CERAMIC CASTER

COMPETENCY BASED CURRICULUM

(Duration: 1 Year 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL 3

SECTOR – PRODUCTION & MANUFACTURING

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

CERAMIC CASTER

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL 3

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

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Sl. No.	Name & Designation Shri/Mr./Ms.	Organization	Mentor Council Designation
Expert group on restructuring of Apprenticeship Training Modules			
1.	Havadiya Ramniklal R.	Yogideep Cera & Co.	Expert
2.	Patel Jaswantbhai P.	Atlas Industries	Expert
3.	Andarpa Prakash M.	Antrix Sanitary wares	Expert
4.	P. B. Jadeja	The P. P. W. Co. Ltd., Morbi	Expert
5.	R.J. Kaila	ITI Morbi	Expert
6.			

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1. BACKGROUND

1.1 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**; trade apprentice, 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.

1.2 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.

1.3 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.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

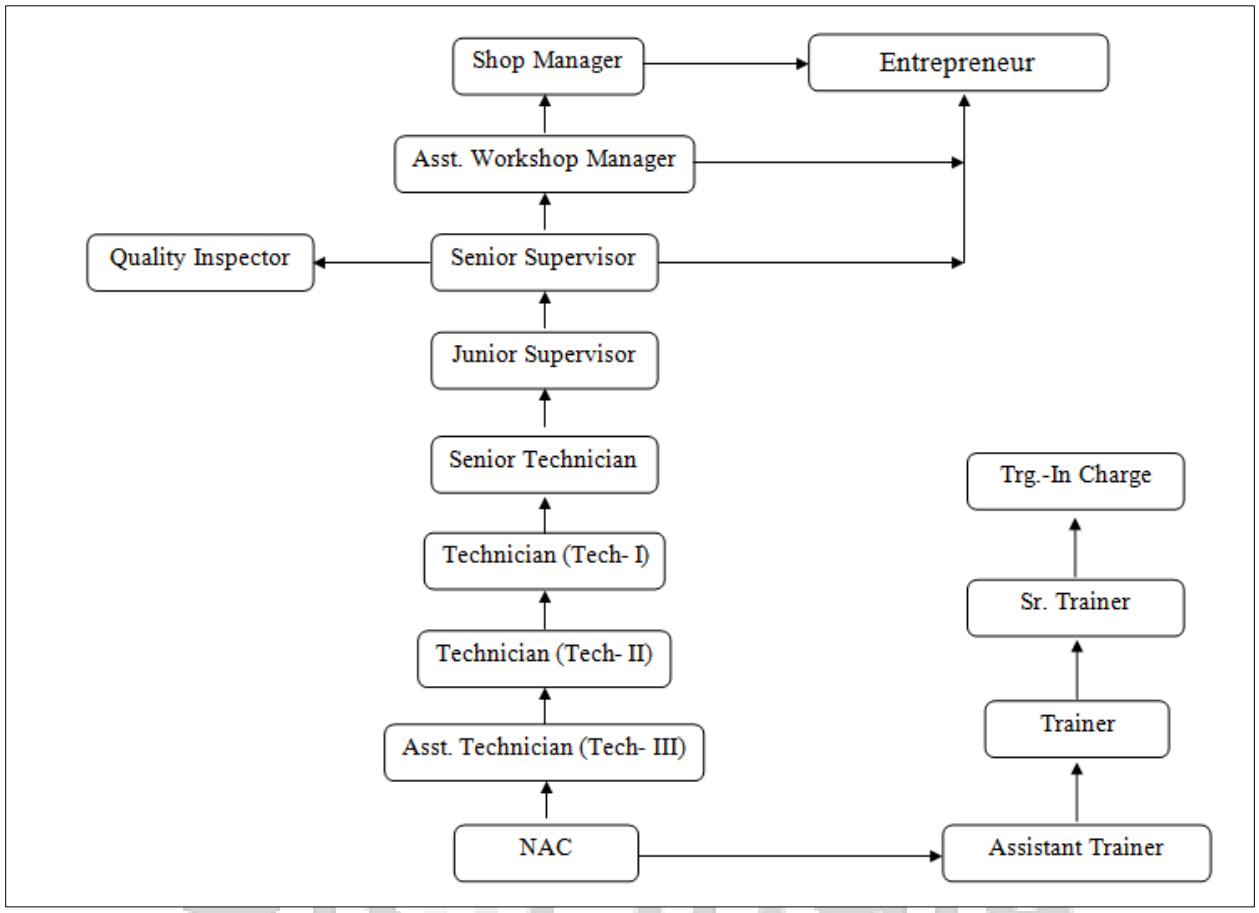
Ceramic caster trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of 01 year + 03months (01 Block of 15 months duration including basic training) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of one year (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	**1-3**	**4 - 15**
Basic Training	**Block– I**	**-----**
Practical Training (On - job training)	**----**	**Block – I**

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A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)
For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	**For 01 Yr. course**
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	**1000**	**500**

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

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Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Ceramic caster; casts clay and porcelain wares like cups, bowls, pots, etc. by pouring slip (semi-liquid clay) into plaster-of-Paris moulds. Selects moulds and cleans inside to remove dust and foreign matter; holds parts of mould together and ties around outer face with cord to prevent leakage of slip through joints; stirs slip thoroughly in container, adding water if necessary to obtain proper consistency; fills pitcher with slip and pours it into mould; pours excess slip from mould after shell of clay of required thickness has formed inside mould; places mould upside down to drip and dry; unties cord holding mould parts together, and removes partially dry molded ware; scrapes ware with knife like tool; smoothens it with wet sponge and places it on drying rack. May fix attachments to ware where required.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

Reference NCO-2004: 7321.15

4. NSQF LEVEL COMPLIANCE

NSQF level for Ceramic caster trade under ATS: **Level 3**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. professional knowledge,
c. professional skill,
d. core skill and
e. Responsibility.

The Broad Learning outcome of Ceramic caster trade under ATS mostly matches with the Level descriptor at Level 3.

The NSQF Level 3 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 3	Person may carry out a job which may require limited range of activities routine and predictable	Basic facts, process and principle applied in trade of employment	Recall and demonstrate practical skill, routine and repetitive in narrow range of application	Communication written and oral, with minimum required clarity, skill of basic arithmetic and algebraic principles, person al banking, basic understanding of social and natural environment	Under close supervision Some Responsibility for own work within defined limit.

5. GENERAL INFORMATION

Name of the Trade	**CERAMIC CASTER**
NCO - 2015	**NCO-2004:**7321.15
NSQF Level	Level – 3
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months + One year (01 Block of 15 months duration including basic training).
Duration of Basic Training	a) Block –I : 3 months **Total duration of Basic Training: 3 months**
Duration of On-Job Training	a) Block–I: 12 months **Total duration of Practical Training: 12 months**
Entry Qualification	8th class passed.
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	NA
CTS trades eligible for Ceramic Caster Apprenticeship	NA

Note:

- *Industry may impart training as per above time schedule for different block, 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 aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Ceramic Caster course of 01 year + 03 months duration under ATS.

Block I:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.

2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Geometry & Mensuration, Heat & Temperature, Levers & Simple machine, graph, Centre of gravity, Power transmission, Pressure]*

3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*

4. Select and ascertain measuring instrument and measure dimension of components and record data.

5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.

6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.

7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.

8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Safety and best practices/Basic Industrial Culture (5S, KAIZEN, etc.)
2. Prepare different types of documentation as per industrial need by different methods of recording information.
3. Explain on Deflocenlation and setting.

4. Explain on casting process.
5. Explain on Plaster Making-economy in the use of Plaster.
6. Classification of different ceramic wares according to body, namely, Terracotta, stoneware, E'ware, Semi-porcelain, Porcelain, Bone china, Vitreous China etc
7. Identify raw materials without use of sophisticated instruments.
8. Examine various parts of machine for ceramic slip house and casting slip, namely – Ball mill, Bungers, Diaphragm Pump Fitter Press, De-airing Pug Mill, Magnets etc.
9. Preparation of casting slip with deflocculating agent like Sodium Silicate, Sodium Carbonate, etc.
10. Study the casting rate with different age of moulds:
    (a)Study the density-pint weight, specific gravity, flow properties, contents of bobbles.
    (b) Age of curing.
11. Examine various faults in casting:-
    (a) Flabby casting
    (b) Pin holding
    (c) Cracking
    (d) Wreathing
    (e) Proportionate shrinkage
    (f) Variation of casting weight
    (g) Bubble formation in casting slip
12. Explain on Development of Strength of Plaster.
13. Test the Casting slip – Viscosity, Pint- weight, PH value, etc.
14. Explain on Strength vs. Thickness.
15. Rectify the defects of the casting slip by thickening, corrective additions, P H control, etc.
16. Practice in Drain Casting, solid Casting and Pressure Casting – Tea set, Dinner Set Artistic Toys, sanitary- ware, Insulators , etc.
17. Practice the uses of casting Tools.
18. Join and finishing of the cast wares.
19. Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

NOTE: *Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.*

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution & contribute to avoidance of same.
	1.13 Take opportunities to use energy and materials in an environmentally friendly manner
	1.14 Avoid waste and dispose waste as per procedure
	1.15 Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.

electrical and apply in day to day work.*[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Heat & Temperature, Levers & Simple machine, graph, Centre of gravity, Power transmission, Pressure]*	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*	3.1 Read & interpret the information on drawings and apply in executing practical work.
	3.2 Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3.3 Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts
6. Explain energy conservation, global warming	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses

and pollution and contribute in day to day work by optimally using available resources.	optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7.1 Explain personnel finance and entrepreneurship.
	7.2 Explain 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.
	7.3 Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1 Use documents, drawings and recognize hazards in the work site.
	8.2 Plan workplace/ assembly location with due consideration to operational stipulation
	8.3 Communicate effectively with others and plan project tasks
	8.4 Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
Block-I (Section:10 in the competency based curriculum)	
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I** (section: 10) must ensure that the trainee performs job that requires limited range of activities which are routine and predictable. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, etc.); **Execution** (perform, illustration, etc. by applying basic methods, tools, materials and information 2) Knowledge of basic facts, process and principle applied in trade of employment3) Basic Mathematical Skills and **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work within defined limit.*	

8. SYLLABUS

BASIC TRAINING (Block – I)
Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Safety: - its importance, classification, personal, general, workshop and job safety. Occupational health and safety. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Importance of housekeeping & good shop floor practices. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Fire& safety: Use of Fire extinguishers.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Institute system including stores procedures. Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE). Response to emergencies eg; power failure, fire, and system failure. Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid. Introduction to 5S concept & its application. Fire: - Types, causes and prevention methods. Fire Extinguisher, its types. Global warming its causes and remedies. Industrial Waste its types, sources and waste Management.
2	Identification of common ceramic raw materials. Familiarisation with the common tools & equipment. Familiarisation with the common ceramic	Different type of raw materials used in ceramic industries- China clays, fire clays, ball clays, feldspar, quartz, limestone, sillimanie, kyamite, chemicals, colouring oxides etc.

	machineries, kilns and furnace etc. Marking out from drawing using scales, dividers, Scribers etc. Practice on the fundamental manufacturing process of ceramic articles.	Visual selection of the raw materials. Classification of ceramic bodies: Common clays (terracotta), Stoneware. Earthenware Faiences, Semi-porcelain, Vitreous china, Hotel china, Bone china etc.
3	Maintenance of tool, cleaning, sharpening, protecting etc. Making and use of templates. Fitting of studs and removal of broken ones, fitting and replacement of dowels. Fitting of vee, flat and endless belts, jointing of belts.	Basic Knowledge about functioning of important machineries like Jaw crusher, Edge runner mill, Ball mill, Blunger, Fitter pump and press. Basic Knowledge about functioning of important machineries like De-airing pug mill ,Jigger & Jolly. Introduction of simple repair and maintenance of pumps and presses. Introduction to preventive maintenance.
4	Simple pipe fitting. Fitting of guards and safety devices. Calcinations of Quartz. Grinding and crushing of feldspar, quartz etc.	Basic Knowledge about functioning of important machineries like Vibratory Screen Toggle Press, Extrusion Press. Basic Knowledge about functioning of important machineries like High duty refractory presses like Screw and hydraulic refractory presses, semi-automatic and automatic machines.
5	Charging of blunger. Wet-grinding of raw materials in ball mill.	Pottery and refractory Driers- different types Driers and their mechanism of drying.
6	Magnetic separation of iron particles. Preparation of clay for casting and pressing. Operation of jigger and jolly.	Different kiln furniture like saggers, setters, stilts, cranks, thimbles, and deck slabs, cantilevers etc, their uses.
7	Simple casting, jointing and finishing. Drying Pressing.	Furnaces- types of kilns and classification of furnaces.

	Drying and glazing.	Intermittent and continuous kilns like Down draft kiln, Chamber kiln, Tunnel kiln fired by solid, liquid, gaseous fuel and electricity. Kiln and furnace instrumentation (reading of instruments).
8-9	Preparation of sagger mixture- pressing of saggers. Hand making of saggers. Drying of saggers. Placing of wares in saggers. Placing of saggers in the kiln. Application of colours and different decoration and art.	Pottery Glaze and Decoration – under glaze, in- glaze, in- glaze and on- glaze decoration and methods of application hand drawing, lithographic transier and printing etc.
10	Making of refractory moulds. Shaping of refractory by hand moulding.	Ceramic Fabrication process like Extrusion, Throwing, Turning, Casting, Jiggering, Pressing etc.
11-12	Operation of tile presses. Operation of insulator making machine. Operation of kilns, Down Draft, Chamber, Tunnel, Decorating etc.	
13	**Revision& Internal Assessment**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration : - 30 hrs.)**
1.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Introduction to Engineering Drawing and Drawing Instruments : - Conventions - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003 Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
2.	**Basic Mathematics** - BODMAS rule Fraction-Addition, Subtraction, multiplication and Division-Problem solving, Decimal-Addition. Simple calculation using Scientific Calculator.	Lines : - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment
3.	**Conversion of Fraction to Decimal and vice-versa.**	Free hand drawing of - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the

		given object to the free hand sketches.
4.	**Percentage**: Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.	Drawing of Geometrical Figures: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. Circle and its elements.
5.	**Material Science** : Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy &Insulator. Types of ferrous and Non-ferrous metals. Difference between Ferrous and Non-Ferrous metals.	Sizes and Layout of Drawing Sheets - Selection of sizes - Title Block, its position and content Item Reference on Drawing Sheet (Item List)
6.	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight. Density, unit of density. Relation between mass, weight & density. Simple problems related to mass, weight, and density.	Method of presentation of Engineering Drawing - Pictorial View - Orthographic View Isometric view
7.	**Mensuration :** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.	Drawing of Solid figures (Cube, Cuboids, Cone) with dimensions.
8.	**Elasticity:**	Free hand Drawing of Solid figures (Prism,

	Elastic & Plastic material. Stress & strain and their units. Young's modules. Ultimate stress and breaking stress.	Pyramid, Frustum of Cone and Pyramid.) with dimensions
9.	**Heat & Temperature**: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, Scale of temperature, relation between different scale of temperature. Thermometer, pyrometer. Transmission of heat, conduction, convection, radiation.	Free Hand sketch of hand tools and measuring tools used in respective trades.
10.	**Basic Electricity:** Introduction and use of Electricity. AC, DC & their comparisons. Current, Voltage, Resistance& their units. Power, Energy & their units. Insulator and conductors & their uses.	Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) Symbol of 1st angle and 3rd angle projection as per IS specification
11.	**Drawing of Orthographic projection**	Drawing of Orthographic projection in 3rd angle.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 55 HRS.)

Topic No.	Topic	Duration (in hours)
	English Literacy	**7**
1.	**Reading** Reading and understanding simple sentences about self, work and environment	
2.	**Writing** Construction of simple sentences Writing simple English	
3.	**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. 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	**10**
1.	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	**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. Use of External memory like pen drive, CD, DVD etc,	
3.	**Computer Networking and INTERNET** 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.	
	Communication Skill	**18**
1.	**Introduction to Communication Skills** Communication and its importance Principles of Effective communication Types of communication - verbal, nonverbal, written, email, talking on phone.	

	Nonverbal communication - components-Para-language Body - language Barriers to communication and dealing with barriers.	
2.	**Listening Skills** Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
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	
Entrepreneurship skill		**8**
1.	**Concept of Entrepreneurship** **Entrepreneurship-** Entrepreneurship - Enterprises:-Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2.	**Institutions Support** 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.	
Productivity		
1.	**Productivity** Definition, Necessity.	
2.	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
Occupational Safety, Health & Environment Education		**6**
1.	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	

2.	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic 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	
Labour Welfare Legislation		
1.	**Welfare Acts** Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
Quality Tools		**6**
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.	
3.	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
4.	**Quality Tools** Basic quality tools with a few examples	

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block – I

1. Safety and best practices/Basic Industrial Culture (5S, KAIZEN, etc.)
2. Prepare different types of documentation as per industrial need by different methods of recording information.
3. Explanation on Deflocenlation and setting.
4. Explanation on casting process.
5. Explanation on Plaster Making-economy in the use of Plaster.
6. Classification of different ceramic wares according to body, namely, Terracotta, stoneware, E'ware, Semi-porcelain, Porcelain, Bone china, Vitreous China etc
7. Identification of raw materials without use of sophisticated instruments.
8. Examining various parts of machine for ceramic slip house and casting slip, namely –Ball mill, Bungers, Diaphragm Pump Fitter Press, De-airing Pug Mill, Magnets etc.
9. Preparation of casting slip with Deflocculating agent like Sodium Silicate, Sodium Carbonate, etc.
10. Study of casting rate with different age of moulds:
    (a)Study of density-pint weight, specific gravity, flow properties, contents of bobbles.
    (b) Age of curing.
11. Examining various faults in casting:-
    (a) Flabby casting
    (b) Pin holding
    (c) Cracking
    (d) Wreathing
    (e) Proportionate shrinkage
    (f) Variation of casting weight
    (g) Bubble formation in casting slip
12. Explanation on Development of Strength of Plaster.
13. Testing of casting slip – Viscosity, Pint- weight, PH value, etc.
14. Explanation on Strength vs. Trickness.
15. Rectification of the above defects of the casting slip by thickening, corrective additions, P H control, etc.
16. Practice in Drain Casting, solid Casting and Pressure Casting – Tea set, Dinner Set Artistic Toys, sanitary- ware, Insulators, etc.
17. Practical uses of casting Tools.
18. Joining and finishing of the cast wares.

19. Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

Note:

- Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
- In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

CERAMIC CASTER			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Safety goggles	(armoured heat proof)	21 nos.
2.	Protective apron	(jute or Asbestos)	21 nos.
3.	Rule Steel	300 M.M/12”	21 nos.
4.	Tool Tray		21 nos.
5.	Hand Brush	25 m.m.	21 nos.
6.	Steel Rule	6”/150 m.m.	21 nos.
7.	Foot Wear / Asbestos Over-shoes		21 nos.
8.	Try Square	250 m.m/10” (for wood work)	21 nos.
9.	Making Gauge (wood work)		21 nos.
10.	Diagonal scale		21 nos.
11.	Divider		21 nos.
12.	Iron Moulds		21 nos.
13.	Wooden Moulds		21 nos.
14.	Wooden Hammer		21 nos.
15.	Crucible	(30 c.c. capacity)	21 nos.
16.	Tongs	(Nickel plated)	21 nos.
17.	Specific Gravity bottle		21 nos.

Ceramic Caster

B : INSTRUMENTS & GENERAL SHOP OUTFIT			
18.	Standard Chemicals required for Acidimetry & Alhalimentry		1
19.	Torsion Viscometer		1
20.	Small Fitter Press		1
21.	Small Vacuum Pugmill (moterised)		1
22.	Modulus of rupture apparatus		1
23.	Platinum Crucible	(30 capacity)	2
24.	Nickel Crucible	(30 capacity)	8
25.	Electric Furnace	1000ºc capacity	1
26.	Electric Furnace	1450ºc capacity	1
27.	Gas fired Muffle Furnace	1200ºc capacity	1
28.	Vacuum Pump		1
29.	Vacuum Desecicator		2
30.	Porcelain Mortar & Pestle		6
31.	Iron Mortar & Pestle		3
32.	Horse-sheet magnet		4
33.	Stop-Watch		2
34.	Chemical Balance		2
35.	Student petrological Microscope		1
36.	Tongs assorted		4
37.	Asbestos Hand Gloves		4 pairs
38.	Pint Mug Enamek		6
39.	Rule, contraction	600 m.m.	1
40.	Drill, Ratchet Brace	10”/250 m.m.	1
41.	Auger	6.9.12.15 m.m assorted	1 each
42.	Blow lamp, Kerosene		2
43.	Shovel, hand		2
44.	Wheel Barrows		1
45.	Funnel Enamel	75 m.m.	4
46.	Funnel Enamel	150 m.m.	4
47.	Buretties, Pipette measuring cylinders, etc as required in a Chemical Laboratory.		As Required
48.	Standard sieves (I.S.Std)		1 Set
49.	Chisel Cold Flat	12 m.m.	4 Set
50.	Chisel Cold Flat	20 m.m.	4
51.	Hammer Ball pien	1 k.g.	4

Ceramic Caster

52.	Hammer Ball pien	2 k.g.	4
53.	Half Round file	150 m.m.	4
54.	Remmer flat		4
55.	Wrench adjustable	75 m.m.	2
56.	Wire Brush		4
57.	Screw Driver	250 m.m.	3
58.	Screw Driver	150 m.m.	4
59.	Engineering Try Square	150 m.m.	2
60.	Scriber	200 m.m.	4
61.	Pliers	200 m.m.	4
62.	Caliper outside	150m.m.	4
63.	Caliper inside	150m.m.	4
64.	Face shields (Clear)		8
65.	Head Wear		8
66.	Fire extinguisher foan, chemical(according to factory regulation)		2
67.	First-Aid Box including burn treatment		2
68.	Fire Buckets with stand		4 Sets
69.	Work Bench	2m x 1.5m x 750 m.m.	2 Nos.
70.	Bench Vice	125m.m.jaw	4
71.	Locker Steel with 8 Drawers each		2
72.	Hack Saw Frame adjustable	225mm to 300m.m	4
73.	Hack Saw Blades	300 m.m.	As Required
74.	Mallet Hide		4
75.	Different tools & appliances for colouring		8 Sets
76.	Taper Trowel		4 (different sets)
77.	Temperature recorders		4 Sets
78.	Bunsen Burner		8
79.	Refractory Fire Bricks		As Required
80.	Oil/ Gas Burners		4 sets each
81.	Pyrometer / Thermocouples		4 sets each

Ceramic Caster

82.	Indicators(Temperature)		4 sets each
83.	Steel Almirah for Teacher		1 (for each trade)
84.	Magnifying Lens		4
85.	Physical Balance	(250g.m.)	3
86.	Travelling Microscope		1
GENERAL SHOP OUTFIT			
87.	Double ended Bench Grinder	150 mm Wheeldia	1
88.	Drying Oven		1
89.	Liquid limit Device		3
90.	Jaw Crusher		1
91.	Roller Mill		1
92.	Edge Runner		1
93.	Hammer Mill		1
94.	Ball Mill		1
95.	Pot Mill (3 to a set)		3 sets
96.	Weighing Scale	10 k.g. capacity	1
97.	Weighing Scale	50 k.g. capacity	1

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: CERAMIC CASTER

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) Space Norms : 45 Sq. m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid 45^o	250 X 1.5 mm	20+1 set
3.	Set square celluloid 30^o-60^o	250 X 1.5 mm	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board IS: 1444	700mm x500 mm	20+1 set
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board		20
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board (size: 8ft. x 4ft.)		01
7	Trainer's Table		01
8	Trainer's Chair		01

Ceramic Caster

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														