



Model Curriculum

Hydroponics Technician

SECTOR: AGRICULTURE & ALLIED SUB-SECTOR: AGRICULTURE CROP PRODUCTION OCCUPATION: LANDSCAPING, GARDENING & URBAN FARMING REF ID: AGR/Q0808, v1.0 NSQF LEVEL: 4











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Hydroponics Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "<u>Hydroponics Technician</u>", in the "<u>Agriculture and Allied</u>" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Hydroponics Techniciar	ı				
Qualification Pack Name & Reference ID.	AGR/Q0808	AGR/Q0808				
Version No.	1.0	Version Update Date				
Pre-requisites to Training	Class 10, preferably					
Training Outcomes	AGR/Q0808 1.0 Version Update Date Class 10, preferably After completing this programme, participants will be able to: • Explore the way light, temperature and humidity interacts with horti crops and their connection to greenhouse plant physiology and environmental management • Assess water quality, characteristics of different treatment systems their application, what is plant food (composition) and understand th principal factors involving EC and pH • Understand the principal factors affecting environmental managem principles, systems and their management • Assess plant structure, photosynthesis, nutrition, characteristics of different root-zone factors and their application, plant food – how platake it, and understand the principal factors involving nutrient mana (including basic formula calculations) • Explore the impact irrigation strategies have on growing media and production (includes EC, pH, air composition, water content and df • Assess media types, characteristics, and their application, and und the principal factors affecting their selection • Identify common pests and characteristics of different diseases, an understand the principal factors involving integrated pest managem and how to implement bio-controls to control common greenhouse (i.e. spider mites, whitefly, thrips, fungus gnats, aphid, russet mite, mite, caterpillars, etc. • Familiarize with the basic principles underlying crop spraying (calcular volume, speed and pressure) for different types of systems • Monitor plant health, hydroponic environment, nutrient solution, peroutine maintenance che		vill be able to: v interacts with horticultural physiology and a treatment systems and h) and understand the commental management h, characteristics of plant food – how plants olving nutrient management growing media and crop ater content and drain %) application, and understand fferent diseases, and ated pest management mmon greenhouse pests aphid, russet mite, broad crop spraying (calculate of systems butrient solution, perform buse efficiency and energy f the produce			





This course encompasses <u>5</u> out of <u>5</u> National Occupational Standards (NOS) of "<u>Hydroponics</u> <u>Technician</u>" Qualification Pack issued by "<u>Agriculture Skill Council of India</u>".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	Introduction Theory Duration (hh:mm) 10:00 Practical Duration (hh:mm) 00:00 Corresponding NOS Code Bridge Module	 Understand general discipline in the class room (Do's & Don'ts) Illustrate the scope and importance of horticulture in India Familiarize with different plant components and plant food (composition) Familiarize with the sources of plant food, how do plants take food, importance of roots Familiarize with the types of hydroponics-solution culture and medium culture Familiarize with the different types of Hydroponic system- NFT – Nutrient Film Technique, DFT – Deep Flow Technique, Ebb & Flow, Wick System, Drip method, Aeroponics and their pros and cons Familiarize with the crops-food and fodder that can be grown using hydroponics system Understand the role of a Hydroponics Technician and the progression pathways 	Laptop, white board, marker, projector and speakers
2	Carry out hydroponic growth of plants and related operations Theory Duration (hh:mm) 10:00 Practical Duration (hh:mm) 70:00 Corresponding NOS Code AGR/N0822	 Identify the crops and their suitability to hydroponics system Explore the way light, temperature and humidity interacts with horticultural crops in the greenhouse, plant physiology and environmental management Assess water quality, characteristics of different treatment systems and their application Illustrate the principal factors involving EC and pH Assess plant structure, photosynthesis, nutrition, characteristics of different root-zone factors and their application, plant food Illustrate the principal factors involving nutrient management (including basic formula calculations) Undertake fertigation Explore how growers can easily save 40% on water use, 60% on fertilizer use 	Greenhouse / Polyhouse with ongoing hydroponic cultivation (media or solution based), temperature and humidity meter, EC and pH meter – 3 different types that are commonly used in India, , mister, fogger, circulatory fans, drip irrigation system with aero drippers, inner (net) curtain, automated fertigation and humidity control mechanism (sand filter, disc filter, motor, valves, pressure gauge), PAR meter (<i>Photosynthetically</i> <i>active radiation</i>)







Sr. No.	Module	Key Learning Outcomes	Equipment Required
		 and become environmentally sound and responsible Identify substrates for the growth of plants Assess media types, characteristics, and their application, and understand the principal factors affecting their selection Choose appropriate nursery medium for growth of plants Identify common pests and characteristics of different diseases Illustrate the principal factors involving Integrated Pest Management (IPM) and how to implement bio-controls to control common greenhouse pests Familiarize with the basic principles underlying crop spraying (calculate volume, speed and pressure) for different types of systems Carry out training and pruning of plants Monitor plant health, hydroponic environment, nutrient solution, perform routine maintenance checks, maximize greenhouse efficiency and energy conservation 	
3	Carry out harvesting, grading, storage and marketing activities in a hydroponics system Theory Duration (hh:mm) 10:00 Practical Duration (hh:mm) 25:00 Corresponding NOS Code AGR/N0823	 Familiarize with the concepts and importance of post-harvest management including cooling, cleaning, sorting, grading and packing Familiarize with the maturity indices of different crops and time of day to reap Carry out harvesting in the hydroponics system Explain the grading practices for different commodities Use various formats to maintain operations and production data at the hydroponics farm Ensure proper storage and marketing of the produce 	Laptop, white board, marker, projector and speakers
4	Manage requirements of a hydroponics system Theory Duration (hh:mm) 10:00 Practical Duration	 Estimate requirements for nutrient media Calculate requirements of seed grains in accordance with demand forecast Estimate water requirement for the hydroponics system Estimate and ensure electricity requirements of the hydroponics system Identify and characterize different types 	Calibrated containers and plates to measure run off (water), different types of media samples (coco peat, perlite, vermiculite, rock wool, etc.)







Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 30:00 Corresponding NOS Code AGR/N0824	 of growing media for hydroponics systems Maintain suitable conditions for optimum growth in a hydroponics system Develop the monitoring, recording and responding approach to good crop balance (includes 'reading' crop and tools to change balance) 	
5	Undertake basic entrepreneurial activities for small enterprise Theory Duration (hh:mm) 10:00 Practical Duration (hh:mm) 30:00 Corresponding NOS Code AGR/N9908	 Expose to various small enterprises related to hydroponics through case studies Work out the B:C ratio for hydroponics cultivation Identify different sources of funds/ subsidies and how to avail the same Identify target customers, demand and supply of commodities Understand different marketing channels Understand relevant legislation and rules Maintain marketing data and basic book keeping Demonstrate basic communication skills Demonstrate basic digital skills 	Laptop, white board, marker, projector and speakers
6	Ensure safety and hygiene in the hydroponics system Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 10:00 Corresponding NOS Code AGR/N0825	 Carry out proper drainage of nutrient water, seal any spillage that may occur and prevent birds and animals from accessing it Maintain a clean and efficient workplace Familiarize with the electrical equipment available in a hydroponic farm Report to the assigned supervisor in a timely manner Practise general safety and first aid 	Gloves, mask, cleaning equipment, Laptop, white board, marker, projector and speakers
	Total Duration: Theory Duration (hh:mm) 55:00 Practical Duration (hh:mm)	Unique Equipment Required: Greenhouse / Polyhouse with ongoing hydro (media and / or water based), temperature a meter, automated curtain operations, mister, fans, drip irrigation system with aero drippers Automated fertigation and humidity control m disc filter, motor, valves, pressure gauge), ca plates to measure run off (water), different ty	ponic cultivation nd humidity meter, EC fogger, circulatory s, inner (net) curtain, nechanism (sand filter, alibrated containers and pes of media samples





Sr. No.	Module	Key Learning Outcomes	Equipment Required		
	165:00	(Coco peat, perlite, vermiculite, rock wool, etc.), PAR meter,			
		Laptop, white board, marker, projector and speakers			

Grand Total Course Duration: 220 Hours, 0 Minutes

(This syllabus/ curriculum has been approved by Agriculture Skill Council of India)





Trainer Prerequisites for Job role: "Hydroponics Technician" mapped to Qualification Pack: "AGR/Q0808, v1.0"

Sr. No.	Area	Details
1	Description	Trainer is responsible for educating the trainees – Hydroponics Farming of different crops by different methods, managing of hydroponics system, operations modules and equipments with their usage and importance, harvesting and marketing of hydroponics produce, safety and hygiene at the workplace etc
2	Personal Attributes	Trainer should be Subject Matter Expert. He/ she should have good communication, leadership, observation and practical oriented skills.
3	Minimum Educational Qualifications	10+2
4a	Domain Certification	Certified for Job Role: "Hydroponics Technician" mapped to QP: <u>"AGR/Q0808"</u> . Minimum accepted score is 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q1402". Minimum accepted % as per respective SSC guidelines is 80%.
5	Experience	 MSc (Agriculture / Horticulture / Botany/Biotechnology/ Agriculture Engineering) with 1 year of relevant work experience B Tech / BSc (Agriculture / Horticulture / Botany/ Biotechnology/ Agriculture engineering) with 1 years of relevant work experience and a total of 2 years work experience Diploma in Agriculture [after10+2 Science] with 3 years of relevant work experience 10+2 (Biology Stream/Elective Agriculture) with 5 years of relevant work experience





Annexure: Assessment Criteria

Job Role Hydroponics Technician

Qualification Pack AGR/Q0808

Sector Skill Council Agriculture Skill Council of India

Guidelines for Assessment

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 proportion of marks for Theory and Skills Practical for each PC

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC

3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)

4. Individual assessment agencies will create unique evaulations for skill practical for every student at each examination/training center based on this criteria

5. To pass the Qualification Pack, every trainee should score a minimum of 70% in aggregate.

6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack







		Marks Allocation				
Assessment outcomes	Assessment criteria for outcomes	Total Marks	Out Of	Theor v	Skills Practical	
1. AGR/N0822: Carry out hydroponic	PC1. identify crops/plants suitbale for hydroponics:	100				
growth of plants and related operations	leafy vegetables such as, lettuce, spinach, fenugreek, coriander					
-	fodder crops such as sorghum, mai barley, oat, alfa-alfa, beseem, sesbania	ze,				
	 agronomical crop such as rice, maize, wheat, paddy, sugarcane 		4	1	3	
	 agro-forestry crop such as eucalypt Bamboo 	us,				
	medicinal and aromatic crops such as a vera, lemon grass, kaunch, tulsi	oe				
	sprouts such as green gram, black gra beans, radish, turnip, sunflower	m,				
	PC2. choose the crop to be grown based priority and market situation	on	3	1	2	
	PC3. choose the appropriate hydropo technique for growth based on following parameters:	nic ihe				
	space and other resources available					
	expected productivity		4	1	3	
_	 availability of suitable growing medium 					
	expected qualityof produce such as colour, appearance, etc		4			
	PC4. Identify different kinds of substrates to used for cultivation of vegetables a fruits, such as:	be ind		1	3	
	lava rocks					
_	clay pebbles					
	coco peat					
-	peat					
	PC5. choose substrate that does not cont too much salt or other elements that harmful to plants	ain are	3	1	2	
	PC6. choose an appropriate nutrient circulat method such as:	ion				
	nutrient film technique		4	1	3	
	deep flow technique (pipe system)					
	PC7. make holes in PVC pipes, in case of de flow technique	ep	3	0.5	2.5	
	PC8. attach plants placed in plastic net pots holes made in PVC pipes	to	3	1	2	
Ī	PC9. ensure the nutrient solution flo adequately through the pipes	WS	3	1	2	
	PC10. apply nutrient film technique especially the case of smaller quick growing pla with green leaves such as lettuce	r in nts	3	1	2	
	PC11. place plants in growing tubes and suspentities them over water	end	3	1	2	







PC12.	maintain a container (reservoir) to hold the nutrient solution required
PC13.	pump the nutrient solution to the tubes of the growing plants
PC14.	ensure that the roots of the plants get
PC15	use non circulating methods of nutrient
1 0 101	application in cases where applicable, such as:
	root dipping technique
	floating technique
	capillary action technique
PC16.	choose appropriate nursery growing medium for seed germination
PC17.	choose a medium with the following characteristics:
	moderately fertile
	sufficient water holding capacity
	good aeration capacity
	free from pests and disease causing
PC18.	use the following materials to raise
	seedlings:
	sand
	pear
PC19.	avoid using any medium to grow
	agronomical crops such as wheat, paddy,
	and fodder purpose
PC20.	sterilize the growing medium before
	usage
PC21.	select nursery containers for growth of plants such as clay pots, plastic pots
PC22.	use trays wherever required
PC23.	carry out cleaning of the pots and trays before sowing seeds
PC24.	carry out adequate application of nutrient
PC25.	provide artificial supporting structures and
D 000	train plants along those structures
PC26.	provide proper support especially in the
	varieties (tomatoes encumber) or crops
	bearing relatively beavy fruits (bell
	pepper, egg plant)
PC27.	tie polythene strings at the base of each
_	plant
PC28.	carry out irrigation of plants either manually or using drip irrigation system
PC29.	use fertigation techniques where suitable

3	1	2
3	1	2
3	1	2
4	1	3
3	1	2
4	1	3
4	1	3
3	1	2
3	1	2
3	1	2
3	1	2
3	1	2
3	1	2
3	1	2
3	1	2
3	0.5	2.5
3	1	2
3	1	2







	PC30.	mix fertilizers required for a particular crop with daily water requirement and apply manually or by using a fertigation system/nutrient tank		3	1	2
	PC31.	decide the amount of fertilizer to be used based on the type of crop to be grown, growth stage and the type of hydroponics technique to be used		3	1	2
				100	30	70
2. AGR/N0823: Carry	PC1.	identify the correct maturity age of the	100	9	2	7
grading, storage and marketing activities in a hydroponics system	PC2.	maintain reports on harvesting schedule and period of crops/plants to adhere to prescribed guidelines		9	2	7
	PC3.	ensure minimum damage to crops/plants during harvesting		9	3	6
	PC4.	discard any damaged or disfigured plants		9	2	7
	PC5.	carry out grading and classify into categories:				
		small		10	3	7
		medium		10	0	,
		large				
	PC6.	store the seeds, plants/crops in cool dry locations		9	3	6
	PC7.	ensure proper aeration during storage		9	3	6
	PC8.	pack produce in small packets for selling purposes		9	3	6
	PC9.	ensure proper labelling of the packets		9	3	6
	PC10.	ensure proper aeration during transportation of plants		9	3	6
	PC11.	coordinate effectively with the transportation vendor		9	3	6
		i		100	30	70
3. AGR/N0824: Manage requirements	PC1.	maintain the PH of the nutrient solution in the prescribed range (5.8 to 6.5)	100	10	3	7
of a hydroponics system	PC2.	maintain adequate nutrient solution temperature, and counter any increase in temperature		10	3	7
	PC3.	ensure that there is ample oxygen dissolved in the nutrient solution		10	3	7
	PC4.	maintain adequate air space between between nutrient solution and roots of plants		10	3	7
	PC5.	ensure adequate light, is available for the plants being grown in the system		10	3	7
	PC6.	use pest and disease free seedlings, planting materials for establishment of hydroponic crops		10	3	7
	PC7.	clean the system regularly using solution of chlorine, and flush the system with clean water before replanting		10	3	7
	PC8.	ensure proper support is available to plants and crops during growth		10	3	7
	PC9.	keep the environment of hydroponic plants clean		10	3	7
	PC10.	carry out artificial pollination by means of blowers and mechanical vibrators so as to improve air quality within the protected		10	3	7







		structures				
				100	30	70
4. AGR/N9908: Undertake basic	PC1.	seek information regarding demand and supply of produce in the market		10	3	7
entrepreneurial activities for small enterprise	PC2.	identify target customers and assess their needs such as amount required, purpose, quality, expectations, etc.	100	10	3	7
	PC3.	perform basic accounting such calculating expenditure incurred, costing and pricing of produce		10	3	7
	PC4.	ensure that the cost of production, transportation and marketing are included in costing and pricing		10	3	7
	PC5.	collect information related to various subsidies/funds offered by the government, authorized state units and other financial institutions involved with the promotion of the produce		10	3	7
	PC6.	comply with relevant regulations in marketing of the produce		10	3	7
	PC7.	track information related to wholesale and retail price of the produce		10	3	7
	PC8.	record daily sell and purchase of items in designated log books, register, etc.		10	3	7
	PC9.	record quantity, quality, date of manufacture and batch number of every produce accurately		10	3	7
	PC 10.	identify appropriate marketing channels related to the produce considering requirements and constraints		10	3	7
				100	30	70
5. AGR/N0825: Ensure safety and hygiene in the hydroponics system	PC1.	clean and monitor the condition of motors controlling water tanks, pumps and growing trays		5	1	4
	PC2.	use clean water in the hydroponic system	100	5	2	3
	PC3.	soak good quality grain as per standards and prevent oversoaking of grains		6	1	5
	PC4.	clean the floor of the hydroponic system on a regular basis		5	1	4
	PC5.	carry out proper drainage of rain water through ground gutters		6	1	5
	PC6.	clean the tank on a regular basis		5	2	3
	PC7.	check for any salt deposits in pipes and prevent any sort of choking		5	2	3
	PC8.	avoid putting grains across holes of growing trays to avoid water logging		5	2	3
	PC9.	carry out misting of water to crops when		6	1	5
	PC10.	use exhaust fans to prevent build up of heat in the system due to excessive sunlight		6	1	5
				5	1	4
	PC11.	avoid using dirty growing trays		5	1	т
	PC11. PC12.	avoid using dirty growing trays detect pests and carry out removal as per standard guidelines		5	2	3







PC14. h rig pre	nandle all tools and equipments in the ght manner so that injuries are evented		5	2	3
PC15. ca an pre it	arry out proper drainage of nutrient water nd seal any spillage that may occur and revent birds and animals from accessing		6	1	5
PC16. d eq	detect shortcircuits and use firefighting quipment where required		5	2	3
PC17. us lab m	se gloves, dedicated shoes/ slippers and b coat for hydroponic nachine/system operation		5	2	3
PC18. us	se first aid kit as and when required		5	2	3
PC19. fo de	ollow organization's safety protocol when ealing with accidents and emergencies		5	2	3
			100	30	70
GRAND TOTA	AL	500	500	150	350