



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

COMPETENCY BASED CURRICULUM

INDUSTRIAL PAINTER

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – CHEMICAL

INDUSTRIAL PAINTER

(Engineering Trade)

(Revised in 2018)



CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

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Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the one-year duration of “Industrial Painter” trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill. In addition to this, a candidate is entrusted to undertake project work, extracurricular activities and on-the-job training to build up confidence. The broad components covered related to the trade are categorized in two semesters each of six months duration. The semester wise course coverage is categorized as below: -

1st Semester – During this semester the trainees will recognize and comply safe working practices with PPE and MSDS. They will also learn hazard and non hazard items, uses of fire fighting equipments. They will also go through the allied training on carpenter, welding, sheet metal work. Preparation of different types of wooden surface and painting on it. Knowledge of pipelines procedure and safety aspect. They will also practice graphics-stickers pasting, fixing, locking on wooden or metal surface.

2nd Semester – During this semester the trainees will learn process of cleaning and painting on metal surface for preventive coating. Repair and maintenance of different pneumatics and paint gun. Practice on spray painting technique. Learn the aspect ratio mixing of paint, hardner and solvent. During the training they will also practice removal of dents and recover the damaged accidental area. They also practice on special effects for modern furniture. Operating system of powder coating technique and also quality test for various paints and painted films.

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2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ labour market. The vocational training programmes are delivered under the 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.

Industrial Painter trade under CTS is one of the popular courses delivered nationwide through a network of ITIs. The course is of one-year (02 semester) 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 & science, Engineering Drawing and Employability Skills) impart requisite core skill, knowledge and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by NCVT which is recognized worldwide.

Trainee broadly needs to demonstrate that they are able to:

- Read and interpret technical parameters/ documentation, plan and organize work processes, identify necessary materials and tools.
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- Document the technical parameter related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS

- Can join the apprenticeship program in different types of industries leading to a National Apprenticeship Certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year (02 semesters):

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	1050
2	Professional Knowledge (Trade Theory)	252
3	Workshop Calculation & Science	84
4	Engineering Drawing	126
5	Employability Skills	110
6	Library & Extracurricular Activities	58
7	Project Work	160
8	Revision & Examination	240
	Total	2080

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time. The employability skills will be tested in the first two semesters itself.

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 has to maintain an 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 NTC will be conducted by NCVT at the end of each semester as per the guideline of Government 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 the basis for setting question papers for final assessment. The examiner during final examination will also check** the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage for practical is 60% & minimum pass percentage of theory subjects is 40%. For the purposes of determining the overall result, 50% weightage is applied to the result of each semester examination.

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 the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

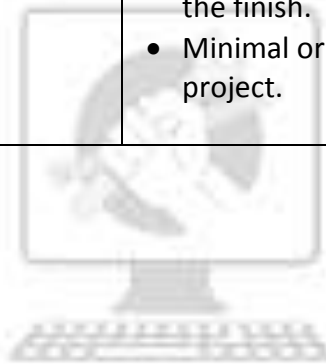
Assessment will be evidence based comprising the following:

- 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 examining body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	<ul style="list-style-type: none"> • Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • Below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and	<ul style="list-style-type: none"> • Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% tolerance dimension achieved while undertaking different work with those

<p>regard for safety procedures and practices</p>	<p>demand by the component/job.</p> <ul style="list-style-type: none"> • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
<p>(c) Weightage in the range of more than 90% to be allotted during assessment</p>	
<p>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.</p>	<ul style="list-style-type: none"> • High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

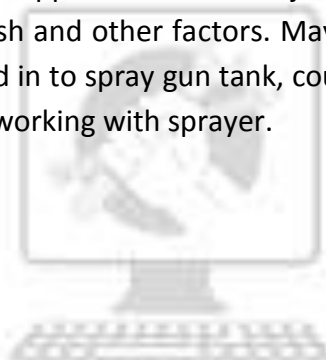


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3. JOB ROLE

Painter, Industrial; applies paint, varnish and similar materials to building and other structure. Chooses the right paint or finish for the surface to be covered taking in to account durability, ease of handling, method of application and customers' wishes. Prepares surface to be covered using scrappers, abrasives, and chemical removers so that paint adheres properly. Removes old coat by stripping, sanding, wire brushing, burning or watering and abrasive blasting. May wash surfaces and do trimming to remove dirt and grease from surfaces; fills holes and cracks; welds; sand-papers rough spots and brushes off dust. Applies primer on new surfaces for the finish coat. Mixes paint and matches colours by stirring together proper portions of pigments, oil, thinner etc. and other substances relying on knowledge of paint composition and colour harmony. Chooses the right paint applicator for each job, depending on the surface to be covered; characteristics of the finish and other factors. May use brush with soft tapered edge, or paint sprayer. Puts coating liquid in to spray gun tank, couples gun to air hose and adjusts air pressure valves and nozzles when working with sprayer.

Reference NCO-2015: 7131.0300



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4. GENERAL INFORMATION

Name of the Trade	INDUSTRIAL PAINTER
NCO - 2015	7131.0300
NSQF Level	Level-4
Duration of Craftsmen Training	One year (Two semesters each of six months duration)
Entry Qualification	Passed 10 th class examination under 10+2 System of education with science and mathematics or equivalent.
Unit Strength (No. Of Student)	20 (Max. supernumeraries seats: 6)
Space Norms	80 Sq. m
Power Norms	2.5 Kw
Instructors Qualification for	
1. Industrial Painter Trade	<p>Degree in Paint Technology/ Bachelor of fine arts from recognized Engineering college/ university with one year experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>Diploma in Paint technology/Painting from recognized board of technical education with two years experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC/NAC passed in the relevant trade with 3 years post qualification experience in the relevant field.</p> <p><i>Desirable:</i> Preference will be given to a candidate with CITS (Craft Instructor Training Scheme) in relevant Trade.</p> <p><i>Preference will be given to a Candidate With Craft Instructor Certificate</i></p>
2. Workshop Calculation & Science	<p>Degree in Engineering with one year experience.</p> <p style="text-align: center;">OR</p> <p>Diploma in Engineering with two-year experience.</p> <p><i>Desirable:</i> Craft Instructor Certificate in RoD&A course under NCVT.</p>
3. Engineering Drawing	<p>Degree in Engineering with one year experience.</p> <p style="text-align: center;">OR</p>

	Diploma in Engineering with two-year experience. OR NTC/ NAC in the Draughtsman (Mechanical / Civil) with three-year experience.					
4. Employability Skill	MBA OR BBA with two-year experience OR Graduate in Sociology/ Social Welfare/ Economics with two-year experience OR Graduate/ Diploma with two-year experience and trained in Employability Skills from DGT institutes. AND Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above. OR Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.					
List of Tools and Equipment	As per Annexure – I					
Distribution of training on Hourly basis: (Indicative only)						
Total Hours/Week	Trade Practical	Trade Theory	Workshop Cal. &Sc.	Engg. Drawing	Employability Skills	Extra-curricular Activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours

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5. NSQF LEVEL COMPLIANCE

NSQF level for **Industrial Painter** trade under CTS: **Level 4**

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
- e. Responsibility

The Broad Learning outcome of the **Industrial Painter** trade under CTS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study.	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and learning and some responsibility for other's works and learning.

6. LEARNING/ ASSESSABLE OUTCOME

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

6.1. GENERIC LEARNING OUTCOME

1. Recognize & comply with 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]*
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, Different Projections, Assembly drawing, Sectional views, Estimation of material]*
4. Select 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 execute the work related to the occupation.

6.2. SPECIFIC LEARNING OUTCOME

Semester – I

9. Marking, sawing, planning, Chiseling, Drilling.
10. Making a types of joints for different frames (like- Screen frame, sign board, & hanging Paintings frames)
11. Manufacture simple sheet metal items as per drawing and join them.
12. Manufacture simple sheet metal items as per drawing and join them by soldering, brazing and riveting.
13. Knowledge of various pipe fittings
14. Join metal component by arc welding observing standard procedure.
15. Cut and join metal component by gas (oxy-acetylene)
16. Join metal components by riveting observing standard procedure.
17. Preparation of wooden surface used various techniques, decorate & make a attractive wooden articles.

18. Prepare different types of wooden surface & paint it. Like Plywood, MDF & low quality wood.
19. Process on pipes & pipe line painting with colour code.
20. Knowledge of pipelines procedure & Safety aspect.
21. Graphics-Stickers pasting, fixing, locking on wooden or metal surface.

Semester – II

22. Process of cleaning on metal surface for preventive coat.
23. Process of painting on metal surface for preventive coat.
24. Identify, replace and assemble different pneumatics and paint gun. [Different components – Compressor, Pressure Gauge, Filter Regulator. Valve for hose]
25. Perform Spray Painting technique. (Spray Gun / hose handling, air & paint pressure controlling,)
26. Operating system of spray booths, Oven, cleaning & their maintenance, application of sealant component on metallic joints.
27. Perform aspect ratio mixing of paint, hardener & solvent. Measure Viscosity of paint. Operate the Spray painting system.
28. Development of spray painting in Home appliances, Agricultural equipment's, Machines, Automotive Bodies etc.
29. Removal of dents & recover the damaged accidental aria. Repaint & recovering damaged aria. Remedies of paint defects.
30. Finish special effects for Modern furniture.
31. Operating system of Powder coating technique.
32. Quality Testing for various paints & Painted films.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOME	ASSESSMENT CRITERIA
1. Recognize & comply with 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 of 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 with 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 Protective 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 and explain different mathematical calculation & science in	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, heat & temperature, heat treatment.

the field of study including basic electrical. <i>[Different mathematical calculation & science]</i>	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply with 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 and earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, Different Projections, Assembly drawing, Sectional views, Estimation of material]</i>	3.1 Read and interpret the information on drawings and apply in executing practical work.
	3.2 Read & analyse the specification to ascertain the material requirement, tools, and 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 measure dimension of components and record data.	4.1 Select appropriate measuring scale/tape/gauges.
	4.2 Measure dimension of the components/assembly & compare 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	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain

warming and pollution and contribute in day-to-day work by optimally using available resources.	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 familiarize 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 execute 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 Execute the task effectively.

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SPECIFIC LEARNING/ ASSESSABLE OUTCOMES	
LEARNING/ ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
SEMESTER-I	
9. Marking, sawing, planning, Chiseling, Drilling.	9.1 Marking Practice on wood.
	9.2 Apply holding & sawing practice on different size of wood.
	9.3 Work on teeth setting & sharpening of different saw.
	9.4 Apply tenoning Half cut on wooden border.
	9.5 Make setting of planers & sharpening on plane blade.
	9.6 Do plane on different wooden surfaces.
	9.7 Do chiseling slots on thick wood.
	9.8 Drilling on wood with different drilling tools (Gimlet, Hand Drill, Portable elect. drilling machine).
10. Making a type of joints for different frames (like- Screen frame, sign board, & hanging Paintings frame).	10.1 Make a simple lap joint.
	10.2 Make a simple mitred half lap joint.
	10.3 Make a simple Dovetail joint.
	10.4 Apply Joint fitting with nails, screw, glue etc.
11. Manufacture simple sheet metal items as per drawing and join them.	11.1 Marking practice of straight lines, circles, profiles and various geometrical shapes.
	11.2 Cutting practice of straight lines, circles, profiles and various geometrical shapes on sheets with snips.
	11.3 Marking out of simple development.
	11.4 Marking out for fold for joints.
12. Manufacture simple sheet metal items as per drawing and join them by soldering, brazing and riveting.	12.1 Make the joint of hemming, form locked.
	12.2 Make the joint of grooved and knocked up single hem.
	12.3 Make the joint of straight and curved edges form double hemming.
	12.4 Make cylindrical objects with joints.
13. Knowledge of various pipe fittings.	13.1 Identify & check different types of pipe.
	13.2 Do pipe cutting & threading
	13.3 Apply different types of pipe joint/ fitting of different materials & different diameter. (Use PVC pipe)
	13.4 Make joint/ fitting for rain water (Use PVC pipe)
	13.5 Make joint/ fitting for water pipe line (Use GI pipe)
	13.6 Make joint/ fitting for water pipe line (Use PVC pipe)
14. Join metal component by arc welding observing standard procedure.	14.1 Identify different components/parts of arc welding machine, collect desired information and set each components/parts as per standard procedure.

	14.2 Observe safety/ precaution during operation.
	14.3 Select appropriate material & plan for arc welding
	14.4 Weld metal parts / mechanical components as per specification observing standard procedure.
	14.5 Check joined part portion to ascertain proper welding.
15. Cut and join metal component by gas (oxy-acetylene)	15.1 Identify different components/parts of Gas (oxy-acetylene) machine, collect desired information and set each components/parts as per standard procedure.
	15.2 Observe safety/ precaution during operation.
	15.3 Select appropriate material & plan for gas cutting & joining operation.
	15.4 Cut & join metal parts / mechanical components as per specification observing standard procedure.
	15.5 Check cut portion/ joined part to ascertain proper welding
16. Join metal components by riveting observing standard procedure.	16.1 Mark and develop various forms as per drawing using sheet metals.
	16.2 Prepare the job for lap and butt joint.
17. Preparation of wooden surface used various techniques, decorate & make an attractive wooden article.	17.1 Apply Cleaning, sanding, knotting, stooping, staining preparation on wooden surface properly for polish.
	17.2 Make & apply putty for varnishing & polishing.
	17.3 Apply polish on prepared wooden surface with cotton rags.
	17.4 Apply Cleaning, sanding, knotting, stooping, staining preparation wooden surface properly for varnish.
	17.5 Apply varnish on prepared wooden surface with brush.
	17.6 Prepare wooden article & apply varnish with spray.
	17.7 Prepare wooden article & apply melamine or PU wooden finish with spray.
	17.8 Make a wooden top with thick layer of melamine polish.
18. Prepare different types of wooden surface & paint it like Plywood, MDF & low-quality wood.	18.1 Prepare wooden surface properly for painting.
	18.2 Practice of applying wood primer by brush.
	18.3 Make a putty for wood finishing.
	18.4 Apply putty & prepare wooden surface properly.
	18.5 Do paint wooden surface properly with brush
	18.6 Prepare & spray painting on different furniture take the all precautions.

19. Process on pipes & pipe line painting with colour code.	19.1 Paint the GI pipe by brush.
	19.2 Paint the sanitary pipe of building. Take & care self precaution & safety.
	19.3 Paint the MS square & round pipe, take all precautions & safety while painting.
	19.4 Do Paint deferent pipe line with colour code as per ISI.
20. Knowledge of pipelines procedure & Safety aspect	20.1 Demonstrate knowledge of safety procedures in Industrial pipe line painting
	20.2 Identify colour code wise– Pipe lines, different types of valves.
21. Graphics-Stickers pasting, fixing, locking on wooden or metal surface.	21.1 Do simple graphics of radium's or vinyl.
	21.2 Selection of graphics properly and pest it on selected (wooden/Metallic) surface evenly.
	21.3 Use lacquer or varnish spray and coat layer of lamination.
SEMESTER-II	
22. Process of cleaning on metal surface for preventive coat.	22.1 Do Scrap on corrode metal surface.
	22.2 Cleaning process of metal surface by wire brush or orbital wire brush.
	22.3 Apply burn process on old paint from metal surface by blow lamp or gas flame.
	22.4 Apply dry sanding with help of emery paper/cloth.
	22.5 Apply wet sanding on old painted object.
	22.6 Clean the metal surface by Sander machine.
	22.7 Do level the different metal surface by portable hand grinder.
	22.8 Do degreasing process on metal surface.
	22.9 Apply de-rusting or pickling process on corrode metal.
	22.10 Observe practical of Different types of , Industrial Painting system by vidio
23. Process of painting on metal surface for preventive coat.	23.1 Prepare metal surface & apply ready primer on metal surface by brush.
	23.2 Apply enamel/ polyester putty or filler on primed surface.
	23.3 Apply enamel paint on primed metal surface by brush.
	23.4 Prepare and paint metallic article by brush.
	23.5 Prepare & colour making for deep painting.

	23.6 Prepare article for deep painting. (Cleaning, rubbing, sandig.)
	23.7 Explain the Electro coat Deeping process & conveyor system with all safety.
24. Identify, replace and assemble different pneumatics and paint gun. [Different components– Compressor, Pressure Gauge, Filter Regulator. Valve for hose]	24.1 Identify pneumatic components – Compressor, pressure gauge, Filter, Regulator, and Lubricator. Different types of valves.
	24.2 Explain the safety procedures in spray systems and personal Protective Equipment (PPE).
	24.3 Maintenance, troubleshooting, and safety aspects of pneumatic and Painting instruments.
25. Perform Spray Painting technique. (Spray Gun / hose handling, air & paint pressure controlling,)	25.1 Application of spray gun holding and stroke adjustment, Paint adjustment, air adjustment techniques.
	25.2 Spraying practice on the surface like as edges, corner, square, round & curved area.
26. Operating system of spray booths, Oven, cleaning & their maintenance, application of sealant component on metallic joints.	26.1 Use and apply of paint spray booth & maintenance, troubleshooting, safety aspects.
	26.2 Use & Operation of Oven Setting, temperature & timing.
	26.3 Apply sealant on metallic joints.
27. Perform aspect ratio mixing of paint, hardener & solvent. Measure Viscosity of paint. Operate the Spray painting system.	27.1 Preparation of Paint mixing for spray painting.
	27.2 Measure the viscosity of paint.
	27.3 Spray Painting practice on ornamental objects, with deferent types of paints.
	27.4 Spraying metallic primer on metal surface.
	27.5 Apply Carpatch, Putty and Filler on metallic surface & preparation.
	27.6 Apply Surfacer on primed or putty finish surface.
	27.7 Spraying finish application for Top Coat. Use of enamel/ N.C. paints. (Or latest paints.)
28. Development of spray painting in Home appliances, Agricultural equipment's,	28.1 Prepare the surface of home appliances.
	28.2 Priming & surfacing process on home appliances.
	28.3 Apply finish undercoat & top coat on home appliances.

Machines, Bodies etc.	Automotive	28.4 Use enamel/ N.C./ P.U. paints- Solid/ Metallic/ Pearl/.
		28.5 Application of preparing machine surface.
		28.6 Priming & surfacing on machine.
		28.7 Application of finish undercoat & top coat on machine.
		28.8 Preparation of the tow wheeler body and spares surface.
		28.9 Priming & surfacing the Tow wheeler body and spares surface.
		28.10 Apply finish undercoat & top coat on Tow wheeler body and spares surface. * Use Automotive paints.
		28.11 Apply Graphic sticker on painted surface properly & apply lacquer coat evenly.
		28.12 Identify the parts of Electrostatic gun assembly & operate it carefully.
		28.13 Identify the parts of Airless gun assembly & 28.14 Operate it carefully.
		28.15 Practice of Different types of Spray painting.
29. Removal of dents & recover the damaged accidental aria. Repaint & recovering damaged aria. Remedies of paint defects.		29.1 Disassemble essential damage parts, inspect & mark denting aria. Choose & decide process tools for denting.
		29.2 Removed dent on marked aria, apply essential method.
		29.3 Do sanding or burn on denting aria & apply primer & surface. Apply putty layer on spotted area evenly.
		29.4 Use wet sanding, level denting surface area, procedure of thin coat of Surfacer.
		29.5 Masking process on unwanted area properly.
		29.6 Match the shade Overlay proper equally on unmask aria.
		29.7 Unmasked the mask area carefully & checkout properly & touch-up it by necessary process.
		29.8 Apply final coat rubbing and waxing process properly.
		29.9 Demonstrate of Paint defects & its remedies.
		29.10 Check & Find out different paint defects (run down, sagging, pin hole, orange peel, oil & water spot, over/ dry spray, uncover, shade variation etc.)
		29.11 Mark the defected area, Decide Techniques & apply remedies properly. Make Finished surface.
30. Finish special effects for Modern furniture.		30.1 Application Process of Finish special effects on different furniture & different surface. (like as- colour gradations, muly tones applying, different textures, etc.)

31. Operating system of Powder coating technique.	31.1 Pretreatment & Clean the metallic article in chemical (degreasing, de-rusting, activation, phosphating, passivation & water rinsing as where required etc.)
	31.2 Procedure of powder coating on cleaned article & baking in oven. Apply appropriate temperature & timing.
32. Quality Testing for various Paints & Painted films.	32.1 Check and identify the Paint defects & its remedies.
	32.2 Testing the quality of paints & Painted surfaces by various testing method & instruments.



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SYLLABUS FOR INDUSTRIAL PAINTER TRADE			
FIRST SEMESTER - 6 MONTHS			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
1-2	Recognize & Comply Safe working practices environment, Regulation, Familiarization and Housekeeping	<ol style="list-style-type: none"> 1. Introduction of trade skills and work application. (02 hrs) 2. Safety attitude development of the trainee by educating them to use personal protective equipment (PPE) and Material safety data sheet (MSDS). (05 hrs) 3. First-aid method and basic training. (02 hrs) 4. Safe disposal of waste materials like- cotton waste, waste paint and waste paint material etc. (02 hrs) 5. Hazard and non hazard identification and avoidance. (02 hrs) 6. Use of fire fighting equipment, like- extinguishers, sand bucket, water etc. (10 hrs) 7. Identification of safety signs, like- Danger, warning, caution and personnel safety (01 hr) 8. Importance of trade training (02 hrs) 9. Understand precautions to be followed while working in the painting jobs. (02 hrs) 10. Motivational talk by experts. 	<p>Introduction of the Institution; rules and management (work) Process of an Institution. Knowledge about the facilities; leaves and rules and subjects an syllabus. Introduction of vocational trade, The importance of trade in the industrial Development of the nation Care in Vocational trade</p>

		(05 hrs) 11. 5S training. (02 hrs) 12. Draw different sketches and Colour Scheme practice. (15 hrs)	
3	do	13. Introduction and identification of tools and equipments different for cleaning and painting (15 hrs) 14. Identification and there assembly and function of trade machineris (10 hrs)	Accident and First-Aid: Cost of Accidents; Causes and effects of an accident; First-Aid in case of internal injuries; fracture; wound and electric shock.
4	Marking, sawing, planning, Chiseling, Drilling.	CARPENTER WORK: 15. Marking Practice on wood. (05 hrs.) 16. Holding & Sawing Practice different size of wood (10 hrs.) 17. Plane on different wooden surfaces. (05 hrs.) 18. Drilling on wood with different drilling tools (Gimlet, Hand Drill, Portable elect. drilling machine. (05 hrs)	Carpenter - safety precaution description, Use hand tools, carpenter tools, types of wood their description & use common defects in timber & their effects..
5	Making a types of joints for different frames (like- Screen frame, sign board, & hanging Paintings frames	19. Make a simple lap joint. (05 hrs.) 20. Make a simple mitred half lap joint. (05 hrs.) 21. Make a simple Dovetail joint. (05 hrs.) 22. Joint fitting with nails, screw, glue etc. (10 hrs)	Equipments for joint, Joints - Types and uses of different types of joints.
6	Manufacture simple sheet metal items as per drawing and join them.	SHEET METAL WORK: 23. Marking of straight lines, circles, profiles and various geometrical shapes and cutting the sheets with snips. (15 hrs.) 24. Marking out of simple development (5 hrs.) 25. Marking out for flaps for joints (5 hrs.)	Safety precautions to be observed in a sheet metal workshop, sheet and sizes, Shearing machine- description, parts and uses.
7	-do-	26. Make various joints: hemming, form locked, grooved and knocked up single hem straight	Marking and measuring tools, wing compass, Prick punch, square tools, snips, types

		and curved edges form double hemming. (15 hrs.) 27. Make cylindrical objects with joints. (10 hrs.)	and uses. hammers and mallets type-sheet metal tools, Soldering iron, Trammel, Stakes
8	-do-	28. Bend sheet metal into various curvature form, wired edges-straight and curves. Fold sheet metal at angle using stakes. (8 hrs.) 29. Make simple Square container with wired edge and fix handle.(17 hrs.)	Stakes-bench types, parts, their uses. Various types of metal joints, their selection and application, tolerance for various joints, their selection & application. Wired edges.
9	-do-	30. Make square tray with square soldered corner.(15 hrs.) 31. Practice in soft soldering and silver soldering. (10 hrs.)	Solder and soldering: Introduction-types of solder and flux. Composition of various types of solders and their heating media of soldering iron. Method of soldering, selection and application-joints. Hard solder- Introduction, types and method of brazing.
10	Manufacture simple sheet metal items as per drawing and join them by soldering, brazing and riveting.	32. Make simple Square table tray with folding edge and fix handle with riveting. (17 hrs.) 33. Make simple triangular tray with folding edge and fix handle with riveting. (8 hrs.)	Marking and measuring tools, wing compass, Prick punch, square tools, snips, types and uses. hammers and mallets type-sheet metal tools, Soldering iron, Trammel, Stakes
11	Knowledge of various pipe fittings	34. Identify & check different types of pipe. (05 hrs) 35. Do pipe cutting & threading. (10 hrs) 36. Apply different types of pipe Joint / fitting of different materials & different diameter. (Use PVC pipe). (10 hrs)	Plumber: Instruction to the trade safety precautions and elementary first aid. Plumber hand tools description on rain water & pipe system including installation of water supply fitting. Description of different types of pipes & their use such as galvanized pipes, PVC pipes. Pipe line leakage & Maintenance.
12	-do-	37. Make joint/ fitting for rain water (Use PVC pipe). (10 hrs)	Do

		38. Make joint/ fitting for water pipe line (Use GI pipe). (10 hrs) 39. Make joint/ fitting for water Pipe line (Use PVC pipe). (05 hrs)	
13	Join metal component by arc welding observing standard procedure.	40. Welding - Striking and maintaining ARC, laying Straight-line bead. (25 hrs.)	Safety-importance of safety and general precautions observed in a welding shop. Precautions in electric and gas welding. (Before, during, after) Introduction to safety equipment and their uses. Machines and accessories, welding transformer, welding generators.
14	Cut and join metal component by gas (oxy-acetylene) Join metal components by riveting observing standard procedure.	41. Making square, butt joint and „T“ fillet joint-gas and ARC. (15 hrs.) 42. Do setting up of flames, fusion runs with and without filler rod, and gas. (10 hrs.)	Welding hand tools: Hammers, welding description, types and uses, description, principle, method of operating, carbon dioxide welding. H.P. welding equipment: description, principle, method of operating L.P. welding equipment: description, principle, method of operating. Types of Joints-Butt and fillet as per BIS SP: 46-1988 specifications. Gases and gas cylinder description, kinds, main difference and uses.
15	Cut and join metal component by gas (oxy-acetylene)	43. Make butt weld and corner, fillet in ARC welding (25 hrs.)	Setting up parameters for ARC welding machines-selection of Welding electrodes. Care to be taken in keeping electrode.
16-17	Preparation of wooden surface used various techniques, decorate & make an attractive wooden articles.	44. Clean, sanding, knotting, staining preparation wooden surface properly for varnishing & polish. (05 hrs) 45. Make & apply putty for varnishing & polishing. (05 hrs) 46. Apply polish on prepared	Polish paper-Types and uses. Putty - Definition, their material types and uses. Method of mixing & its different system of application. Varnish - Definition; types and characteristics of varnish. Process of making

		<p>wooden surface with cotton rags. (05 hrs.)</p> <p>47. Apply varnish on prepared wooden surface with brush. (05 hrs.)</p> <p>48. Prepare wooden article & apply varnish with spray. (10 hrs.)</p> <p>49. Prepare wooden article & apply melamine or PU wooden finish with spray. (10 hrs.)</p> <p>50. Make a wooden top with thick layer of melamine polish. (10 hrs.)</p>	<p>of varnish its importance and contains.</p> <p>Polish- Types and uses. Different application methods</p>
18	Prepare different types of wooden surface & paint it. Like Plywood, MDF & low quality wood.	<p>51. Prepare wooden surface properly for painting. (05 hrs)</p> <p>52. wood primer by brush (05 hrs)</p> <p>53. Make a putty for wood finishing. (02 hrs.)</p> <p>54. Apply putty & prepare wooden surface properly. (03 hrs.)</p> <p>55. Do paint wooden surface properly with brush (05 hrs)</p> <p>56. Prepare & spray painting on different furniture taking all precautions. (05 hrs)</p>	<p>Paint- Definition; classification and use. Pigment, Binders, Solvent, oil, dryers; additives.</p> <p>Painting- Definition and importance of painting.</p> <p>Method of wooden surface painting..</p>
19	Process on pipes & pipe line painting with colour code.	<p>57. Paint the GI pipe, take all precautions while painting. (05hrs.)</p> <p>58. Paint the sanitary pipe, take all precautions while painting. (05hrs.)</p> <p>59. Paint the MS square & round pipe, take all precautions while painting. (05 hrs.)</p> <p>60. Paint deferent pipe line with colour code as per ISI. (10 hrs)</p>	<p>Intention and effects of pipe line painting, Colour Codes of pipe line painting. ISI colour code.</p>
20	Knowledge of pipelines procedure & Safety	61. Demonstrate knowledge of safety procedures in Industrial	Safety for Industrial pipe line painting

	aspect.	pipe line painting (Demo by video & charts) (15 hrs.) 62. Identify colour code wise– Pipe lines, different types of valves, (10 hrs.)	
21	Graphics-Stickers pasting, fixing, locking on wooden or metal surface	63. Make simple graphics of radium's or vinyl & cut it (08 hrs) 64. Select the Graphics and pest it on selected (wooden/Metallic) surface properly. (08 hrs) 65. Use lacquer or varnish spray and coat layer of lamination. (09 hrs)	Use of graphics for attractiveness & deferential look ness, Procedure of pasting. Their instruments Procedure of locking edges of graphic material. Surface coating and even ness (one layer coat) their material & spraying method.
22-23	Project Work Broad areas: a) Make polishing samples on Different types of wood pieces. b) Manufacture The Sheet Metal- small table articles with finish painting.		
24-25	Revision		
26	Examination		

Note: -

1. *Some of the sample project works (indicative only) are given against each semester.*
2. *Instructor may design their own project and also inputs from local industry may be taken for designing such new project.*
3. *The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit Project report.*
4. *If the instructor feels that for execution of specific project more time is required than he may plan accordingly to produce components/ sub-assemblies in appropriate time i.e., may be in the previous semester or during execution of normal trade practical.*

SYLLABUS FOR INDUSTRIAL PAINTER TRADE

SECOND SEMESTER – 06 Months

Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
27-28	Process of cleaning on metal surface for preventive coat.	66. Scrap the corrode metal surface. (08 hrs) 67. Clean the metal surface by wire brush or orbital wire brush. (08 hrs) 68. Burn the old paint from metal surface by blow lamp or gas flame. (08 hrs) 69. Do dry sanding with help of emery paper/cloth (08 hrs) 70. Apply wet sanding on old painted object. (08 hrs) 71. Clean the metal surface by Sander machine. (05 hrs.) 72. level different metal surface by portable hand grinder. (05 hrs.)	Corrosion- Definition and classification. Reasons for rusting and effect of climate. Different anti-rusting process.
29	-do-	73. Apply degreasing process on metal surface. (05 hrs) 74. Apply de-rusting or pickling process on corrode metal. (06 hrs.) 75. Treated phosphating on metal surface with all pre-treatment process. (08 hrs) 76. Demonstrate practical of Different types of , Industrial Pt system by video (06 hrs)	Metal surface - types and selection of sanding paper (polish paper). Metal surface cleaning- Mechanical and chemical cleaning. (Dry/ wet Sanding, scraping, wire brushing, orbital wire brushing, paint burning, sand and shot- blasting, pickling and phosphating).
30	Process of painting on metal surface for preventive coat.	77. Make a proper thin metal primer for brush application. (02 hrs.) 78. Prepare metal surface & apply ready primer on metal	Metal Primer - Types, Purpose, application and use. Types of surface. Types of solvent or reducers / thinner/ automotive paints (

		<p>surface by brush. (05 hrs)</p> <p>79. Apply enamel / polyester putty or filler on primed surface. (08 hrs)</p> <p>80. Apply enamel paint on primed metal surface. (10 hrs)</p>	<p>Enamel, NC, Stoving, PU, Epoxy, rubber base sound-deadener paint, metallic, pearl, water base automotive (paint), lacquer.</p>
31	-do-	<p>81. Prepare and paint metallic article by brush. (15 hrs.)</p> <p>82. Prepare & colour making for deep painting. (01 hr)</p> <p>83. Prepare article for deep painting. (04 hrs)</p> <p>84. Demonstrate practical of Electro coat Deepings process & conveyor system by video (05 hrs)</p>	<p>Types of painting process- Traditional and modern technology. Ex.- Brushing, Deeping, barreling, Airosole, roller coating, suction spray, vertical spray, pressure vessel, spray airless, electrostatic, powder coating etc.</p>
32	<p>Identify, replace and assemble different pneumatics and paint gun.</p> <p>[Different components – Compressor, Pressure Gauge, Filter Regulator. Valve for hose]</p>	<p>85. Identify pneumatic components – Compressor, pressure gauge, Filter-Regulator-Lubricator (FRL) unit, and Different types of valves and actuators. (05 hrs.)</p> <p>86. Demonstrate knowledge of safety procedures in spray systems and personal Protective Equipment (PPE) (orally & video). (05 hrs.)</p> <p>87. Maintenance, troubleshooting, and safety aspects of pneumatic and Painting instruments (The practical for this component may demonstrated by video) (15 hrs.)</p>	<p>Spray Gun - Principles of spray painting, spray gun accessories and their function different types of spray guns. Holding of spray gun and stroke adjustment. Types of spray painting method. Air compressor for Painting Process. Required instruments for spray painting.</p>
33	<p>Perform Spray Painting technique. (Spray Gun / hose handling, air & paint pressure controlling,)</p>	<p>88. Knowledge & Inspect spray gun holding and stroke adjustment, Paint adjustment, air adjustment techniques. (15 hrs)</p>	<p>Description of spray painting plant. Types of booth, description of booth, care and maintenance of spray booth.</p>

		89. Spraying practice on the surface like as edges, corner, square, round & curved area. (10 hrs.)	
34	Operating system of spray booths, Oven, cleaning & their maintenance, application of sealant component on metallic joints.	90. Operate, maintenance, troubleshooting, and safety aspects of paint spray booth (08 hrs.) 91. Operate, and safety aspects of Oven Setting, temperature & timing. (08 hrs.) 92. Apply sealant on metallic joints. (09 hrs)	Types of oven for painting. Description of oven and its care. Sealant - Definition and description. Purpose of sealant application - edge protection; prevention of water leakage. (Hiding the metal joint/clinch).
35	Perform aspect ratio mixing of paint, hardner & solvent. Measure Viscosity of paint. Operate the Spray painting system.	93. Paint preparation & mixing for spray painting (05 hrs) 94. Practice to Measure the viscosity of paint (10 hrs) 95. Spray Painting practice on ornamental objects, with deferent types of paints. (10 hrs)	Paint viscosity - importance, method of the paint viscosity. Paint preparation & mixing for different application.
36	-do-	96. Spraying metallic primer on metal surface (05 hrs) 97. Apply Car-patch, Putty, Filler on metallic surface & prepare it. (10 hrs.) 98. Spraying Surfacer on primed or putty finish surface. (05 hrs) 99. Spraying finish Top Coat on prepared job. (05 hrs) *Use enamel/ N.C. paints. (Or latest paints.)	Introduction and uses of Pressure feed, Airless and Electrostatic Spray painting.
37	Development of spray painting in Home appliances , Agricultural equipment's, Machines, Automotive Bodies etc.	100. Prepare the surface of home appliances (ex- fan, cooler, fridge, washing machine etc.) (07 hrs) 101. Priming & surfacing on home appliances (09 hrs) 102. Apply finish undercoat & top	-do-

		coat on home appliances (09 hrs)	
38	-do-	103. Prepare the surface of machine (ex- lath, drilling, grinding, compressor, suing machine etc.) (07 hrs) 104. Priming & surfacing on machine. (09 hrs) 105. Apply finish undercoat & top coat on machine. (09 hrs)	Process of article and machine painting
39	-do-	106. Prepare the Tow wheeler body and spares surface. (07 hrs) 107. Priming & surfacing the Tow wheeler body and spares surface. (07 hrs) 108. Apply finish undercoat & top coat on Tow wheeler body and spares surface. (07 hrs) 109. Apply Graphic sticker on painted surface properly & apply lacquer coat evenly. (04 hrs)	Car: Process of repainting. (Removal of dent, car patch, putty process, metal primer, surface, paint) Spray painting. Types of paint defects & its reamedes. Importance of polishing, removal defects by polishing,
40	-do-	110. Identify the parts of Electrostatic gun assembly & operate it care fully. (08 hrs.) 111. Identify the parts of Airless gun assembly & operate it care fully. (08 hrs.) 112. Demonstrate practical of Different types of Spray painting , Industrial Painting system by video (09 hrs)	-do-
41-42	Removal of dents & recover the damaged accidental aria. Repaint & recovering damaged aria. Remedies of paint defects.	113. Disassemble essential damage parts, inspect & mark denting aria. Choose & decide process tools for denting. (06 hrs) 114. Removed dent on marked aria, apply essential method. (10 hrs)	Removal of defects by polishing. Removal dented aria on the different surface, types of denting process.

		<p>115. Do sanding or burn on denting area & apply primer & surface. Apply putty layer on necessities area evenly. (10 hrs)</p> <p>116. Use wet sanding, level denting surface area, apply thin coat of surfacer. (05hrs)</p> <p>117. Masking on unwanted area properly (05hrs)</p> <p>118. Match the shade Overlay proper equally on unmask area. (05 hrs)</p> <p>119. Unmasked the mask area carefully & checkout properly & touch-up it by necessary process. (04 hrs)</p> <p>120. Apply final coat rub and wax properly & matched it. (05 hrs.)</p>	
43	-do-	<p>121. Demonstrate knowledge of Paint defects & its remedies. (video) (05 hrs.)</p> <p>122. Check & Find out different paint defects (run down, sagging, pin hole, orange peel, oil & water spot, over/ dry spray, uncover shade variation etc.) (05 hrs.)</p> <p>123. Mark the defected area, Deside Techniques & apply remedies properly. Make Finished surface. (15 hrs)</p>	Types of paint defects & its remedies. Importance of polishing, removal defects by polishing,
44-45	Finish special effects for Modern furniture.	124. Process Finish special effects on different furniture & different surface. (like as-colour gradations, malty tones applying, deferent textures, etc.) (25 hrs.)	Furniture making is a multiple skills, using different applications on one object like Painting, Polishing, Varnishing, Waxing, staining, PU coating textures creating etc.

46	Operating system of Powder coating technique.	125. Pre-treated & Clean the metallic article in chemical (degreasing, de-rusting, activation, phosphating, passivation & water rinsing as where required etc.)(08 hrs.) 126. Proceed powder coating on cleaned article & bake it in oven in appropriate temperature & timing. (17 hrs.)	Operating system of Powder coating technique. Chemical cleaning process, Types of coating powders,
47	Quality Testing for various paints & Painted films.	127. Demonstrate the Paint defects & its remedies. (video) (05 hrs.) 128. Test the quality of paints & Painted surfaces by various method & instruments. (20 hrs)	Different types of paints & painted surface testing equipments, Types of testing methods. Use & care.
48-49	Project Work Broad areas: a) Make a Sample of different painting types of defects on metal plates. b) Decorate small furniture or article. c) Paint & decorate kids Toys by spray.(ex-small cars, doll, etc.) d) Powder coating article like as gate lamp assembly, keychain, metallic toys.		
50-51	Revision		
52	Examination		

Note: -

1. Some of the sample project works (indicative only) are given against each semester.
2. Instructor may design their own project and also inputs from local industry may be taken for designing such new project.
3. The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit Project report.

4. *If the instructor feels that for execution of specific project more time is required than he may plan accordingly to produce components/ sub-assemblies in appropriate time i.e., may be in the previous semester or during execution of normal trade practical.*



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9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

S No.	Workshop Calculation and Science	Engineering Drawing
First Semester		
1.	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance <ul style="list-style-type: none"> - Relationship to other technical drawing types - Conventions - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2.	Fractions : Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Drawing Instruments : their Standard and uses <ul style="list-style-type: none"> - 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.
3.	Square Root : Square and Square Root, method of finding out square roots, Simple problem using calculator.	Lines : <ul style="list-style-type: none"> - 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
4.	Ratio & Proportion : Simple calculation on related problems.	Drawing of Geometrical Figures: Definition, nomenclature and practice of <ul style="list-style-type: none"> - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram.

		<ul style="list-style-type: none"> - Circle and its elements.
5.	Percentage : Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	Lettering and Numbering as per BIS SP46-2003: <ul style="list-style-type: none"> - Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6.	Material Science : properties -Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	Dimensioning: <ul style="list-style-type: none"> - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text
7.	Mass, Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	Free hand drawing of <ul style="list-style-type: none"> - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches.
8.	Speed and Velocity : Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.	Sizes and Layout of Drawing Sheets <ul style="list-style-type: none"> - Basic principle of Sheet Size - Designation of sizes - Selection of sizes - Title Block, its position and content - Borders and Frames (Orientation marks and graduations) - Grid Reference - Item Reference on Drawing Sheet (Item List)
9.	Work, Power and Energy : work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	Method of presentation of Engineering Drawing <ul style="list-style-type: none"> - Pictorial View - Orthogonal View - Isometric view
10.	-----	Symbolic Representation (as per BIS SP:46-2003) of : <ul style="list-style-type: none"> - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints.

		<ul style="list-style-type: none"> - Electrical and electronics element - Piping joints and fittings
Second Semester		
1.	<p>Algebra : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).</p>	Construction of Scales and diagonal scale
2.	<p>Mensuration : Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle,</p> <p>Volume of solids – cube, cuboids, cylinder and Sphere.</p> <p>Surface area of solids – cube, cuboids, cylinder and Sphere.</p>	Practice of Lettering and Title Block
3.	<p>Trigonometry: Trigonometrical ratios, measurement of angles.</p> <p>Trigonometric tables</p>	<p>Dimensioning practice:</p> <ul style="list-style-type: none"> - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance. - Text of dimension of repeated features, equidistance elements, circumferential objects.
4.	<p>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.</p>	<p>Construction of Geometrical Drawing Figures:</p> <ul style="list-style-type: none"> - Different Polygons and their values of included angles. Inscribed and Circumscribed polygons. - Conic Sections (Ellipse & Parabola)
5.	<p>Basic Electricity: Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of</p>	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.

	connections – series, parallel, electric power, Horse power, energy, unit of electrical energy.	
6.	<p><u>Levers and Simple Machines:</u> levers and its types.</p> <p>Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.</p>	Free Hand sketch of hand tools and measuring tools used in respective trades.
7.	-	<p>Projections:</p> <ul style="list-style-type: none"> - 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.
8.	-	Drawing of Orthographic projection from isometric/3D view of blocks
9.	-	Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
10.	-	Drawing details of two simple mating blocks and assembled view.

9.2 EMPLOYABILITY SKILLS

CORE SKILL – EMPLOYABILITY SKILL	
First Semester	
1. English Literacy	Duration : 20 hrs Marks : 09
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, 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 on messages and filling in message forms, Greeting and introductions, office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. IT Literacy	Duration : 20 hrs Marks : 09
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of the computer.
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.
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.
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, WebSite, 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.
3. Communication Skills	
	Duration : 15 hrs Marks : 07
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.
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.
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.
Facing Interviews	Manners, etiquettes, dress code for an interview Do's & don'ts for an interview

Behavioral Skills	Problem solving Confidence building Attitude
Second Semester	
4. Entrepreneurship Skills	Duration : 15 hrs Marks : 06
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & record, Role & function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing Analysis	Qualities of a good entrepreneur, SWOT and risk analysis. Concept & Application of PLC, Sales & Distribution management. Difference between small scale & large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's 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 familiarize with the policies / programmes, procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop act, Estimation & costing, Investment procedure - Loan procurement - Banking processes.
5. Productivity	Duration : 10 hrs Marks : 05
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working aids, Automation, Environment, Motivation - How it improves or slows down productivity.
Comparison with Developed Countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in select industries, e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and insurance.
6. Occupational Safety, Health and Environment Education	Duration : 15 hrs Marks : 06

Safety & Health	Introduction to occupational safety and health Importance of safety and health at workplace.
Occupational Hazards	Basic hazards, chemical hazards, vibroacoustic hazards, mechanical hazards, electrical hazards, thermal hazards. occupational health, occupational hygiene, occupational diseases/ disorders & its prevention.
Accident & Safety	Basic principles for protective equipment. Accident prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & sick at the workplaces, First-aid & transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to environment. Relationship between society and environment, ecosystem and factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of energy, re-use and recycle.
Global Warming	Global warming, climate change and ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	
Duration : 05 hrs Marks : 03	
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.
8. Quality Tools	
Duration : 10 hrs Marks : 05	
Quality Consciousness	Meaning of quality, Quality characteristic.
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.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of housekeeping, Practice of good housekeeping.
Quality Tools	Basic quality tools with a few examples.



Skill India
कौशल भारत - कुशल भारत

LIST OF TOOLS & EQUIPMENTS			
Industrial Painter			
S No.	Name of the Tools and Equipment	Specification	Quantity
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit s no. 1-7 is required additionally)			
1.	Rule steel	24"	21 Nos.
2.	Drawing Board	Imperial size	21 Nos.
3.	Rule wooden (Consumable)	24"	21 Nos.
4.	Brush Round Short Hair- (Consumable)	0 to 12 No.	21 Nos.
5.	Brush Flat Short Hair - (Consumable)	0 to 12 No.	21 Nos.
6.	Varnish Brush soft hair- (Consumable)	25mm, 50mm, 75mm, 100mm	21 Nos.
7.	Stencil/ Paper Cutter (Consumable)	medium size	21 Nos.
B. SHOP TOOLS, INSTRUMENTS – For 2 (1+1) units no additional items are required			
Lists of Tools and Equipments:			
8.	T' Square	Imperial size	2 Nos.
9.	Square Blade	150 mm	1 No.
10.	Safety google (white)		6
11.	Scriber		5 Nos.
12.	Marking Gauge		1 No.
13.	Wing Compass	254 mm or 300 mm	5 Nos.
14.	Hand saw	450 mm	5 Nos.
15.	Hack Saw with Frame		5 Nos.
16.	Smoothing Plane		1 No.
17.	Mallet Round		5 Nos.
18.	Carpenter Hammer (Ball Pin)		2 Nos.
19.	Hammer (Crass Pin)		2 Nos.
20.	Portable Electric Hand Drill Machine		1 No.
21.	Drill Bits (Consumable)	3 mm, 5mm, 8mm, 10mm, 12mm	1each
22.	Chisel Knife-	5mm, 8mm, 10mm, 20mm, 30mm	1each
23.	Hacking Knife		1 No.
24.	Paint Tin Opener		2 Nos.
25.	Scraper Knife		5 Nos.

26.	Shave Huck Knife		1 No.
27.	Glider Knife		5 Nos.
28.	Pliers Insulated		1 No.
29.	Paint Burner (Acetylene Gas)		1Set
30.	Blow Lamp		2 Nos.
31.	Screw Driver	100mm / 200mm	2 each
32.	Step Ladder (Aluminum)	6 feet	2 Nos.
33.	working Bench	240 cm X 120 cm X 75 cm	1 No.
34.	Bench Vice	125mm	2 Nos.
35.	Weight Per Litter Cup	100 ml capacity	1 No.
36.	Ford Cop for Viscosity Measurement with stand	No.3 & No.4	2 each
37.	Mild Steel Panels	300 mm X 200 mm (18 X 22 SWG)	4Nos.
38.	Sink (Stainless steel)	H 250mm x W 450mm x L 600mm.	4 Nos.
39.	Fire Extinguisher		2 Nos.
40.	Fire Buckets with stand (4 in 1)		1 set
41.	Suction feed spray gun with accessories.	1 Ltr. Capacity of cup	2 Nos.
42.	Portable Electric Hand Grinder		1 No.
43.	Glosso Meter		1 No.
44.	Infra red lamp		2 Nos.
45.	Digital DFT meter		2 Nos.
46.	Orbital Sander Machine with dust collector		5 Nos.
47.	Aerograph (Air Brush/ Pen Gun)		1 No.
48.	Pneumatic Polishing Machine with Pads		5 Nos.
49.	Goggles (Consumable)		5 Nos.
50.	Face Mask & Respirator (Consumable)		5 Nos.
51.	Gloves (Rubber) (Consumable)		5 Nos.
52.	Pipe vice		2 Nos.
53.	Hacksaw		2 Nos.
54.	Pipe wranch	10"& 16"	2 Nos. each
55.	flat file- smooth finish	12"	2 Nos.
56.	circular cut file	12"	2 Nos.
57.	raft cut	12"	2 Nos.
58.	Gun Spray with Gravity Feed Cup with Complete accessories	with Complete accessories (Capacity- ¼ ltr. ,1/2 ltr. , 1/3ltr. , 1 ltr.)	2 Nos. each
59.	Conventional Spray Gun For Pressure Feed	with Complete accessories	2 Nos.

60.	Electric spray gun	with Complete accessories	1 Nos.
61.	Comb Gauge		2 Nos.
62.	Pencil Hardness Tester		2 Nos.
63.	Digital Weight Machine	Capacity 5 kg. weighing scale	1 No.
C. GENERAL INSTALLATION			
64.	Air Compressor	3 Phase, 2 HP	1 Nos.
65.	Air Compressor	single Phase, 1 HP	1 Nos.
66.	Pressure Feed Container with Conventional	20 ltr. Capacity with Complete accessories	1 set
67.	Electrostatic spray Gun unit	with complete accessories	1 set
68.	Airless Spray Gun unit	with complete accessories	1 set
69.	Sealer Drum Press Pump with Sealer Gun Assembly	with complete accessories	1 set
70.	Side Draught Dry Paint Booth- Overall Dimensions (mm):	1580(W) x 2250(D) x 3200(H); Working Dimensions (mm): 1500(W) x 1320(D) x 2040(H)	1 No.
71.	Powder Coating set up with Gun booth & Oven		1 Unit
72.	Arc Welding Table -	Metal - 900 X 600 X 750 mm with Positioner	1
73.	Acetylene Cylinder		1 No.
74.	Oxygen Cylinders		1 No.
75.	Electric Spark Lighter		6 Nos.
76.	Oxygen Gas Pressure Regulator Double Stage		1 No.
77.	Acetylene Gas Pressure Regulator Double Stage		1 No.
78.	Rubber Hose	- Acetylene, Diameter = 8 mm, Length = 10 meters	1 No.
79.	Rubber Hose -	Oxygen, Diameter = 8 mm, Length = 10 meters	1 No.
80.	Rubber Hose Clips	- 1/2 inch	6 Nos.
81.	Tong - Flat -	300 mm	4 Nos.
82.	cylinder Key		4 Nos.
83.	Gas welding torch with nozzle set	with Input voltage 415 (\pm 10%), Frequency – 50/60, Current range – 30/300, Efficiency - >85	1 Nos.
D. Shop Floor Furniture and Materials - For 2 (1+1) units no additional items are required.			
84.	Stool		16 Nos.
85.	Desk with Locker		16 Nos.
86.	Metal Shelving Rack Open Type	1800 x 900 x 500 mm with 4	2 Nos.

		Adjustable Shelves	
87.	Steel Locker's with 8 Drawer's	One locker for each trainee	3 Nos.
88.	Green Glass Board	6'X4'	1 No.
89.	Cupboard		4 Nos.
90.	Instructor table		1No.
91.	Instructor chair		2 Nos.
E. Designing Lab			
92.	Computer's with Accessories (Table & Chair)		3 set
93.	Anti Virus (Latest Version)		5 Nos.
94.	Softwares- Corel Draw /Acee - Dcee Viewer (Latest Version)		1 Each (Multy installer)
95.	UPS	3 KV	1 No.

TOOLS &EQUIPMENTS FOR EMPLOYABILITY SKILLS		
S 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.

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:														
S No	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total Internal Assessment Marks	Result (Y/N)
	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		
1														
2														