CURRICULUM

FOR THE TRADE OF

Concrete Lab Technician

UNDER

APPRENTICESHIP TRAINING SCHEME

GOVERNMENT OF INDIA

MINISTRY OF SKILL DEVELOPMENT AND ENTREPRENEURSHIP

DIRECTORATE GENERAL OF TRAINING

1. Category of trade : Non-Engineering

2. Name of the Trade :Concrete Lab Technician

3. Duration of Apprenticeship Training : **24 Months**

Break up of the Apprenticeship Training

(i) Duration of Basic Training : 6 (3+3) months / 1200 Hrs

(ii) Duration of Practical Training/ On-the-job Training: 18 (9+9) Months

4. Entry Qualification : **10th Pass**

(A) <u>Basic training components</u>

(i) Employability Skills – 110 Hrs

(ii) Basic numeracy - 50 Hrs

(iii) Trade theory - 120+120 Hrs

(iv) Trade practical - 400+400 Hrs

(B**Practical Training/On-the job training** : 18 Months

CONTENTS

1. ACKNOWLEDGEMENT

L&T Construction Corporate Centre, HQ, sincerely acknowledges with thanks the contribution and cooperation extended by the Construction Skills Training Institutes and project sites of L&T projects, Trade Experts, Subject Matter Experts and all others to bring out this curriculum for the trade of **Concrete Lab Technician(under Testing, Research and Development)** under Apprenticeship Training Scheme.

Special acknowledgement to the following departments in L&T Construction who have contributed valuable inputs in bringing out this curriculum through their expert members:

1. Competency Development Centre
2. Skills training institutes Facilities & Management Team
3. Principals and Master Trainers
4. Subject Matter Experts from respective department
5. VACUM (Vocational Curriculum) Development team of L&T Construction Skills Training Department

2.

2. BACKGROUND

2. 1. Apprenticeship Training Scheme under Apprentice Act 1961

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

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

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

2. 2. Changes in Industrial Scenario

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

2. 3. Reformation

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

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

3. RATIONALE

[Need for Apprenticeship asConstructionworks]

In a construction industry, the identification and selection of most important construction trades, which covers almost 80% of the construction work activities. These trades cover Bar bending, Masonry, Formwork, Plumbing, Finishing-Tiling, Lab Technician, Surveyor, Electrician, Welding, CCTV, Optical Fibre Cable (OFC) and all sectorial activities. It will covers the Construction, Installation & Surveillance and Infrastructure industries.

The greater degree of relevance of the training with latest advancements of the industry will enhance the employability opportunities.

1. Identify, select, handle, and use the basic hand tools and small equipments.
2. Identify, select, handle, and use materials and consumables.
3. Use personnel protective safety equipments.
4. Dispose waste/debris and perform good housekeeping.
5. Prepare and mix Cement mortar to specified proportions
6. Test cement for normal consistency.
7. Test cement for Initial setting time.
8. Test cement for Final setting time.
9. Cast cement mortar cubes.
10. Test cement mortar cubes.
11. Conduct Sieve analysis test of coarse aggregate.
12. Conduct Sieve analysis test of fine aggregate.
13. Test the specific gravity of coarse aggregate.
14. Test the water absorption of Coarse aggregate.
15. Test the moisture content of coarse aggregate.
16. Test the slump of concrete.

17. Cast concrete cubes.
18. Test the compressive strength of concrete cubes.
19. Test the Impact value of coarse aggregate.
20. Test the Crushing value of coarse aggregate
21. Test Los Angles abrasion of coarse aggregate
22. Test the Flakiness index of coarse aggregate.
23. Test the Elongation index of coarse aggregate.
24. Test the soil for Optimum Moisture Content and Maximum Dry Density for compaction
25. Test the compaction at field by core cutter method
26. Test the compaction at field by sand replacement method

4. JOB ROLE

Brief description of Job role:

Concrete lab Technician Tradeis one of the basic trade in Construction Industry which is common to all type of Constructions and has variance with respect to specificrequirements of the Project.

Brief Job Description of Concrete lab Technician: A Concrete lab Technicianworks in the lab, site lab, field on all Concrete/Soil/Asphalt related activities, samples the materials, organize and test the materials samples, data entry of results, calculation of test results, and interpretation of results. He also assists the lab incharge in setting out the lab and upkeep maintenance of lab equipment / instruments

5. LEARNING OUTCOMES

A. GENERIC OUTCOME

- Recognize & comply safe working practices, environment regulation and housekeeping.
- Work in a team, understand and practice soft skills, technical English to communicate with required clarity.
- Understand and explain the concept in quality tools and labour welfare legislation and apply such in day to day work to improve productivity & quality.
- Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
- Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
- Understand and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry.

B. SPECIFIC OUTCOME

The Trainees will be able to

- Identify, select, handle, and use the basic hand tools and small equipments.
- Identify, select, handle, and use materials and consumables.
- Use personnel protective safety equipments.
- Dispose waste/debris and perform good housekeeping.
- Prepare and mix Cement mortar to specified proportions
- Test cement for normal consistency.
- Test cement for Initial setting time.
- Test cement for Final setting time.
- Cast cement mortar cubes.
- Test cement mortar cubes.

- Conduct Sieve analysis test of coarse aggregate.
- Conduct Sieve analysis test of fine aggregate.
- Test the specific gravity of coarse aggregate.
- Test the water absorption of Coarse aggregate.
- Test the moisture content of coarse aggregate.
- Test the slump of concrete.
- Cast concrete cubes.
- Test the compressive strength of concrete cubes.
- Test the Impact value of coarse aggregate.
- Test the Crushing value of coarse aggregate
- Test Los Angles abrasion of coarse aggregate
- Test the Flakiness index of coarse aggregate.
- Test the Elongation index of coarse aggregate.
- Test the soil for Optimum Moisture Content and Maximum Dry Density for compaction
- Test the compaction at field by core cutter method
- Test the compaction at field by sand replacement method

6. GENERAL INFORMATION

1.	Name of the Trade	:	Concrete Lab Technician
2.	Duration of Apprenticeship Training	:	24 Months
	Basic Training	:	6 Months
	Practical Training	:	18 Months
3.	Duration of Basic Training	:	
	a. Block –I	:	3 months
	b. Block - II	:	3 months
4.	Total duration of Basic Training	:	6 Months
5.	Duration of Practical Training (On -job Training)	:	18 Months
6.	Entry Qualification	:	10^{th} Pass
7.	Selection of Apprentices	:	The apprentices will be selected asper Apprenticeship Act amended time to time.
8.	Rebate for ITI passed trainees	:	NA

Note: *Industry may impart training as per above time schedule, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspect is compromised and duration of industry training to be remains as 1 year.*

7. COURSE STRUCTURE

Training duration details:-

Time (in months)	**1-3**	**4-12**	**13-15**	**16-24**
Controlled Condition training	Part A	-------	Part B	------
On-job training	-----	Part A	------	Part B

Components of training	Duration of training in Months																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Controlled Condition Training Part A																								
On Job Training, Part A																								
Controlled Condition Training Part B (@ site)																								
On Job Training, Part B																								

8. SYLLABUS

8.1 BASIC TRAINING

(Part A & B)

DURATION: 06 MONTHS

GENERAL INFORMATION

1)	Name of the Trade	:	Concrete Lab Technician
2)	Hours of Instruction	:	800 Hrs.
3)	Batch size	:	20
4)	Power Norms	:	NA
5)	Space Norms	:	NA
6)	Examination	:	The internal assessment will be held on completion of each Block.
7)	Instructor Qualification	:	

a) Degree/Diploma in Engineering or Masters from recognized university/Board with one/two year post qualification experience respectively in the relevant field.

8)Tools, Equipment's & Machinery required: - As per Annexure – I

8.1.1 Details of Syllabus of Core Skill

COURSE CONTENTS:-

Introduction to Basic Competencies
• IntroductiontoTrade anddutiesof "CONCRETELAB&FIELDTECHNICIAN" • Occupationalhealthhazards,Personal ProtectiveEquipments(PPE)usage • Introduction,Handling,StoringandMaintenanceofTools,Materials,ConsumablesandSmallEquipments • Understandingtolerancelimits,measuringinMKSsystem,fieldtestingofMaterialsandConsumables.

Controlled Condition Training (Part A and Part B)

Duration: 6 Months (3 Month in each part)

Controlled Condition Training, Part A: 3 Months

PracticalCompetencies	UnderpinningKnowledge(Theory)
Testson Cement	IntroductionofCementanditsphysicalandchemicalproperties UnderstandIS:4031(Part1)-1996,IS:4031(Part4)–1988,IS:4031(Part5)–1988,IS:4031(Part3)–1988 and IS: 4031 (Part6)-1988 Knowledge of tools andequipmentsused inTestoncement ProcedureforconductingtestoncementsObservationtables Calculationofresult Housekeeping Safetypractices
Fineness To determinethefineness ofcementbydrysieving	
Consistency To determinethequantityofwaterrequired toproducea cementpasteofstandardconsistency	
Initialandfinalsettingtime To determinetheinitialandthefinalsettingtime ofcement	
Compressivestrengthfor3day, 7daysand28days To determinetheCompressivestrengthfor3day,7daysand 28days ofcement	
Testson Aggregates	IntroductionofFineand Coarseaggregateand itsproperties UnderstandIS:2720(Part 4) –1985, IS:2386(Part III)–1963,IS:2386(PartIV)–1963,IS:2386(PartI)-1963 Knowledge of toolsandequipmentsused inTestonAggregates
Sieveanalysis To determinetheparticlesizedistributionoffineandcoarsea	

Waterabsorption For determination ofspecificgravity&waterabsorptionofaggregates	ProcedureforconductingtestonAggregatesObservationtables Calculationofresult Housekeeping & Safetypractices
Aggregateabrasionvalue For determination oftheaggregateabrasionvalueof coarseaggregate	
Aggregateimpactvalue To determinetheaggregateimpactvalueofcoarseaggregate, which passes12.5mmISsieve and retainedon 10 mm ISsieve.	
FlakinessIndexand ElongationValue For determination offlakinessindexof coarseaggregate, wherethe sizeofthecoarseaggregatearelargerthan6.3mm	
Aggregatecrushingvalue For determination oftheaggregatecrushingvalueofcoarseaggregate,which passes12.5 mm.ISsieveandretained on 10mm.IS sieve.	
TestsonFreshConcrete	IntroductionoffreshconcreteUnderstandIS: 1199 -1959 Knowledge of toolsandequipmentsused inTestonFresh Concrete Procedureforconducting Slump cone testObservationtables Calculationofresult Housekeeping Safetypractices
Slump Cone Thistestisperformed to measureconsistencyorworkabilityoffreshconcrete,wherethenominalmaximumsize ofaggregate does notexceed 38 mmusingslumptestapparatus	

Controlled Condition Training, Part B: 3 Months

PracticalCompetencies	UnderpinningKnowledge(Theory)
Test onHardenedconcrete **Compressiontest** To determinethecompressivestrengthofconcrete specimens	IntroductionofHardenedconcreteU nderstandIS: 516 –1959 Knowledge of tools and equipments used inCompressiontest Procedureforconducting CompressivestrengthtestObservationtables Calculationofresult Housekeeping
Testson Soil **Watercontent-Ovendryingmethod** For determination ofthe moisturecontentofsoilbyovendrying method **Liquidlimit** For determination oftheliquidlimitofsoilusingcasagrandeapparatus **Plasticlimit** Fordetermination oftheplasticlimitofsoil **Maximum dry densityandoptimummoisturecontent -protortest** To determinemoisturecontentand drydensityrelationshipusingheavycompactionnorm odifiedcompactionmethod **CBR** Determination of CBR ofsoileither inundisturbed orRemouldedcondition	IntroductionofSoilanditsproperties UnderstandIS:2720(PartII)–1973,IS:2720(PartV) –1973,IS:2720(PartV)–1985,IS:2720(PartXL)– 1977,IS:2720(PartVIII)–1983,IS-2720-PART-16-1979, IS:2720 (PartXXIX)– 1975, IS:2720 (Part XXVIII)– 1974 Knowledge of tools andequipmentsused inTestoncement ProcedureforconductingtestoncementsOb servationtables Calculationofresult HousekeepingSafet ypractices

In-situdrydensity-Corecuttermethod To determinethefielddensityof soilbycorecuttermethod	
In-situ dry density- Sand replacementmethod To determinethefielddensityof soilata givenlocation bysandreplacementmethod	

8.1.2 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1) **Name of the subject** : **EMPLOYABILITY SKILLS**

2) **Applicability** : ATS- Mandatory for fresher only

3) **Hours of Instruction** : 110 Hrs.

4) **Examination** : The examination will be held at the end of two years Training by CSDCI.

5) **Instructor Qualification** :

i) MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12^{th} /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGET Institute.

8.1.3 SYLLABUS OF EMPLOYABILITY SKILLS

Part A

Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	**20**
1	**Pronunciation :** Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)	
2	**Functional Grammar** Transformation of sentences, Voice change, Change of tense, Spellings.	
3	**Reading** Reading and understanding simple sentences about self, work and environment	
4	**Writing** Construction of simple sentences Writing simple English	
5	**Speaking / Spoken English** Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.	

	I.T. Literacy	
1	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2	**Computer Operating System** Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.	
3	**Word processing and Worksheet** Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets	**20**
4	**Computer Networking and INTERNET** Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.	

	Communication Skill	
1	**Introduction to Communication Skills** Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body - language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.	
2	**Listening Skills** Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.	**15**
3	**Motivational Training** Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.	
4	**Facing Interviews** Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
5	**Behavioral Skills** Problem Solving Confidence Building Attitude	

Topic No.	Topic	Duration (in hours)
	Entrepreneurship skill	**15**
1	**Concept of Entrepreneurship** **Entrepreneurship** - Entrepreneurship - Enterprises:- Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function ofentrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2	**Project Preparation & Marketing analysis** Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of Product Life Cycle (PLC), Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.	
3	**Institutions Support** Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.	
4	**Investment Procurement** Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.	
	Productivity	
1	**Productivity** Definition, Necessity, Meaning of GDP.	

2	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	**10**
3	**Comparison with developed countries** Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.	
4	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	**15**
1	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4	**First Aid** Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
5	**Basic Provisions** Idea of basic provision legislation of India. of safety, health, welfare under legislation of India.	
6	**Ecosystem** Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.	

7	**Pollution** Pollution and pollutants including liquid, gaseous, solid and hazardous waste.	
8	**Energy Conservation** Conservation of Energy, re-use and recycle.	
9	**Global warming** Global warming, climate change and Ozone layer depletion.	
10	**Ground Water** Hydrological cycle, ground and surface water, Conservation and Harvesting of water	
11	**Environment** Right attitude towards environment, Maintenance of in -house environment	
	Labour Welfare Legislation	
1	**Welfare Acts** Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.	**05**
	Quality Tools	
1	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2	**Quality Circles :** Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	**10**
3	**Quality Management System :** Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.	
4	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
5	**Quality Tools** Basic quality tools with a few examples	

8.2BASIC NUMERACY

GENERAL INFORMATION

6) **Name of the subject** : **BASIC NUMERACY**

7) **Applicability** : ATS- Mandatory for fresher only

8) **Hours of Instruction** : 50 Hrs.

9) **Examination** : The examination will be held at the end of two years Training by CSDCI.

10) **Instructor Qualification** :

iii) MBA/BBA with two years experience or graduate in Science and Mathematics with two years experience and trained in Basic Numeracy from DGET Institute.

And

Must have studied in Mathematics at 12^{th} /diploma level

8.2.1 SYLLABUS OF BASIC NUMERACY

Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	**50 Hrs**
1	Number System/Fractions	
2	Square Root/Cube Root	
3	Average/Percentage	
4	Area Calculation- Triangles, Quadrilaterals	
5	Concept of geometry- Square, Rectangle, Circle, Triangle	
6	Basic Trigonometry	

8.3 PRACTICAL TRAINING (ON-JOB TRAINING)

(Part A & B)

DURATION: 18 MONTHS

Broad Skill Components to be covered during On-Job Training

On Job Training, Part A: 9 Months

1) Tests on Cement
    a. Fineness
    b. Consistency
    c. Initial and final setting time
    d. Compressive strength for 3day, 7days and 28days
2) Tests on Aggregates
    a. Sieve analysis
    b. Water absorption
    c. Aggregate abrasion value
    d. Aggregate impact value
    e. Flakiness Index and Elongation Value
    f. Aggregate crushing value
3) Tests on Fresh Concrete
    a. Slump Cone

On Job Training, Part B: 9 Months

1) Test on Hardened concrete
    a. Compression test
2) Tests on Soil
    a. Water content-Oven drying method
    b. Liquid limit
    c. Plastic limit
    d. Maximum dry density and optimum moisture content-protor test
    e. CBR
    f. In-situ dry density- Core cutter method
    g. In-situ dry density- Sand replacement method

4.**Instructors Qualification:**

i) Degree/Diploma in **Civil** Engg. from recognized university/Board With one/two year post qualification experience in the relevant field.

OR

ii) ITI in relevant trade with three year experience / 8 years' experience in the relevant field with 10^{th} Qualification.

5. Infrastructure for On-Job Training: Ongoing Project sites

9. ASSESSMENT STANDARD

Assessment Guideline

Successful achievement of the partical assesment is the professional judgement of the instructor/assessor. Failure to demonstrate the appropriate practical skills and practices to the satisfatction of the Assessor will result in a failure of the course. The following area will be consoidered.
Selection of materials, Understanding of drawing, Quality of work (Functional aspects, Dimensional features, Surface finish), Personal safety, time taken to complete the job.
If the delegate fail a couse the Training Provider must make a recommendation outline a time period required for the delegate to gain sufficient industry experinece prior to repete the course.

A sample assessment sheet is below

Sr.No	CBR MOISTURE CONTENT AND UNIT WEIGHT OF TEST SAMPLES						
1	Mold No.						
2	No of Layers						
3	No of Blows Per Layer						
4	Condition of sample	Before Soaking	After Soaking	Before Soaking	After Soaking	Before Soaking	After Soaking
5	Wt.of wet Sample +Mold						
6	Wt.of Mold						
7	Wet of Wet Sample						
8	Volume of Sample						
9	Wet Unit Weight						
10	Moisture determination	Before Soaking	After Soaking	Before Soaking	After Soaking	Before Soaking	After Soaking
11	Container No.						
12	Wet. Wet Sample +Container						
13	Wet. Dry Sample +Container						
14	Wet of Water						
15	Wet of Container						
16	Wet of Dry Sample						
17	% Moisture Content						
18	Dry Unit Weight						
19	MDD						
20	% Compaction						

10. FURTHER LEARNING PATHWAYS

- On successful completion of the course trainees can opt for any charge hand/ foreman / supervisory course under CSDCI.

Employment opportunities:

On successful completion of this course, the candidates may be gainfully employed in the following industries:

1. Construction Sector – Structural activities.

ANNEXURE – I

TOOLS & EQUIPMENT FOR BASIC TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONALKNOWLEDGE

TRADE: Storage and Inventory Executive (warehouse/Manufacturing plant)

LIST OF TOOLS & EQUIPMENTS FOR 20 APPRENTICES

A : TRAINEES TOOL KIT:-

LIST OF QC LAB EQUIPMENT		
Sr. No.		***Available Quantity***
1	***Brass Sieve (200mm Dia)***	
2	14.0mm	2
3	12.5mm	6
4	10.0mm	6
5	9.5mm	2
6	4.75mm	9
7	4.0mm	0
8	2.80mm	0
9	2.36mm	2
10	2.00mm	1
11	1.7mm	1
12	1.4mm	1
13	1.18mm	2
14	1.0mm	1
15	850mic	0

16	710mic	0
17	600mic	2
18	425mic	2
19	300mic	2
20	212mic	1
21	180mic	1
22	150mic	3
23	125mic	0
24	90mic	11
25	75mic	5
26	45mic	2
27	pan (200mm Dia)	1
	IS Sieve (450mm Dia)	
1	75mm	6
2	63mm	0
3	53mm	7
4	50mm	7
5	45mm	5
6	40mm	5
7	37.5mm	3
8	31.5mm	5
9	26.5mm	7
10	25mm	3
11	22.4mm	3

12	20mm	4
13	19mm	4
14	16mm	5
15	14mm	1
16	13.2mm	0
17	12.5mm	5
18	11.2mm	4
19	10mm	2
20	9.5mm	4
21	6.3mm	4
22	4.75mm	6
	IS Sieve (300 mm Dia)	
1	100mm	0
2	90mm	0
3	80mm	0
4	75mm	0
5	63mm	1
6	53mm	2
7	50mm	2
8	45mm	1
9	40mm	1
10	37.5mm	3
11	31.5mm	1
12	26.5mm	15

13	25mm	4
14	22.4mm	1
15	20mm	0
16	19mm	4
17	16mm	3
18	14mm	0
19	13.2mm	2
20	12.5mm	0
21	11.2mm	0
22	10mm	0
23	9.5mm	0
24	8.0mm	0
25	6.3mm	0
26	5.6mm	0
27	4.75mm	1
28	2.36mm	0
29	1mm	1
30	600mic	5
	General	
1	Refill Box (50mm)	1
2	Refill Box (25mm)	1
3	Rain Gauge	1
4	Scoop (Large Size)	1
5	Scoop (Medium Size)	1

6	Scoop (Small Size)	2
7	Plastic Measuring Cylinder (2000 Ml Capacity)	1
8	Plastic Measuring Cylinder (1000 Ml Capacity)	2
9	Plastic Measuring Cylinder (500 Ml Capacity)	2
10	Plastic Measuring Cylinder (250 Ml Capacity)	18
11	Plastic Measuring Cylinder (100 Ml Capacity)	0
12	Plastic Measuring Cylinder (50 Ml Capacity)	5
13	spatula	2
14	Chisel	2
15	Steel container Bag size (2ltr Capacity)	25
16	Hydrometer (for Density Check)	1
17	Calcium Carbide pkt	20
18	Sodium sulphate	5
19	Stopwatch	0
	Glass Beaker (Borosil)	
1	Glass Beaker -100ml (New -20)	20
2	Glass Beaker -500ml	1
3	Glass Beaker -600ml (New 2)	2
4	Glass (500mm*500mm*500mm	2
5	Glass (100mm*100mm*100mm	2
6	Glass Funnel	1
7	GMM Bottle -2ltr Capacity	2
8	GMM Bottle -5ltr Capacity	1

9	GMM Bottle -1ltr Capacity	1
10	Specific Gravity 50ml Capacity Cement test	1
11	Specific Gravity 50ml Capacity Bitumen test	1
	Thermometer	
1	Glass Thermometer (50'c)	0
2	Glass Thermometer (100'c)	0
3	Glass Thermometer (250'c)	3
4	Digital Thermometer	1
	Concrete	
1	Flexural beam mould	45
2	CTM 2000 KN	1
3	Vicat needle Apparatus	3
4	Vicat needle (Set)	2
5	Standard sand Grade 2	6
6	Groute Mould (100*100*100mm)	7
7	Groute Mould (50*50*50mm)	27
8	Cement Mortar Casting Cube mould 70.6*70.6mm	45
9	Cube Mould (150*150*150mm)	150
10	Slump Cone Apparatus	9
11	Trowel (Concrete work)	2
12	Measuring Cylinder (15ltr) (For Bulk Density Test)	1
13	Measuring Cylinder (20ltr) (For Bulk Density Test)	1
14	Motor vibrator (Cement test)	1
15	Trowel (Set) for Cement test)	2

	Proving Ring & Dial Gauge	
1	50 KN Proving Ring	5
2	100 KN Proving Ring	1
3	10 KN Proving Ring	2
4	2 KN Proving Ring	2
5	Dial Gauge (0.25mm)	23
	Soil Testing	
1	CBR Testing Apparatus	1
2	CBR Mould	12
3	Spacer Disk	5
4	Perforated Plate	12
5	Tripod (CBR)	0
6	Filter Paper For CBR (Packets)	15
7	annular Disk 5 kg Capacity	0
8	annular Disk 2.5 kg Capacity	12
9	Slotted Disk 5kg Capacity	5
10	Slotted Disk 2.5kg Capacity	2.5
11	Proctor Mould 1000 cc	1
12	Proctor Mould 2250 cc	2
13	Proctor Rammer (4.89 kg)	4
14	Container for (Small Size LL/PL)	0
15	Container for (Big Size 250gm Capacity)	25
16	Casagrande's Apparatus	2
17	Cone Penetrometer for LL/PL	1

18	Hot Air Oven (Big Size) 90cm*60cm*60cm	2
19	Hot Air Oven (Big Size) 60cm*60cm*60cm	1
20	Hot Air Oven (Small Size) 45cm*45cm*45cm	3
21	Small Oven (for LL/PL Test)	1
22	mallet Hammer	10
	FDD Testing	
1	Nuclear Density Gauge	1
2	Density Cylinder (10ltr)	1
3	Density Cylinder (3ltr)	1
4	sand Pouring Cylinder Sit(with Catting Tray& calibrating Container)200mm Dia	8
5	sand Pouring Cylinder Sit(with Catting Tray& calibrating Container)150mm Dia	1
6	sand Pouring Cylinder Sit(with Catting Tray& calibrating Container)100mm Dia	1
7	Sand calibration Container (100mm Dia)	11
8	Sand calibration Container (200mm Dia)	9
9	Cutting tray (Extra) 200mm Dia	10
10	Cutting tray (Extra) 100mm Dia	3
11	Core Cutter Apparatus for FDD(2set Mouls with Cover Doly and Rammer	2
12	Rapid Moisture Meter	12
	Aggregate	
1	AIV Test Apparatus	1
2	Los Angeles Abrasion Apparatus	1
3	FI/EI Gauge	8

4	Crushing Value Mould (with Container)	1
5	Wire Basket (For Density)	2
	Asphalt	
1	Silicon Oil (Liter)	10
2	Ductility Mould Apparatus (Set three Mould)	1
3	water Bath (Small Size) (New-1)	1
4	Kinement Viscometer (U-Tube)	10
5	Softening point(Ring&Ball) set for Mould with jar 500Ml (New-1 Set)	3
6	Marshall Compaction Pedestal Stand-100mm dia	1
7	Marshall Compaction Pedestal Stand-150mm dia	2
8	Marshall Compaction Pedestal Rammer-100mm dia	1
9	Marshall Compaction Pedestal Rammer-150mm dia	6
10	Marshall Stability Apparatus	1
11	Marshall Mould-100mm	20
12	Collar & Base Plate	2
13	Marshall Mould-150mm	25
14	Collar (150mm) (New 5 Collar)	5
15	Base Plate (150mm) (New 5 Plate)	7
16	Vacuum Pump	1
17	Bitumen Penetrometer Automatic Type Set (Controller)	1
18	Mixing Bowl	1
19	Bitumen Penetration Mould (55mm dia 35 mm ht)	2
20	Bitumen Penetration Mould (75mm dia 45 mm ht)	1

21	Bitumen Penetration Needle	1
22	Bitumen Extractor (Manual) (New-1)	1
23	Bitumen Extractor (Electronical) (New-1)	1
24	Thin Film Oven	0
25	Ductility Apparatus (New-1)	1
26	Breaking Head -100mm dia (New -1)	3
27	Breaking Head -150mm dia	1
28	Hot Plate (30cm*24cm) (New-1)	1
29	Digital Thermometer (300'c)	1
	Weighing Balance	
1	Electronic Balance (50 kg) e=(1g)	6
2	Electronic Balance (30 kg) e=(1g)	3
3	Electronic Balance (10 kg) e=(1g)	
4	Electronic Balance (5 kg) e=(1g)	2
5	Electronic Balance (600 kg) e=(0.01g) (New -1)	1
6	Electronic Balance (300 kg) e=(200GM)	1
7	Pan Balance-100kg Capacity	1
8	Pan Balance-30kg Capacity (New -1)	0
9	Pan Balance-25kg Capacity	3
10	Pan Balance-20kg Capacity	1

11	Pan Balance-5kg Capacity	2
	Standard Weights	
1	20kg	0
2	10kg	11
3	5kg	8
4	1kg	25
5	500gm	7
6	200gm	19
7	100gm	10
8	50gm	5
9	20gm	1
10	10gm	2
11	5gm	4
12	Brass Weight Box (200gm,100gm,50gm,20gm,10gm,5gm,2gm,1gm)	4
	Glass Item (Glass Measuring Cylinder) (Borosil)	
1	Glass Jar-1000ml	1
2	Glass Jar-250ml	0
3	Glass Jar-100ml	0
4	Glass Jar-1000ml	0
5	Glass Jar-50ml	0
6	Glass Jar-25ml	0
7	Pycnometr	50
	GI TRAY	
1	1000mm*1000mm*55mm	3

2	1000mm*600mm*55mm	2
3	750mm*750mm*50mm	2
4	650mm*600mm*50mm	4
5	600mm*600mm*50mm	1
6	600mm*450mm*50mm	2
7	500mm*500mm*50mm	1
8	450mm*300mm*50mm	1
9	250mm*250mm*50mm	1
10	200mm*200mm*50mm	1

Note: In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

INFRASTRUCTURE FOR ON-JOB TRAINING

Actual training will be conducted at ongoing construction project sites

ANNEXURE-II

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1. Due care to be taken for proper & inclusive delivery among the batch. Some of the following some method of delivery may be adopted:

A) LECTURE

B) LESSON

C) DEMONSTRATION

D) PRACTICE

E) GROUP DISCUSSION

F) DISCUSSION WITH PEER GROUP

G) PROJECT WORK

H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due Diligence to safety & with prioritizing transfer of required skills.