	-	25	100	5
AGR/N9908.Undertake basic entrepreneurial activities for small enterprise	30	40	-	30	100	5
AGR/N9903.Maintain health and safety at the workplace	40	25	-	35	100	5
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	5
Total	**600**	**795**	**-**	**555**	**1950**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.