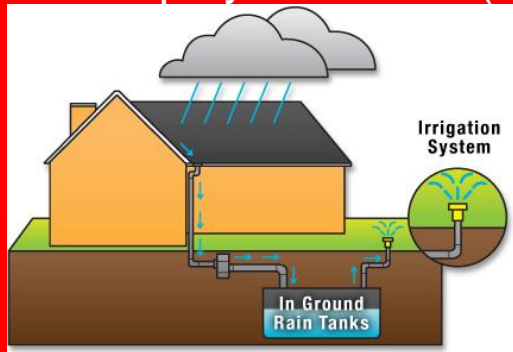


Rain Water Harvesting Sector



Course curricula for
Modular Employable Skills (MES)



Director General of Employment and Training
Ministry of Labour and Employment
Government of India

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Modular Employable Skills (MES)

1. a Background

Number of forums have emphasised the need for the skill development, especially for the less educated, poor, women, handicaps and out of school youth. The skill level and educational attainment of the work force determines the productivity, income levels as well as the adaptability of the working class in changing environment. Large percentage of population in India is living below poverty line, the main reason being the lower percentage of skilled persons in the workforce.

The skill development at present is taking place mostly in the informal way, i.e. persons acquire skill at the work-place when they help their parents, relatives and employers etc. Such persons do not have a formal certificate and thus earn lower wages and are exploited by employers. They have come through informal system due to socio-economic circumstances of the family and the compulsions of earning a livelihood rather than attending a formal course. While their productivity is low, their contribution to the national GDP cannot be ignored. If the country can create a system of certification which not only recognizes their skills but also provides education and training in a mode that suits their economic compulsions, it will not only benefit the workforce to earn a decent living but also contribute to the national economy by better productivity of this workforce.

Another related problem is the large number of students drop outs (About 63% of the school students drop out at different stages before reaching Class-X). Women discontinue education at one stage feels insecure and loneliness. Physically handicapped and mentally disabled are dependent on others for their entire life.

The third problem is that the industries are facing shortage of skilled people to operate the machines and produce the materials, and the skills available are not adequate considering the changing requirement of the technology.

1. b. Frame work for Skill Development based on ‘Modular Employable Skills (MES)’

Very few opportunities for skill development are available for the above referred groups i.e. out of school youth and existing workers especially in the informal sector. Most of the existing Skill Development programmes are long term in nature. Poor, women, handicaps and less educated persons cannot afford long term training programmes due to higher entry qualifications, cost etc. Therefore, new frames work for Skill Development for the Informal Sector has been evolved by the DGET to address to the above mentioned problems. The key features of the new frame work for skill development are:

- Demand driven short term training courses based on modular employable skills decided in consultation with Industry.
- Flexible delivery mechanism (part time, weekends, full time)
- Different levels of programmes (Foundation level as well as skill up gradation) to meet demands of various target groups.
- Central Government will facilitate and promote training while Vocational Training Providers (VTP) under the Government and Private Sector will provide training
- Optimum utilization of existing infrastructure to make training cost effective.

- Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially.
- Testing and certification of prior learning (skills of persons acquired informally)

The Short Term courses would be based on ‘Modular Employable Skills (MES).

The concepts for the MES are:

- Identification of ‘minimum skills set’ which is sufficient to get an employment in the labour market.
- It allows skills up-gradation, multiskilling, multi entry and exit, vertical mobility and life long learning opportunities in a flexible manner.
- It also allows recognition of prior learning (certification of skills acquired informally) effectively.
- The modules in a Sector when grouped together could lead to a qualification equivalent to National Trade Certificate or higher.
- Courses could be available from level 1 to level 4 in different vocations depending upon the need of the employer organizations.
- MES would benefit different target groups like :
 - ✓ Workers seeking certification of their skills acquired informally
 - ✓ Workers seeking skill upgradation
 - ✓ Early school drop-outs and unemployed
 - ✓ Previously child labour and their family

1. c. Age of participants

The minimum age limit for persons to take part in the scheme is 14 years but there is no upper age limit.

1. d. Curriculum Development Process

Following procedure is used for developing course curricula

- Identification of Employable Skills set in a Sector based on division of work in the labour market.
- Development of training modules corresponding to skills set identified so as to provide training for specific and fit for purpose
- Organization of modules in to a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, pre requisites for higher level modules and how one can progress from one level to another.
- Development of detailed curriculum and vetting by a trade committee and by the NCVT (Close involvement of Employers Organizations, State Governments, experts, vocational training providers and other stake holders is ensured at each stages).

1. e. Development of Core Competencies

Possession of proper attitudes is one of the most important attribute of a competent person. Without proper attitudes, the performance of a person gets adversely affected. Hence, systematic efforts will be made to develop attitudes during the training programme.

The trainees deal with men, materials and machines. They handle sophisticated tools and instruments. Positive attitudes have to be developed in the trainees by properly guiding them and

setting up examples of good attitudes by demonstrated behaviours and by the environment provided during training.

Some important core competencies to be developed are:

1. Safety consciousness and safe working practices
2. Care of equipment and tools
3. Punctuality, discipline and honesty
4. Concern for quality
5. Respect for rules and regulations
6. Concern for health and hygiene
7. Cordial relationship and Cooperation with co-workers and team work
8. Positive attitude and behaviour
9. Responsibility and accountability
10. Learn continuously
11. Communication skills
12. Concern for environment and waste disposal

Following competencies should also be developed during level-II and higher courses:

1. Ability for planning, organizing and coordinating
2. Creative thinking, problem solving and decision making
3. Leadership
4. Ability to bear stress
5. Negotiation

1. f. 6. Duration of the Programmes

Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different backgrounds and experience. Duration has been prescribed in hours in the curriculum of individual module, which are based on the content and requirements of a MES Module. However, some persons may take more time than the prescribed time. They should be provided reasonable time to complete the course.

1. g. Pathways to acquire Qualification:

Access to the qualification could be through:

- An approved training programme;
Or
- A combination of an approved training programme plus recognition of prior learning including credit transfer;
Or
- The recognition of prior learning that provides evidence of the achievement of the competencies for the qualification.

1. h. Methodology

The training methods to be used should be appropriate to the development of competencies. The focus of the programme is on “Performing” and not on “Knowing”. Lecturing will be restricted to the minimum necessary and emphasis to be given for ‘Hands on training’.

The training methods will be individual centred to make each person a competent one. Opportunities for individual work will be provided. The learning process will be continuously monitored and feedback will be provided on individual basis.

Demonstrations using different models, audio visual aids and equipment will be used intensively.

1. i. Instructional Media Packages

In order to maintain quality of training uniformly all over the country, Instructional Media Packages (IMPs) will be developed by the National Instructional Media Institute (NIMI), Chennai.

1. j. Assessment

DGE&T will appoint assessing bodies to assess the competencies of the trained persons. The assessing body will be an independent agency, which will not be involved in conducting the training programmes. This, in turn, will ensure quality of training and credibility of the scheme. Keeping in view the target of providing training/testing of one million persons through out the country and to avoid monopoly, more than one assessing bodies will be appointed for a Sector or an area.

1. k. Certificate

Successful persons will be awarded certificates issued by National Council for Vocational Training (NCVT).

1. l. MES courses approved by NCVT

The NCVT released a list of 340 approved courses on 15th September 2008, i.e. on the Engineers day (128th birth day of Sir. M. Visweswariah). The courses were allotted 6 digit alpha numerical codes with the following formula

From Left side:

1st, 2nd and 3rd digits –Sector Codes (Alpha Codes)

4th digit – Level Code (1 for level 1, 2 for level 2, 3 for level 3 and so on. As the level increases, the position in the industry also increases)

5th and 6th digits – Course serial number (separate series for courses at same level with in each 2. Sector)

1. m. The Rain Water Harvesting Sector

Rainwater harvesting can enable households, factories, schools and offices to overcome their problems of irregular and inadequate water supply or water supply of poor quality. The process involves storing rainwater that falls within one’s premises and re-using it after basic treatment. By using equipment that is easily available, rainwater is diverted towards existing underground tanks or terrace connected tanks and then supplied to the taps. The purification methods used

by households, factories and offices can be used to treat rainwater. Treated rainwater is safe not just for cleaning and washing but also for cooking and personal consumption. The amount of rainfall notwithstanding, people living and working in various types of geographical terrains can harvest rainwater. In the long run, rainwater harvesting will replenish the India's rapidly depleting ground water levels, and lead to water security and sustainability.

Rain water harvesting is made compulsory in many states considering the deforestation and reduction in ground water level. It is therefore essential to train more people in the field of rain Water harvesting, so that all houses can be equipped with this system and save the earth from drying up.

1. n. The members of the Sectoral Skill Panel for Rain water harvesting Sector

Sectoral Skill Panel - Cinema Industry			
Sr. No	Name	Address	Phone And Email
1	Mr. S. J. Amalan	Director, Apex Hi-Tech Institute, Bangalore and Regional Director D.G.E.T, Ministry of Labour and Employment, Karnataka, Andhra Pradesh and Orissa.	sjmalan@yahoo.co.in 080-23378335 +(91) 0 9880361079
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3	Mr. B. Purushothama	Consultant – QMS and Textiles, B-17, Jayanthi Apartments, 13th cross, 4th Main, Malleswaram, Bangalore 560003	purushothama1949@yahoo.co.in +(91) 0 9448864028 080-23461512
4	Mr. Ravikumar.S	Chief consultant Green Technologies, Bangalore	Email: greenstech@gmail.com Phone: 9900969798, 9448571861
5	Mr. Gopala Rao B. S	Water Expert City Managers Association Karnataka, Bangalore	Email: bs_karanth@yahoo.co.in Mb: 9448093165
6	Mr. Satish	Training co-ordinator SAMVAD, Bangalore	Email: katsatish@rediffmail.com Mb: 9449359156
7	Mr. Vikshut Mundkur	Project co-ordinator Green Commandos, Bangalore	Email: vikshut@gmail.com Mb: 9945429131

8	Satish. V	Proprietor Sri Vinayaka Traders, Bangalore	Mb: 9844065326
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2. Two modules are identified in this sector. They are as shown in the table – 2

Sr.No	Code	Module	Entry Qualification	No of hours
1	RWH 101	Assistant Rainwater Harvester	7 th Std	200
2	RWH 201	Rain Water Harvester	7 th std + RWH 101	300

LEVEL – 1

1. Module Name:	Assistant Rainwater Harvester	
2. Sector:	Rain Water Harvesting	
3. Code:	RWH-101	
4. Entry Qualification:	7 th Standard	
5. Age:	18 Years & above	
6. Duration:	200 hours	
7. Terminal Competency	<ul style="list-style-type: none"> ▪ Shall be able to identify, select and practically use the plumbing tools. ▪ Should be able to identify, select and know the use of plumbing materials and fittings. ▪ Should be well versed with the safety procedures with selection and use of safety tools and equipments. ▪ Should have knowledge of good housekeeping practices, Handling of materials and waste disposal. ▪ Should be able to prepare cement sand mortar, perform chase cutting in wall and filling the chase with mortar. ▪ Should be able to perform cutting, threading of GI pipes. Should be able to tighten the GI pipe line and specials after fitting done by plumber. Should be able to perform supporting activities on wall like drilling, nailing, clipping and hammering. ▪ Should be able to fix PVC pipes and fittings. ▪ Should be able to identify the rainwater harvesting components ▪ Should be able to identify different types of ground water recharge structures 	
8. Course Contents		
Practical Competencies	Underpinning Knowledge(Theory)	
<ul style="list-style-type: none"> ▪ Basic principles of plumbing ▪ Basic principles of Rainwater harvesting ▪ identification of tools and equipments used in plumbing works ▪ Use of protective clothing, boots, goggles and equipment as applicable to a task ▪ Good housekeeping practices, proper handling of materials and waste disposal. ▪ Safety precautions and safety belts while working at site 	<ul style="list-style-type: none"> ● Role of assistant Rainwater Harvester ● Description of trade ● Different types of tools and equipments used in plumbing works. ● Safety precautions ● While using different hand tools ● While using raw materials ● With co-workers ● On the machines & equipments 	

<ul style="list-style-type: none"> ▪ Store/lay materials at work in safe manner ▪ Measurement. Mm, cm, inch, foot, meter ▪ Area. Square foot, square meter, acre ▪ Volume. Cubic meter, cubic foot ▪ Conversions. Square foot to square meter, cubic foot to cubic meter. 	<ul style="list-style-type: none"> • Knowledge of measurements and its conversion to other system
Identification of different types of pipes & specials used in rainwater harvesting works	Knowledge of various pipes and specials with their specific uses.
Preparation of cement mortar and performing chase cutting and mortar filling	Knowledge of operations with PVC Pipes
Carry out operations on PVC pipes – cutting, Gluing, & washer tightening	Knowledge of various plumbing fittings
Carry out operations on walls & Ceiling – drilling, nailing, clipping, finishing and hammering	
Carry out fixing PVC pipes to fittings and prepare joints	Encasing activity with cement concrete around Rain water pipes
Replacement of old/ broken fixtures and fittings	
Identification of different types of Rainwater harvesting components and knowledge about its functioning	Catchment's area, rainwater pipes/gutters, first flush/first rain separator system, filters, recharge structures.
Identification of different types of Recharge structures and knowledge about its functioning	Percolation pit, bore well recharge pit, recharge trench, barrel method, recharge wells.
Preparing rooftop area for rainwater harvesting	Cleaning the rooftops for age growth, filling up the cracks, clearing unwanted material from the rooftop, trimming/cutting branches of trees and shrubs overlapping rooftop area. Fixing traps at rainwater inlets
Channelize all given rainwater down pipes to a given point	Maintain the slop and size of the pipe for free flow of water
Install the first flush system with necessary air vent	Fixing clamps at appropriate distance and fixing door bend and. gate valve.
Installing the given rainwater filter	Identification of the suitable location for placing filter, fixing inlet and outlet, and diverting filtered water to the given point.
Construction rainwater storage structure	Construction of underground sump-tank, Surface level water tank, and rain barrel

	system,
Construction of sand bed filter using brick and mortar	Construction of the 3chamber sand bed to the given site/catchment's area, using cement and mortar and required filter media

LEVEL - 2

1. Module Name:	Rainwater Harvester
2. Sector:	Rain Water Harvesting
3. Code:	RWH - 202
4. Entry Qualification:	7 th Standard + RWH 101
5. Age:	18 Years & above
6. Duration:	200 hours
7. Terminal Competency	<ul style="list-style-type: none"> ▪ Should be able to identify, select and practically use the plumbing tools. ▪ Should be able to identify, select and know the use of plumbing materials and fittings. ▪ Should be well versed with the safety procedures with selection and use of safety tools and equipments. ▪ Should have knowledge of good housekeeping practices, Handling of materials and waste disposal. ▪ Should be able to fix Taps and Valves ▪ Should be able to perform cutting, threading, bending and jointing of GI pipes on ceiling and walls. ▪ Should be able to perform cutting, bending and jointing of PVC pipes on floors, walls. & ceiling ▪ Should be able to install water pumps and connect to supply lines. ▪ should be able study do site specific rainwater harvesting audit based on clients requirement ▪ Should be able to calculate the quantity of possible rainwater collection in the given site ▪ Should be able collect and study the rainfall pattern of the given region (minimum past 20 years of rainfall pattern) ▪ Should be able to prepare the cost effective and site specific rainwater harvesting system design plan. ▪ Should be able to assess the requirement of materials for a specific work. ▪ Should be able to calculate the quantum of work done
8. COURSE CONTENTS	

Practical Competencies	Underpinning Knowledge(Theory)
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<ul style="list-style-type: none"> • Identification of tools and equipments used in plumbing work • Use of protective clothing, boots, goggles and equipment as applicable to a task • Good housekeeping practices, proper handling of materials and waste disposal. • Safety precautions and safety belts while working at site • Store/lay materials at work in safe manner • Use and store of tools and equipments in a safe manner • Measurement length & dia in MKS & FPS system 	<ul style="list-style-type: none"> • Role of Rainwater Harvester. • Description of trade • Different types of tools and equipments used in rainwater harvesting work. • Safety precautions • While using different hand tools • While using raw materials • On the machines & equipments • Study of various types of plumbing materials used in rainwater harvesting work <ul style="list-style-type: none"> ▪ Knowledge of measurements and its conversion to other system
<p>Taps & Valves Given a selection of taps and valves and following demonstration by instructor the trainee will dismantle taps & Valves, inspect packing glands and washers, replace packing gland and washers, adjust locking nuts ensuring no leaks when tested.</p>	<p>Working principles and methods of testing. Use of basic tools and bench vice. Safe handling of tools and fittings. Types of gland packing.</p>
<p>P.V.C. Pipe Bending From a given sketch, calculate and measure length & size of pipe, fittings,& fixtures required, mark out and cut to size. Bend P.V.C. pipe to 5 times diameter of pipe:- Pipe diameter to be maintained no distortion. Free from abnormal marks.</p>	<p>Use of hand tools, Marking out for bending. Use of blowlamp and flame control. Uniform heating. Avoidance of burning. Bending on former.</p>
<p>P.V.C. Jointing From a given sketch and with necessary tools join p.v.c. pipe with socket joints so that joint length is not less 1.5 time pipe diameter. Assemble exercise and secure with solvent cement to tolerance of $\pm 2\text{mm}$ & square to $\pm 1^\circ$.</p>	<p>Use of hand tools, beveling reamer, applying heat with blow lamp. Preparation of Socket, Cleanliness. Application of solvent cement assembly methods.</p>

Installing Water Pump, Connecting Supply Pipe Position, level, fix and secure pump to pump base. Connect supply pipes, foot valves etc to ensure air tight connections. Test to meet by-laws in local authority.	Working principles of water pump and foot valve. Methods of connection.
Prepare a rainwater harvesting site audit report	Study the hydro geological aspects, already available water structures such as water storage tanks, bore well, open well, challenges if any , and the client requirement of the given site
Preparing the rainwater harvesting system design plan	Identification of cost effective and best possible rainwater harvesting components and rainwater harvesting structures to the given site
Preparing site specify and need specific filter design and filter media	Selection and preparing filter media to be used in sand bed filter Sponge traps method, First flush system, Silt trap, Sand bed filter, using commercially available rainwater filters.
Understanding and preparing need specific rainwater storage structure	Calculating and designing rainwater storage structure in the available space, design should include all safety precaution, position of maintenance lids, air vent, rainwater inlet location,
Preparing site specify and need specific artificial ground water recharge structure design	Percolation pit, Bore- well recharge pit, gravity feed system, Recharge well, Barrel method, recharge trench, check dams, sub surface dykes, injection wells,

LIST OF TOOLS AND MATERIALS

For courses

„Assistant Rainwater Harvester and Rainwater Harvester

S.No.	Description	Unit	Quantity		Total
			Display	Training	
1	Pipe Wrench (Size No.8) & (Size No.12)	Set		6 each	12
2	Wooden Bench (3' x 6' height - 4')	Nos		3	3

3	Hammer Sledge (2 pound) & (1 pound)	Nos		4 each	8
4	Flat Chisel (1') & Point Chisel (1')	Nos		5 each	10
5	Flat Punch (1/2') & Point Punch (1/2')	Nos		5 each	10
6	Rawel Jumper Bit set (6 mm) & (8 mm)	Nos		5 each	10
7	Spanner Set (Double End)	Set		2	2
8	Spirit Level (length 2 feet)	Nos		5	5
9	Tube Level (1/4" Hose White)	Mtr		30	30
10	Screw Spanner (Size No.12)	Nos		5	5
11	Screw Driver (1 1/2 feet) & (1 feet)	Nos		5 each	10
12	Grip Plier (266 - 10)	Nos		5	5
13	Pocker (Tapuria 871)	Nos		5	5
14	Cutting Pliers - Taparia	Nos		5	5
15	Hacksaw Frame with Blade	Nos		10	10
16	Try Square (small)	Nos		5	5
17	Plum Bob (Small)	Nos		5	5
18	Cocking Chisel (1 1/4")	Nos		4	4
19	Blow lamp	Nos		4	4
20	Trowel Mason (small) & (Big)	Nos		5 each	10
21	Spade with handle	Nos		5	5
22	Mortar Pan	Nos		5	5
23	Hand Drilling Machine	Nos		1	1
24	Cleaning Brush & Painting Brush (2")	Nos		5 each	10
25	Hand Bending Machine (1/2" to 1")	Nos		3	3
26	Ladder (10 feet height)	Nos		2	2
27	Measuring Tape (5m)	Nos		5	5
28	Spun Yarn	Kg		50	50
29	Hydraulic Pressure Test Pump	No.		1	1
30	Safety Belt			5	5