

Gujarat Council of Vocational Training
Gandhinagar



1. Name of Course:

Maintenance and Operation of Construction
Equipment

N.C.O. No. for Skills Covered:
(Please refer National Classification of
Occupations -2004 available
on www.dget.nic.in)

2. Engineering OR Non-engineering: **Engineering**

3. No. of students per batch: 20 Nos / Batch

4. Duration in Hours. : 420 Hrs

5. Duration in Month: 2.5 Months @ 42 hours/Week

6. Examination Scheme:

No.	Name of Subject	Teaching Hours during full course.	Maximum Marks. (Excluding Sessional)	Minimum Marks required for Passing (Excluding Sessional).	Sessional Marks if any.
Subject-1	Theory	60 Hrs	100	40	NA
Subject-2	Practical	360 Hrs.	300	180	NA
Subject-3					
Subject-4					
Subject-5					

7. Entry qualification for Trainee:

Minimum entry qualification (Essential):	Minimum 8 th Standard Passed
Desirable:	10 th Standard Passed

8. Minimum qualification for Trainer:

Minimum qualification (Essential):	Diploma in Mechanical Engineering
Desirable:	





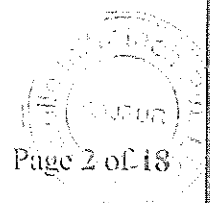
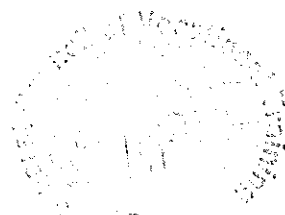
9. Syllabus Committee Member:

Sr. No.	Name	Organization	Designation	Technical Qualification	Experience in Years	Signature
1.	Mr. Ramji Patel	Apollo Infratech Pvt. Ltd.	DGM(Works)	Diploma Mech.	15	
2.	Mr. Pradip Patel	Apollo Infratech Pvt. Ltd.	Manager - Design	BE (Mechanical)	14	
3.	Mr. Jigar Patel	Apollo Infratech Pvt. Ltd.	Manager - HR	LLB	10	
4.	Mr. A. R. Panchal	ITI, Mehsana	Principal	Diploma Mech.	21	
5.	Mr. T. K. Parmar	ITI, Mehsana	AAA(Junior)	Diploma Mech.	20	

10. Terminal Skills of trainee: (Should be well defined and having reference to NCO):

The trainee, after successful completion of training, will have following skills...
Successful candidate would be able to ...

1. Can understand the importance of safety during routine work.
2. Can perform troubleshooting for self-loading mobile concrete mixer.
3. Can operate self loading mobile concrete mixer with required precautions.
4. Can perform troubleshooting for CAP machines.
5. Can operate CAP machines with required precautions.
6. Can perform troubleshooting for fixed form concrete paver.
7. Can operate fixed form concrete paver with required precautions.
8. Can follow the daily, weekly and monthly instructions as per manual to keep the machine in good condition.
9. Can co-ordinate with service engineer for major breakdown and can solve the same with available sources as instructed by service engineer.
10. Basic knowledge of hydraulic circuit and its components.
11. Can perform troubleshooting for hydraulically operated systems





Gujarat Council of Vocational Training
Gandhinagar



11. Approximate cost of Tools
/ Equipments / Machinery for
Starting one batch of the course:

Rupees
Rs. 3, 21, 00,000/-

Reference Year
2015-2016

12. Area required for practical / Workshop for one batch.

4000 Sq. Meter

13. Minimum Power connection required

5 K.W.

14.1 No of items in Standard list of Machinery:

43 Nos.

14.1.1. Page NO: 4 & 5

14.2 No of items in Standard list of Shop outfit:

154 Nos.

14.2.1. Page NO: 6

14.3 No of items in Standard list of Trainee Tool-Kit:

444 Nos

14.3.1. Page NO: 7

14.3 No of items in Standard list of Consumables

As Per Attached Sheet

14.3.1. Page NO: 8

***** FOR OFFICIAL USE *****

Approved by GCVT in Governing Body meeting on

: 30-12-2015

Syllabus implemented w.e.f. admission session

: next session

Revision History :

1. Revision No..... Revision Date.
2. Revision No..... Revision Date.
3. Revision No..... Revision Date.

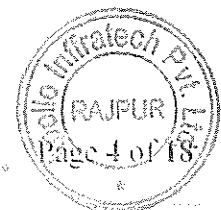
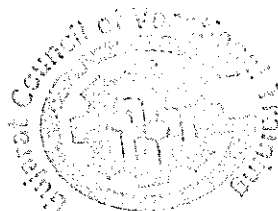




Standard List of Machinery

For Trade of - Maintenance and operation of construction equipment

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1	Model: 25 FX – Self Loading Transit Mixer.	Machinery	1	0	1
2	Model: 4 TT – Self Loading Transit Mixer.	Machinery	1	0	1
3	Model : CAP 200 - Vertical Precast pipe Making machine	Machinery	1	0	1
4	Model : STP 4500 -Fixed Form Concrete paver	Machinery	1	0	1



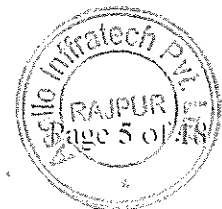


Standard List of Equipment

For Trade of - Maintenance and operation of construction equipment

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1	Hydraulic Power Pack	Equipment	05	01	06
2	Test Bench for Hydraulic system	Equipment	05	01	06
3	Hydraulic hoses and fittings	Equipment	05	01	06
4	Hydraulic cylinder.	Equipment	05	01	06
5	Batch grinder	Equipment	03	--	03
6	Torque wrench	Equipment	05	01	06
7	Pneumatic wrench	Equipment	05	01	06

Note : We will provide practical training in group of students. Each group will be split in 5 to 6 students.



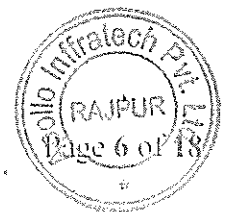


Standard List of Shop Outfit

For Trade of - Maintenance and operation of construction equipment

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1	Safety Hamlet	Shop Outfit	25	03	28
2	Safety Glows	Shop Outfit	25	03	28
3	Ear plug	Shop Outfit	25	03	28
4	Safety Shoes	Shop Outfit	25	03	28
5	Grinding goggles	Shop Outfit	13	01	14
6	Apron	Shop Outfit	25	03	28

Note : We will provide practical training in group of students. Each group will be split in 5 to 6 students.



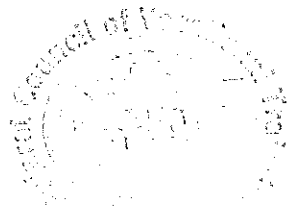


Standard List of Tools

For Trade of - Maintenance and operation of construction equipment

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Tool kit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1	Grinding Disc.	Tool	12	02	14
2	Measure taps.	Tool	12	02	14
3	Right angle	Tool	12	02	14
4	Level indicators	Tool	06	01	07
5	Plumb	Tool	12	02	14
6	Fix Spanner Sets	Tool	12	02	14
7	Ring Spanner Sets	Tool	12	02	14
8	Hammer 500 grams	Tool	12	02	14
9	Plier	Tool	12	02	14
10	Bench vise	Tool	05	-	05
11	Drill bit	Tool	12	02	14
12	Allen key set	Tool	12	02	14
13	Hack saw with blade	Tool	12	02	14
14	Round and flat files	Tool	12	02	14
15	Tap set	Tool	12	02	14
16	Hand drill machine	Tool	06	-	06
17	Screw Drivers	Tool	12	02	14
18	Teflon tap	Tool	100	10	110
19	Loctite	Tool	100	10	110
20	Multi meter	Tool	04	01	05
21	Grease gun - 5 Kg	Tool	05	-	05

Note : We will provide practical training in group of students. Each group will be split in 5 to 6 students.



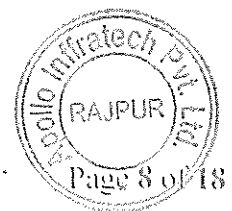
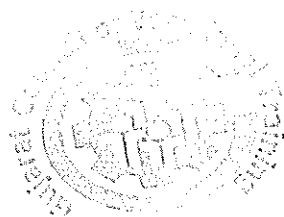


Standard List of Consumables

For Trade of - Maintenance and operation of construction equipment

Sr. No.	Description of Item with detailed specifications	Item type i.e. Machinery / Equipment OR Shop Outfit OR Trainee Toolkit	Quantity Required per one Batch of Students	Quantity Required per one Batch of Students for Instructor	Total Quantity Required (Total of previous two columns)
1	Hydraulic oil	Consumables	300 Ltr	-	300 Ltr
2	Diesel	Consumables	180 Ltr	20 Ltr	200 Ltr
3	Grease	Consumables	50 Kg	-	50 Kg
4	Engine oil	Consumables	50 Ltr	-	50 Ltr
5	Gear oil	Consumables	100 Ltr	-	100 Ltr
6	Raw materials for practical (Aggregates, sand, cement fly ash, additive)	Consumables	50 Tones	10 tones	60 Tones

Note : These are consumables for the machine and those have long life so those are not required for particular for any instructor.



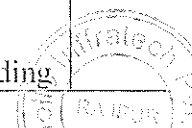
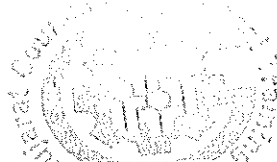


Name of Syllabus: Maintenance and Operation of Construction Equipment
Sector: Construction
Terminal Competency:

Week No	Theory	No of Hrs	Practical	No of Hrs
1	<p>Self-loading mobile concrete mixer</p> <ol style="list-style-type: none">1. Brief introduction about the course.2. Safety Precaution & first Aid.3. Use, care and maintenance of tools.4. Introduction to self-loading mobile concrete mixer.5. Symbols used in the handbook.6. Identification of manufacturer, machine type and model, nameplate and chassis stamp.7. Description of the machine.8. Main parts of the machine and their respective positions.9. Driver's position.10. Warranty.11. Intended uses.12. Improper use.13. Noise level.14. Delivery report.15. Information on safety.16. Requirements for the machine operator.17. Working clothes18. General safety requirements19. Accident prevention20. Fire prevention21. Tires and wheels22. Stability	6 Hours	<ol style="list-style-type: none">1. Practice health and safety Familiarize.2. Select, use, maintain & store- tools, consumables.3. Personal safety while practical training.4. Brief introduction of self-loading mobile concrete mixture and its application.5. Introduction to the hand book and various symbols used in it.6. Interpretation and importance of symbols.7. Demonstration of various identification mark like manufacturer name, machine type and model, name plate and chassis stamp.8. Brief description of machine with details of main parts and their respective positions and driver's position.9. What is warranty and importance of warranty.10. Practical demonstration of intended and improper uses of machine.11. Demonstration for noise level of machine and importance of noise level.12. Understanding of delivery report.13. Demonstration of general and special safety	36 Hours

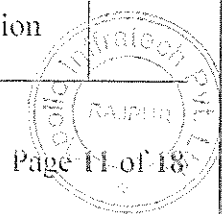


	<p>23. General safety 24. Operating safety 25. Safety during maintenance operations 26. Adhesive safety labels and their position on the machine 27. Meanings of the safety labels 28. Safety device to use for protection during maintenance work.</p>		<p>requirements for machine operators. 14. Dos and don'ts during machine operation and maintenance. 15. Demonstration of accident and fire prevention. 16. Demonstration of safety labels and their positions. 17. Understanding of safety labels.</p>	
2	<p>Operation 1. Introduction 2. Before climbing onto the machine 3. Climbing into the driver's cab 4. Adjusting the seat 5. Driving and controls 6. Mixer operation control levers 7. Water delivery system 8. Before starting the engine 9. Starting the engine 10. Starting up a cold or warm engine 11. Starting the engine with a reserve battery 12. Disconnecting the battery 13. Checking the efficiency of the parking brake 14. Not in use 15. Moving the machine 16. Machine operating cycle 17. Stopping and parking the machine 18. Handling a machine that has broken down 19. Loading and transporting the machine 20. Transit by road 21. Lengthy periods of inactivity 22. Disposing of the machine 23. ROPS/FOPS structure 24. Seat belt</p>	6 Hours	<p>1. Practical introduction about the machine operation. 2. Demonstration of check points before climbing on to the machine and in to the driver's cabin. 3. Demonstration for adjusting the seat as per operator's requirement. 4. Demonstration of driving instructions and understanding of driving controls. 5. Demonstration of mixer operation control levers. 6. Understanding and demonstration of water delivery system. 7. Check points before starting the engine. 8. Demonstration of starting the engine with various methods. 9. Demonstration of disconnecting the battery. 10. Demonstration of checking the efficiency of parking brake. 11. Demonstration of total operating cycle of machine including loading</p>	36 Hours



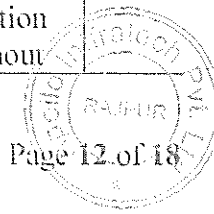
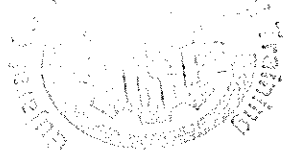


	25. Lifting the machine		<p>the material, mixing with proper quantity, movement with load and unloading at proper place.</p> <p>12. Demonstration of stopping and parking the machine at proper place and position.</p> <p>13. Demonstration to handle the machine that has broken-down.</p> <p>14. Demonstration of standard loading practices if the machine needs to be transferred to another site.</p>	
3	<p>Maintenance</p> <ol style="list-style-type: none"> 1. Lubricants – Hygiene and safety requirements 2. Hygiene 3. Storage 4. Disposal 5. Spillages 6. First aid 7. Fire 8. Scheduled maintenance 9. Before doing maintenance 10. Safety devices 11. Disconnecting the battery 12. Ensuring that the machine is stable 13. Greasing 14. Diagram of lubrication points 15. Tires and wheels 16. Brakes 17. Engine air filter 18. Cleaning the pre-filter 19. Replacing the main filter cartridge 20. Replacing the safety cartridge 21. Engine cooling system 22. Hydraulic system 23. Checking oil level and changing oil 24. Replacing filters 25. Pressure control points in the hydraulic circuits and 	6 Hours	<ol style="list-style-type: none"> 1. Maintenance and its importance. 2. Introduction to different types of lubricants. Importance of lubricants in our machine. 3. Understanding of hygiene and safety requirement of lubricants. 4. Understanding of standard storage and disposal practices of various lubricants. 5. Understanding and importance of scheduled maintenance. 6. Dos and don'ts before starting any maintenance. 7. Introduction to safety devices used during maintenance. 8. Demonstration of procedure to disconnect the battery. 9. Demonstration of checking the stability of machine. 10. Demonstration and importance of greasing at various points. 11. Standard practices to maintain good condition of tires and wheels. 	36 Hours



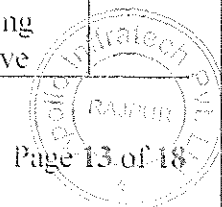
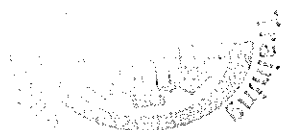


<p>their normal values</p> <ol style="list-style-type: none">26. Front and rear axles27. Checking and changing the oil in the differential gear28. Checking and changing the oil in the wheel reduction gears29. Checking and changing the oil in the gearbox30. Checking and changing the oil in the drum rotation reduction gear31. Water delivery system32. Cleaning the outside filter33. Washing the drum34. Eliminating solid concrete scraps35. Fuel system36. Type of fuel37. Filling the fuel tank38. Electric system39. Battery40. Fuses and relays41. Light bulbs42. General fuse43. Troubleshooting		<ol style="list-style-type: none">12. Standard practices to check and maintain brakes.13. Demonstration for standard practices of checking, cleaning and changing engine air filters.14. Understanding of engine cooling and hydraulic system by identifying parts as per circuit diagram.15. Demonstration to check correct oil level.16. Demonstration of the procedure to change the oil from system.17. Demonstration for standard practices of checking, cleaning and changing hydraulic filters.18. Demonstration to control the pressure at various control points and understanding the correct values of pressure.19. Fitment and application of front and rear axles.20. Demonstration to Check and change the oil in the differential gear21. Demonstration to Check and change the oil in wheel reduction gears.22. Demonstration to Check and change the oil in the gear box.23. Demonstration to Check and change the oil in drum rotation reduction gears.24. Demonstration for operation of water delivery system.25. Demonstration to clean the outside filter.26. Demonstration of washing the drum and elimination of solid concrete without
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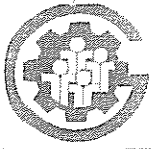


			<p>affecting the drum surface.</p> <p>27. Demonstration of entire fuel system.</p> <p>28. Understanding types of fuel and their application.</p> <p>29. Demonstration of filling the fuel in fuel tank.</p> <p>30. Demonstration and understanding of entire electric system including battery, fuses, relays, bulbs. etc. Understanding the circuit diagrams and symbols of the above parts.</p>	
4	<p>Features, Tables and Diagrams</p> <ol style="list-style-type: none"> 1. Overall sizes and weights 2. Capacities 3. Steering 4. Speed 5. Engine 6. Chassis 7. Axles and gearbox 8. Brakes 9. Loading shovel 10. Drum assembly 11. Chute assembly 12. Mixer operation water pump 13. Water system 14. Electric system 15. Exchanger 16. Table of torque wrench settings for the nuts and bolts 17. Table of tire pressures 18. Table of lubricants 19. Scheduled maintenance timetable 20. Hydraulic system diagrams 21. Diagram of hydraulic drum rotating system 22. Diagram of hydraulic drive system 23. Diagram of hydraulic 	6 Hours	<ol style="list-style-type: none"> 1. Understanding of overall dimension, weight and capacity of the machine. 2. Understanding the overall features and applications of major parts like engine, steering, axles, gearbox, brakes, loading shovel, drum assembly, chute assembly, mixer operation, exchanger etc. 3. Understanding of water and electric system and physical verification of the same against drawing. 4. Demonstration of torque wrench and study of standard torque table. 5. Demonstration of tier pressure checking as per requirement given in the table. 6. Study for table of lubricants and use of lubricants accordingly. 7. Understanding of scheduled maintenance time table and perform maintenance accordingly. 8. Study of different hydraulic circuit like hydraulic drum rotating system, hydraulic drive 	36 Hours





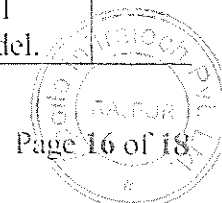
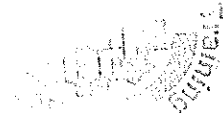
	<p>power steering and servo controlled mixer operation system</p> <p>24. Diagram of hydraulic system for parking brake</p> <p>25. Electric wiring diagram</p>		<p>system, power steering and servo controlled mixer operation system, parking brake system, etc. and physical verification of the same against circuit diagram.</p> <p>9. Study of electric wiring diagram and physical verification of the same against circuit diagram.</p>	
5	<p>CAP Machine</p> <ol style="list-style-type: none"> 1. Introduction to CAP 200 2. Specification of machine 3. EU Declaration of Conformity 4. Safety Instructions 5. Safety in general 6. Precautions during mould change and demoulding 7. Precautions during cleaning, maintenance and change of spare parts 8. Moving about the machine (dangerous zones) 9. Noise 10. Emergency stop and main power disconnect switch 11. Hooking on lifting eyes 12. Use of lifting yoke for outer mould 13. Technical data, maintenance and adjustment 14. Concrete feeder 15. Technical data 16. Adjustment and maintenance , 17. Core suspension 18. Core vibrator 19. Description 20. Technical data 21. Dismounting/mounting of vibrator from the core 22. Setting of stroke 23. Instructive settings of stroke for the vibrator 	6 Hours	<ol style="list-style-type: none"> 1. Basic introduction to CAP 200 machine and its application. 2. Understanding and demonstration for specification of machine. 3. Demonstration of general and special safety instructions during operation and maintenance of the machine. 4. Demonstration of precautions to be taken during mould change and demoulding of machine. 5. Demonstration of precautions to be taken during cleaning, routine maintenance and change of spare parts. 6. Introduction and effect of noise level. 7. Demonstration of emergency stop of machine. 8. Application of lifting eye and lifting yoke for outer mould. 9. Demonstration of concrete feeder with its detail technical data, adjustments and maintenance. 10. Application of core suspension and core vibrator with detail technical data. 	36 Hours



	<ol style="list-style-type: none"> 24. Trouble shooting diagram for vibrator 25. Lubrication system 26. Maintenance and lubrication 27. Swivel arm with pressing/rocking device 28. Hydraulic pump 29. Lifting yoke for pipe moulds 30. Pallet lock 31. Guidelines for tightening bolt connections 32. Bolt connections quality 8.8 33. Hydraulic connections 34. Lubrication 35. Lubrication point number 		<ol style="list-style-type: none"> 11. Precautions to be taken during Dismounting/mounting of vibrator from the core. 12. Demonstration for Dismounting/mounting of vibrator from the core 13. Demonstration for stroke setting of vibrators. 14. Demonstration for trouble shooting diagram for vibrator. 15. Demonstration and importance of lubrication system. 16. Introduction of routine maintenance and lubrication points. 17. Application of Swivel arm with pressing/rocking device. 18. Introduction and demonstration of entire hydraulic system with respect to hydraulic circuit diagrams. 19. Introduction to pallet locking system. 20. Guide line for torque tightening of standard and special nut-bolts. 	
6	<ol style="list-style-type: none"> 1. Mould parts 2. Initial mounting of mould equipment 3. Change of mould equipment from one dimension to another 4. Daily cleaning 5. General cleaning 6. Adjustment Charts 7. Control panel on the swivel arm 8. Control panel on the front of the concrete feeder 9. Electric panel at the floor 10. Settings/adjustments during operation 11. Operation sequence during 	6 Hours	<ol style="list-style-type: none"> 1. Demonstration of various mould parts. 2. Demonstration for mounting procedure of mould equipment. 3. Procedure to change of mould equipment as per pipe diameter requirement. 4. Introduction to general cleaning areas. 5. Understanding of adjustment chats and demonstration of various adjustment points. 6. Introduction for function of various control panels 	36 Hours

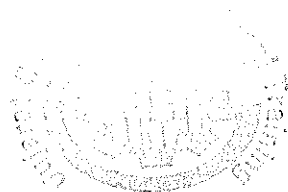


	<p>a production cycle (Single casting station)</p> <p>12. Troubleshooting</p> <p>13. Troubleshooting guide for the machine</p>		<p>like swivel arm, front of concrete feeder, at floor etc.</p> <p>7. Demonstration of settings/adjustment which required during operation for all these control panels.</p> <p>8. Demonstration of operation sequence during production cycle and understanding for importance, of each sequence.</p> <p>9. Understanding of trouble shooting guide and demonstration for troubleshooting of major problems occurred during operation.</p>	
<p>7</p>	<p>Fixed form concrete paver</p> <p>1. Purpose of the information in the manual</p> <p>2. Intended user of the manual</p> <p>3. Instruction manual limitations</p> <p>4. How to preserve the manual</p> <p>5. Machine Handling</p> <p>6. Instruction for lifting and moving machine</p> <p>7. Safety Instructions</p> <p>8. Safety symbols</p> <p>9. Hazard symbols</p> <p>10. General safety</p> <p>11. Technical Specifications</p> <p>12. Overall Dimensions</p> <p>13. Features</p>	<p>6 Hours</p>	<p>1. Brief introduction about fixed form concrete paver and its application.</p> <p>2. Introduction to the user manual and its importance.</p> <p>3. Introduction to machine handling procedure and its demonstration.</p> <p>4. Demonstration of standard practices for lifting and moving machine from one site to another.</p> <p>5. Demonstration of safety instructions to be followed during operation.</p> <p>6. Understanding of safety and hazard symbols.</p> <p>7. Understanding of general safety and dos and don'ts during operation.</p> <p>8. Understanding of total technical specifications of all models and its importance.</p> <p>9. Understanding of overall dimensions and detail features for each model.</p>	<p>36 Hours</p>





8	1. Fixed Form Paver Assembly 2. Purpose 3. Function 4. Parts Illustration 5. Drive Unit 6. Paver Frame 7. Control Unit 8. Screw jack with Tires 9. Drive Tubes 10. Strike Tube 11. Rail and Bracket 12. Operating Instructions 13. Pre-operation Checklist 14. Maintenance Instructions 15. Electric Circuit Diagram	6 Hours	1. Introduction to the application of the machine. 2. Introduction to machine assembly and its different parts. 3. Demonstration for the function of different parts like drive unit, paver frame, control unit, screw jack with tires, drive tube, strike tube, rail, bracket, etc. 4. Understanding of operating instruction and brief demonstration of the same. 5. Understanding of pre-operation check-list and demonstration of each point to be checked before starting the machine. 6. Understanding of maintenance instructions and demonstration of preventive maintenance and major troubleshooting during operation. 7. Understanding of electric circuit diagram and physical verification of circuit against the drawing.	36 Hours
9	Product Overview 1. Mobile Concrete Batching Plant. 2. Stationary Concrete Batching Plant. 3. Transit Mixer 4. Concrete Pump 5. Customer Feedback Form Notes.	6 Hours	1. Product overview and understanding for application of Mobile Concrete Batching Plant, Stationary Concrete Batching Plant, Transit Mixer and Concrete Pump. 2. Understanding of important notes (Dos & Don'ts) during operation.	36 Hours
10	Theory Revision for all for subjects	6 Hours	Practical Revision for all four subjects	36 Hours





Gujarat Council of Vocational Training
Gandhinagar



TOTAL HOURS		60 hrs		360 hrs

Signature:

Name

Sign

1. Mr. Ramji Patel - DGM Works

2. Mr. Pradip Patel – Manager Design

3. Mr. Jigar Patel – Manager HR

4. Mr. A.R.Panchal – Principal (Mehsana)

5. Mr. T. K. Parmar – AAA (Junior)

