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(43)

SYLLABUS FOR  
**PAINTER (GENERAL)**

Under  
CRAFTSMEN TRAINING SCHEME  
&  
APPRENTICESHIP TRAINING SCHEME

As approved by  
GOVERNMENT OF INDIA

In consultation with  
THE NATIONAL COUNCIL FOR  
VOCATIONAL TRAINING  
&  
CENTRAL APPRENTICESHIP COUNCIL

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3911, Roshanpura, Nai Sarak,  
Delhi-110006 (India)

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OF PAINTER (GENERAL)**

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# THE CRAFTSMEN TRAINING SCHEME

*Syllabus of Practical Training & Related Instructions*

*Including*

*List of Tools & Equipments For the Trade*

*of*

**PAINTER [GENERAL]**

1. *Total Duration of Training : 2 Years.*

2. *Minimum Educational:*

*Qualification:* Passed 8th class Examination or its equivalent.

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## TRADE : PAINTER ( General )

Period of Training : 2 Years or 104 weeks

The following syllabus is for the first 52 weeks consisting of

( 1 ) Induction Training	- 1 week
( 2 ) Allied Trade Training : Carpentry, Sheet Metal, Plumber, Electrician and M/c. Shop.	- 19 weeks
( 3 ) Main Trade Training	- 31 weeks
( 4 ) Test	- 1 week
Total	- 52 weeks

Note: The syllabus has been divided into two portions - The first 52 weeks & the remaining 52 weeks.

2

Week No.	Practical work	Trade Theory	Engineering Drawing	Workshop Calculation and Science
1	2	3	4	5

### 1. INDUCTION TRAINING

<p>Familiarisation with the Instt. -importance of the trade trg.—Machinery used in the trade-type of work done by trainees in the Instt—Type of jobs made by the trainees in the trade-Introduction to safety including fire fighting equipments and their uses etc.</p>	<p>Importance of safety &amp; general precautions observed in the Instt. &amp; in the Section-Importance of the trade on the development of Industrial Economy of the country. What is related instructions—subjects to be taught, achievements to be made recreational, medical facilities and other extra curricular activities of the Institute ( All necessary guidance to be</p>
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3

provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures etc.).

2. Importance of the allied trades—types of work done by trainee in allied trades—Introduction of practical in allied trade & their importance.

Related instructions under allied trade, subjects to be taught & their importance in the trade.

Freehand sketching of straight lines, rectangles, squares, circles, polygons etc.

Applied workshop problem involving multiplication & division common fractions addition, subtraction, multiplication & division application of fractions to shop problems.

### 3-4. ALLIED TRADE—CARPENTER:

Marking out for carpentry work. Use of carpenter's basic hand tools for simple

Safety precautions, descriptions, uses & care of hand tools, their names, materials from which made & their uses. Grin-

—Do—

Reading of simple Blue Print,

Common properties and uses of cast iron, wrought iron, plain carbon steel, high speed steel and alloy steel.

operation viz. Sawing, planing, chiseling, drilling etc. Grinding of tools.

ding of tools and precaution to be taken.

Applied workshop problems as in Week No. 2.

- 5-6. Making simple carpentry joints, used in door, windows, timber—floors, panels, wooden partitions etc.

Types of woods their description and use—common defects in timber and their effects.

—Do—

Free hand sketching with dimensions of simple solids such as cubes rectangular blocks, cylinders etc.

Properties & uses of copper, zinc, lead, tin, aluminium, brass, bronze solder bearing metals, timber & rubber.

Decimals-addition, conversion of decimals to common fraction—shop problems.

- 7-8. Use of jointing devices—nails, screws, nuts, bolts & dowels joints by wooden filling by glue.

Common joints their description & use. Use of nails, screws hinges, dawels etc. Glue its specification, preparation of compounding and their application.

Sketching of views of simple solid bodies as mentioned above when viewed perpendicular to their surface and axes.

—Do—

Freehand sketching of

Brief description of manufacturing process of pig-iron & cast iron. Reduction of common fractions to decimal fractions—shop problems.

Brief description of

1	2	3	4	5
			nuts & bolts with dimensions from samples.	manufacturing process of steel, copper & aluminium. Metric-system-metric weights & measurement units—conversion factors
9-10	Planing & surface preparation of wood for varnishing & polishing.	Use of planer, different types & their functions.	Freehand sketching of rivets & washers with dimensions from samples Freehand sketching of keys & screw threads with dimensions from samples. —Do— Explanation of simple orthographic projection 1st angle.	Shop problems on metric system of weight & measurement. Effects of alloying elements on properties of cast iron & steel. Square root the square root of a perfect square—the square foot of a whole number and a decimal.

**ACHIEVEMENTS:** Should be able to:—

- (1) Use carpenter's hand tools.
- (2) Make simple carpentry joints.

## 6 Painter (G)

1	2	3	4	5
		(3) Uses suitable jointing devices. (4) Identify different types of timbers.		
11.	<b>ALLIED TRADE— SHEET METAL :</b> Importance of skills involved. Use of simple hand tools such as mallets, scriber, steel rule, ships, groover etc. Use of ferrous sheet metals for the following operations marking, cutting, bending, folding. Development of surfaces from blue prints.	Introduction to the trade. Safety precaution to be observed. Common hand tools used for sheet metal & their definition, description, function and uses.	Explanation of simple orthographic projection 3rd angle. Views of simple hollow & solid bodies with dimensions. Use of different types of lines and symbols for drawings.  —Do—	Mass—unit of mass, Force—absolute unit of force. The weight of body -- unit of weight shop problems. Percentage and its application shop problems.
12.	Joining of simple sheet metals of different gauges by simple self secured joints. Joining sheet metal by soft soldering. Joining of sheet metal by brazing.	Different types & uses of joints employed in sheet metal work. Description of common machines & equipment used in sheet metal. Brief description of brazing & soldering.		C. G. S. and F. P. S. systems, of units of force, weight etc. their conversion—problems.

1	2	3	4	5
13- To familiarise with machinery & equipment & the different types of containers & practice in making articles such as trays, cylinders & cones.	Sheet metal wire gauge, equivalent inch. & mm., sizes of standard wire gauges. Metals commonly rolled into sheets such as tinplates, galvanised sheets, iron sheets, copper, brass sheets, aluminium sheets etc.—brief description of physical properties of the above	Views of simple hollow & solid bodies with dimensions. Use of different types of lines & symbols for drawings. Simple isometric drawings isometric views of simple objects such as square, rectangles, cubes, rectangular block etc.	Ratio & proportion shop problems. Algebra—algebraic symbols, addition subtraction, multiplication and division of expressions involving algebraic symbols. Simple equations & transposition—problems. Simple problems on work, energy & power.	

ACHIEVEMENTS : should be able to :

- (1) Use sheet metal hand tools & equipment.
- (2) Identify various types of sheet metals used in industry.
- (3) Make joints by soldering & brazing.
- (4) Make simple sheet metal articles like, trays cylinders, cones etc.

15. ALLIED TRADE Plumbing Introduction to the trade. Simple isometric drawings isometric views of Standard algebraic formula e.g.  $(a+b)^2$ ,  $(a \div b)^2$  etc.

1	2	3	4	5
	uses. Jointing stone-ware socket pipes with cement mortar & cast iron pipes running, with lead & caulking. Erecting washbasins. Erecting simple sanitary fittings.	elementary first aid. Plumber's hand tools description & use. Description on erecting rain water & drainage piping systems including installation of sanitary & water supply fittings.	Simple objects such as square, rectangles, cubes, rectangular blocks etc.	Simple simultaneous equations with two unknown quantities.
16.	Joining of pipes of different materials & of different diameters. Uses of different type of binding material for leakage.	Description of different types of pipes & their uses such as galvanised pipes, lead pipes, aluminium pipes, Brass pipes, plastic & synthetic pipes etc.	Simple isometric drawings isometric views of simple objects such as square, rectangles, cubes, rectangular blocks etc.	Meaning of friction-examples.

ACHIEVEMENTS: should be able to:

- (1) Use Plumber's Hand Tools.
- (2) Identify different types of pipe and pipe fitting in sanitary installations.



### 17. ALLIED TRADE - ELECTRICIAN :

Practice in identifying series & parallel circuits & study the difference between series & parallel circuits, different system of wiring, fixing & connecting appliance for domestic & industrial lighting.

Introduction to the trade. Safety precautions and elementary first aid treatment for electric shocks, burns etc. Elementary electricity. General idea of supply system. Electric fittings, system of wiring. Wiring installation for domestic & industrial lighting.

Use of drawing instruments T square & drawing boards.

Mensuration areas of rectangles, squares, triangles, circles, regular polygons etc. - calculation of areas.

18. To familiarise with the electrical wires viz-V.I.R., CTS Cables etc. and electrical fitting of pannel board, switch board, joint boxes, conduit pipe wiring, tube lamp fitting, pump and motor installations.

General idea of conduit pipe or synthetic pipe wiring & its accessories I.E. Rules. Description of electrical wiring materials used for domestic purpose. Brief description

Construction of simple figures & solids as mentioned above with dimensions & titles. Use of different types of scales in inches and mm.

—Do—

of various electrical equipment used in industries viz. Generators, Motors, Transformers, Starters etc. & their uses.

**ACHIEVEMENTS** should be able to :

- (1) Use electrical hand tools.
- (2) Identify different types of wiring & electrical installations.
- (3) Take necessary safety precautions as per I. E. Rules.

### 19. ALLIED TRADE - Machinshop :

Basic hand tools and their uses. Handling practice of different hand tools.

Safety precautions for the trade. Brief description of different types of hand tools and their functions.

Construction of simple figures & solids as mentioned above with dimensions & titles. Use of different types of scales in inches & millimetres;

Calculation on volume & weight of simple solid bodies such as cubes & hexagonal prisms. - shop problems.

1	2	3	4	5
20.	Identification of different machine tools, their components, functions and uses.	Brief description of various machine tools & accessories & their uses.	Lettering numbers and alphabets.	Heat & temperature—thermometric scale Fahrenheit & Centigrade scales and their conversion. Name & use of temperature measuring instruments normally used in workshops.

ACHIEVEMENTS: should be able to :

- 1) Use different types of simple hand tools used in machinshop.
- 2) Identify different types of machine tools and their accessories.

#### 21. - MAIN TRADE TRAINING :

22.	preparing of surfaces on wood by cleaning, rubbing down, knotting, stopping, filling, artificial wood	Painter hand tools, brushes of various sizes, diamond glazier, stopping knife, scrapers, platte	Freehand isometric sketching of simple objects with dimensions.	Shop problems on determination of volume & weight of simple solid bodies.
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12

1	2	3	4	5
	staining & graining.	knife, chisel knife, shave hook plumb line, lining tool, rule file etc. -their description, use care & maintenance.	-do-	Calculating area & volume of wood in diffent shopes & sizes.
23.	Putty preparation, mixing of putty - different processes of making, use of putty on different wooden surfaces.	Blow lamp-its use, care & maintenance. Putty-definition, types, uses. Method of mixing & its different system of application.	Freehand isometric sketching of simple objects with dimensions. Freehand sketching of plan & elevation of simple objects like hexagonal bar, square bar, circular bar, tapered bar, hollow bar etc.	Geometry-properties of lines angles, triangles & circles. Simple problems on lines, angles, triangles circles.
24- 25	Finishing, varnishing and polishing of wooden furniture such as chair, table almirahs, trays etc. both	Varnishes-gold sizes, spur varnish, synthetic varnish. Preparation of different types of varni-	Views of simple solid & hollow bodies cut by section plane.	Effect of forces on material in such application as extending, bending, twisting and shearing.

13

old & new furniture.

shes, resin varnish, synthetic varnishes, copal varnish etc. Pigments & extenders.

Reading of simple blue print.

Oil, driers, resins, solvents & thinners-Description of each of the items, classification & uses.

Exercises on the print reading. Signs & symbols used in electrical drawings.

Trigonometry- Trigonometric functions-use of trigonometric tables applied problems.

Calculation of areas of triangles, polygons with the aid of trigonometry.

26- Preparing of surfaces on wood for varnishing, finishing polishing of doors, windows, pannels, partitions of rooms, wooden boxes etc.

Varnishes- Method of preparation-Different types-classification & their application on woods.

Exercises on blue print reading, Drawing simple circuits using signs & symbols using colour representation  
Exercises on blue print reading.

Further use of trigonometric functions & tables applied problems.

#### 14 Painter (G)

ACHIEVEMENTS: should be able to

- 1) Prepare wooden surfaces for varnishing.
- 2) Prepare and use Putty.
- 3) Prepare varnish and use the same.

28- Metal pretreatment such as scraping, rubbing by emery cloth, wire brushes, buffing etc.

Corrosion-causes of corrosion, effect of atmosphere in different places.

Free-hand sketching of simple objects related to the trade & preparation of simple working drawings from the sketches.  
Free hand sketching of simple objects related to the trade & preparation of simple working drawing from the sketches.

Further practice in calculations involving area and volume of wood & workout total cost on the basis on given rates.

30- Metal pretreatment such as pickling, phosphatising, sand blasting etc.

Corrosion on different metals both ferrous & non-ferrous-factors controlling corrosion-corrosion test-atmospheric, water, soil etc.-Protection against.

Freehand- sketching of simple objects related to the trade & preparation of simple working drawings from the sketches. Panel board layout of an electroplating-shop.

Electricity and its uses. Electric current-positive and negative terminals. Use of switches & fuses. Conductors & insulators. Reading of simple graphs.

1	2	3	4	5
32- Preparing of surfaces for 33 primary coat of different metals, practicing by brushes of various sizes-setting and application practice.	Brushes-description, sizes & uses. Method of application, process for coating different metals, precaution, care and maintenance.	Further practice in blue print reading & exercises related to the trade.	Calculation of volume & weight of simple solid bodies by using logarithm. Further problems on mensuration as above.	
34- Finishing painting by brushes on the metal surfaces like trays, boxes, containers, tables, chairs etc.	Painter's equipments-ladder-step scaffolding-trestle buckets etc. Their description & use.	-do- Freehand sketching of simple objects related to the trade & preparation of simple working drawings from the sketches. Sketching of electroplating barrel.	-Revision- Plotting and reading of simple graphs.	
37- Metal pre-treatment such 38 as pickling, phosphatising, sand and shot blasting, buffing, wire brushing etc.	Corrosion-its effects & types methods to prevent corrosion, purpose of metal pre-treatment,	-do- Sketching an electroplating vat, Care and use of drawing	Different forms of energy heat, mechanical and electrical-examples. Conversion from one to	

2	3	4	5
	description of various methods and field of application.	board, T-square and instruments.	another. Practice in the use of logarithmic tables for multiplication, division square, cube, square root, cube root etc.
39- Primary colours, colour 40 blendings by mixing of various ingredients in different colours for brush painting & spray painting.	Paint-definition, classification, & uses. Method of selection, application preparation, techniques. Mixing of ingredients, various types, their purposes and its effect on paints.	Freehand sketching of nuts & bolts. Preparation of drawings of the above (Measuring of working drawing should be explained).	Use of Logarithmic table as above.
41- Painting by brushes of 42 wooden furniture such as chairs, tables, trays, almirahs, racks, boards, pannels etc.	Painter's equipment such as-ladder, step scaffolding, trestle, buckets etc., their description & uses. Mixing of paint, tools &	Simple blue print reading of objects as far as possible. Freehand sketching of different forms of threads.	Use of Logarithmic tables as above. properties & uses of cast iron.

		equipment used for mixing - description, uses with safety measures. Nitrocellulose / Shellac lacquers for wood-Problems associated with painting of different types of wood.		
43- Painting by brushing of		Basic knowledge of symbol of different pipe lines such as gas, steam, water, oil, chemicals etc. Precautions against air pollution while painting.	Preparation of drawings of above conventional representation of threads. Reading of simple blue prints simple exercises (44th week).	Use of Logarithmic tables as above. Properties and uses of copper and aluminium.
46 cast iron pipe, steel pipe and galvanised pipes, lead pipes, aluminium pipes, synthetic pipes etc.		Application of standard paints approved by I.S.I.	Freehand sketching of locking devices ( 45th week ). Drg. of above indicating the lockings in position ( 46th week ).	Calculation on area, volume & weight of simple solid bodies such as cube, squares, hexagonal prisms - application to shop problems.
<b>METHOD PAINTING</b> Different types of pipe lines such as hot and cold water, liquid & gas, chemicals and oil, steam pipe lines etc.				

Simple exercises on blue print reading.

Properties & uses of lead, tin, zinc, brass, bronze, high carbon steel and alloy steel.

**ACHIEVEMENTS:** The Trainees Should be able to:

- (1) Identify corroded parts and know methods of corrosion prevention.
- (2) Know the pre-treatment process and handle the tools & equipment.
- (3) Mix various types of paints to produce different colours.
- (4) Use various types of painting brushes.
- (5) Paint different wooden and metal surfaces.
- (6) Identify different types of pipe lines & paint them.

47- Practice on metal surfaces with the help of spray painting plants with compressed air.	Description of various spray painting plants & equipment, method of construction their fields of application, safety precaution etc.	Freehand sketching of rivets & riveted joints. Freehand sketching of different types of riveted joints.	Further practice in problems on mensuration as above. Difference between mass & weight.
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1	2	3	4	5
49- Practice in painting by dipping the metal surfaces, like trays, boxes, containers, castings frames, garden benches etc.	Roller coating machine-dipping by hand and mechanical devices, different types of ovens, their construction working principles, field of application, safety precaution etc.	Preparation of drawings of riveted joints. Further practice in blue print reading and experience related to the trade.	Problems on mensuration as above. Revision.	

ACHIEVEMENTS: The Trainees Should be able to:

- (1) Handle spray painting equipment.
- (2) Paint wooden and metal surfaces by spray painting process.
- (3) Use hand tools and machanical devices for dipping.
- (4) Paint various metal surfaces by dipping process.

51. ——— Revision ——— ——— Revision ——— ——— Revision ——— ——— Revision ———

52. .... T E S T .....

20

### SYLLABUS FOR THE 2nd YEAR OF 52 WEEKS IS AS FOLLOWS

1	2	3	4	5
53- Preparing surfaces of walls & ceiling, cleaning rough surfaces for distempering. Practice in use of nail brushes, iron hig, chiseling, rubbing by emery and brushes etc.	Description of bonds for plastering walls. Techniques of constructing walls. Methods of erecting scaffolding. Purpose of cleaning wall surfaces & their effects & processes of cleaning, different methods of cleaning, its description, precautions and uses.	Freehand sketching and blue print reading.	Problems on mensuration. Preparation of simple estimation.	
55- Mixing paints & colour making. Distempering walls, matching colours for ceiling and walls,	Dry distemper, cement colour for floor, cement paint, lime colour- colour making process	Exercises on blue print reading. Preparation of drawings of above.		—Do—

21

relief painting & texturing of walls & ceiling. Method of making scaffolding.

for distempering & cement paints, precaution & application processes.

Freehand sketching of pipe joint flanged joints.

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|---|---|---|---|
| <p>59- Painting of walls with oil colour, preparing wall for oil paints, mixing of paints.</p>                  | <p>The methods employed in preparing surfaces for oil painting of wall various painting faults &amp; their remedies. Method of wall painting with oil colour paint. Emulsion paints for buldings.</p> | <p>Freehand sketching of pipe joint-screwed sleeve joint.</p>                   | <p>Density of solids &amp; liquids-simple experimental determination.</p>                           |
| <p>61- Painting of walls with oil colours. Mixing paints &amp; colour making. Painting walls &amp; ceiling.</p> | <p>The method employed in preparing various oil paints. Remedies of atmospheric corrosion, calculation of the amount of paints needed for the jobs.</p>   | <p>Preparation of drawings of pipe joints. Exercises on blue print reading.</p> | <p>Specific gravity - principle of archimedes. Relation between specific gravity &amp; density.</p> |

## 22 (Painter (G))

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| <p>63- Painting of walls with oiled colour of residential house, colouring of door &amp; windows fittings, electrical fittings, water supply pipe lines house drainage, sanitary fittings etc.</p> | <p>Painter's equipments classification, function &amp; their uses-Principles of spray gun painting. Method of application and precautions analysis of rates for simple items of works. Schedule of rates specification.</p>                                  | <p>Freehand sketching of shaft couplings-Muff coupling with keys, spigotted flanged coupling forged with shaft or keyed in place, cottered sleeve joint, knuckle joint. Preparation of drawings of the joints from the sketches drawn.</p> | <p>Quantity of heat, specific heat of solids liquids &amp; gases-heat gained and heat lost. Simple problems on heat gained &amp; heat lost.</p>   |
| <p>65- Painting with oil colour, water colour of a building, office buildings, ITI workshop building inside and outside fittings including sanitary drainage water supply, gas pipes etc.</p>      | <p>Building painting by spray gun &amp; brushes, difference-specific application and their defects &amp; remedies. Different colour used, selection of paints for different type of fitting, electrical, water supply, sanitary &amp; drainage line etc.</p> | <p>Exercises on blue print reading. Freehand sketching of simple bearings with bearing blocks.</p>   | <p>Further problems on mensuration-area of circle &amp; ellipse-Volume and weight of regular cone and spheres - calculation of area, volume and weight of simple hollow bodies-problems related to the trade.</p> |

ACHIEVEMENT S: The Trainees should be able to:

- (1) Prepare wall surfaces for distempering & painting.
- (2) Mix paint for wall painting.
- (3) Paint walls of residential & workshop buildings.
- (4) Paint sanitary, fittings electrical fittings, pipe fittings, door and windows fittings including wooden fittings.

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|---|---|---|
| <p>67- Sign-painting Practice in<br/>70. freehand sketching for Geometrical shapes, human figures, animal figures and natural scenes with black &amp; white by pencil &amp; colours (both), cutting stencils of gothic letters &amp; roman letters, lettering-different types of lettering-Roman, Gothic,</p> | <p>Methods of stencilling, special types of stencils. Care of stencils. Drawing instruments used in lettering, use of T-square &amp; drawing board. Method employed, precautions to be taken lettering-description, types &amp; their uses. Common practice</p> | <p>Freehand sketching of simple bearings with bearing blocks. Preparation of working drawings of simple bearings. Problems on mensuration as above.</p> |
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Architectural, ornamental in different languages. and freehand. Cutting ornamental stencils in card board lettering practice on different languages for at least 3 languages.

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|---|---|---|
| <p>71- Painting letters &amp; figures of<br/>72. different types, painting of words, signs, signals name board, advertisements etc.</p> | <p>Conception of colour, primary secondary &amp; tertiary. Definition of colour, terms such as tint, shade, hue, tone monochromatic, warm colours. Glossary of terms for paints &amp; enamels-their nature-constituents of paints &amp; methods of manufacture. Different types</p> | <p>Freehand sketching of pulleys and preparation of working drawings. Problems on mensuration as above.</p> |
|---|---|---|



		of paints as primer surfaces, under coats, full gloss paint & enamels.		
73- Sign board painting in different media, chart, poster, festoon, banner, models etc. Use of hand made paint (Powder mixing) Ready-made enamel paint, water colour.		Method of mixing powder pigments different types proportion and colour making. Linseed oil, turpentine oil & varnishes-their function & its properties - application method of mixing paints.	Exercises on blue print reading.	Further practice on problem involving estimation of material for painting.
74. Painting of walls system of layout-Advertisement, Industrial & Commercial painting. Layout of painting with combination colouring viz. cinema poster (including scenery, lettering & portrait).		Painting of walls-Layout-process - types - Use of paint. Combination of all types. Method of evaluating the job work, estimating and costing. Preservation of painted	Freehand sketching of gearspur, helical & bevel. Exercises on blue print reading.	Problems on mensuration as above. Estimation of Labour charges for painting jobs.

articles, posters etc. General idea of commercial artist definition activities.

**ACHIEVEMENTS:** The Trainees should be able to:

- (1) Prepares Letters & figures of different types & stencil cut on paper & board.
- (2) Paint letters & figure of different types.
- (3) Paint posters, charts, banners, festoons, sign board model etc.
- (4) Paint wall scenery, advertisements, cinema posters etc.

77 Preparation of pigments with oil, driers, resins etc. Practice in the mixing and matching of colours, coloured objects and materials in both oil & water medium.	Pigment, definition, types of pigments, Properties of pigments manufacturing processes, their different types & uses. Application of oil driers, resins etc. & their purpose, colour pigments, matching of colours in both oil and water medium.	Isometric Drawing—construction of isometric scales.	Simple Problems related to labour and material estimation.
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1	2	3	4	5
78- 79	Testing of different paints and varnishes for specific gravity, weight per litre, viscosity, hardness gloss and finish, adhesion, flexibility & drying time.	Methods of testing paints and varnishes,	Isometric views of simple objects related to the trade.	do-
80- 81	Stove enamelling of sheet metal & cast iron articles such as cycle parts, fan parts etc.	Enamels-air drying & stoving. Testing of oil strainers, dry pigments, volatile paints, thinners, varnishes & enamels for viscosity drying gloss, finish, weight per litre, flexibility & adhesion	As above from given views in orthographic projection.	Example on simply supported load beams.
82- 83	Novelty finishes both air drying & stoving on different articles such as fans, type writers, ovens etc.	The procedures involved in novelty painting, precautions to be taken. colour schemes.	Views of simple solids cut by section planes true views of sections.	Problems in Mensuration as above.

1	2	3	4	5
ACHIEVEMENTS: The trainees should be able to :				
(1) Test different paint and varnishes for specific gravity, viscosity and hardness etc.				
(2) Stove enamel sheet metal and cast iron articles with novelty finish.				
84- 87	Painting on machine tools, such as lathe, shaper, planer, slotter, milling machine, grinding machine, boring machine etc. including accessories. Tools and equipment of different types - by brushing, spraying, dipping, removal of paints & surface treatment, use of masking equipment.	Processes of pretreatment of metal, surfaces. Standard colour code practices, as per classification. Process of painting different type of machine tools, equipments, spare parts etc.	Development of surfaces of simple objects. Construction of simple curves of inter penetration.	Plotting of graphs of simple equations, reading of graphs.

1	2	3	4	5
88. Repairs of painting defects, preservation of bleeding, blistering, blooming, chalking, discolourisation, fading, lifting, checking, cracking, wrinkling, flaking, scaling, peeling off, runs and sags. Blistering and peeling, pin-holding, orange peeling, blushing, missing etc.		Treatment of various defects arising while painting and their remedies, common coating failures, causes and remedies such as lifting, checking, cracking, wrinkling etc.	Construction of simple curves of interpenetration.	Centre of Gravity-simple experimental determination.
			—Do—	—Do—
89. Practice on silk screen painting in different media such as Festoon, posters etc.		Description of silk screen painting. Preparation of surface prior to the application of textures. Various processes of painting of silk screen. Precaution during painting.		

### 30 Painter (G)

1	2	3	4	5
90. Furniture description—job work—decoration of new furniture such as bookshelf, dressing table, job work decoration of old furniture for dining room, dressing room, kitchen room—toilet room etc.		Different colours used, shades & their effects procedures of decoration etc. Patching work, cleaning the various surfaces curved, round ornamental grills etc. Methods of work applied for various painting surfaces, instruments used in different position for cleaning & painting. Precaution for colours painting in same parallel surfaces.	Development of surfaces.	Reading and plotting simple graphs.

**ACHIEVEMENTS:** The trainees should be able to :

- (1) Remove paints, prepare surfaces & paint machine tools & equipments etc.
- (2) Repair painting defects.
- (3) Repair silk screen painting.
- (4) Repair job work decoration of new & old furniture etc.

1	2	3	4	5
91.	Spray painting in different surfaces like corners, round parallel, curved surfaces, angles, rectangular, cone, cylinder, square, Adjustment of spray gun stroke & holding spray-gun etc. for multipurpose work.	Spray painting equipment, spraygun - different types, methods of spraying techniques on various surfaces. Precautions in holding of spray gun & spraying stroke.	Development of surfaces.	Stable, unstates and neutral equilibrium of bodies-simple explanation.
92.	Practice of painting safety colour code on different symbolic articles & identification of pipe lines as per International & Indian Standard.	Various colour codes & Identification of pipe lines as per International & Indian Standards.	Freehand sketching of small parts related to the trade.	Reading & plotting of simple graphs.
93.	Spray painting with compressed air automisation, practice in different types of spray guns viz Externally fed spray gun, suction, pressure & gravity feed	Various types of spray-guns & their accessories used in industry their maintenance, techniques of their use, safety precautions.	Freehand sketching of simple assembled parts.	Friction-limiting Friction-laws of friction-co-efficient of friction-angle of friction.

32

1	2	3	4	5
	guns, catalyst spray guns with external mixing of catalyst & resin-their application.			
94	Practice of Airless & Electrostatic spraying such as Hydraulic airless spraying, steam spraying. Electrostatic spraying-Rausburg No. 1 process and No. 2, Electrostatic hand guns. Rausburg Electro-air gun, Statair gun, Rausburg Electro-hydraulic, gun.	Airless and Electrostatic spraying-description, safety precaution. Comparison between air and hydraulically operated guns.	-Do-	Simple estimation on the requirement of materials etc. related to the trade.
95	Practice on Rausburg electrostatic blade coater, high-tension supplies for electrostatic spraying, handling of	Rausburg electrostatic blade coater-Description, its use. Paints used on electrostatic spraying	Freehand sketching of simple assembled parts.	-Do-

33

electromagnetic generators. different types of paints  
Safety devices in electro- & mixing procedure.  
static spraying, application  
of electrostatic spraying.  
Handling of paint for  
electrostatic spraying.

ACHIEVEMENTS : The Trainees should be able to:

- 1) Do spray painting in different surfaces like corner, round, curved cylinder etc.
- 2) Paint safety colour codes as per International & Indian Standards.
- 3) Identify pipe lines as per International & Indian Standards.
- 4) Do spray painting with different types of spray guns.
- 5) Handle airless and electrostatic spraying, Rausburg electrostatic blade coater.

- |    |  |   |  |   |
|----|--|---|--|---|
| 96 | practice on different types of spray booths such as simple cabinet booth, back extract, wet booth etc. for spray painting of various parts stack cleaning, spray booth water treatment, Handling paint sludge, booth cleaning. | Different types of spray booths-system of inlet & outlet of the booths. Booth sizes-booth development-cellulose solutions regulations. Description of filtration equipment. | Freehand sketching of detailed components from assemblies. | Mechanical advantages velocity ratio and efficiency of simple machine-pulley, wheel and axel, screw jack, wrench etc. |
|----|--|---|--|---|

- |           |  |   |   |   |
|-----------|--|---|---|---|
| 97        | Spray painting on machines & cast surfaces-finishing of iron casting-pretreatment for removal of paints and surface treatment-Fettling degreasing-solvent wiping-Grease burning - removal of scale. Finishing priming - puttying and filling end surfacing, finishing coats. Practice on other types of machine castings, non-ferrous castings, sheet-metal finishing etc. | Different type of pre-treatment processes cleaning of the surfaces. method of spraying on various ferrous & non-ferrous castings, sheet metal containers. Use of higher performance coatings like chlorinated rubber & epoxy paints | Freehand sketching of detailed parts & production of working drawings of the parts.<br><br>Production of working drawings as above. | Problems on simple estimation as above. |
| 98-<br>99 | Spray painting on Car body-finishing - pretreatment process, primer, surfacer, stoving, wet sanding, synthetic finishing cellulose   | Method and application processes of car body finishing Various types of systems of spray painting and their effect on   | Production of working drawing as above.   | problems on simple estimation as above. |

finishing, acrylic finishes (thermo - setting) finishing sheet metal components etc. spray painting on scooters and motor cycles including pretreatment processes.

metal surfaces. Synthetic, cellulose & acrylic paints and finishing.

100 Spray painting practices on refrigerator & domestic appliances - pretreatment of surfaces-priming-finishings coats. Refrigerator liner finishing.

Stoving, methods of heat transfer, time temperature relation in a stoving oven. General idea of oven design and their classification. Safety precautions in use of ovens.

Production of working drawings as above.

Problems on simple estimation as above.

**ACHIEVEMENTS:** The trainees should be able to

- (1) Do spray painting on different types of booths.
- (2) Do spray painting on machine and cast surfaces.
- (3) Do spray painting of car, scooter and motor cycle bodies and their components.
- (4) Do painting of Refrigerator and domestic appliances.

101 Dismantling assembling & fitting of painting and varnish equipment and accessories and their routine maintenance. Handling practice of fire fighting equipment & its safety precautions.

General idea of ISI specifications on paints & varnishes. Function of different types of fire fighting equipment, safety precautions.

Exercises on blue print reading.

Magnetic substances-natural and artificial methods of magnetisation-use of magnets.

102 Practice in storage of paints handling & storage of materials, conveying, lifting & weighing. Systematic arrangement for keeping paint containers.

System of storing-storage of paints & lacquers, solvents & thinners, painter's tools, including spray painting equipment etc. Maintenance of store records.

Revision & exercises on blue print reading.

Simple electric circuit-Ohm's Law simple calculation.

103 Revision practice of varnishing of wooden surfaces, painting by

Methods of estimating labour, materials & costing procedures for

—Do—

Revision

brushing, painting of painting & varnishing.  
walls and metal surfaces, Preparation of work  
painting of letters and schedules.  
figures, spray painting.

**ACHIEVEMENTS :** The trainees should be able to :

- (1) Handle painters tools, equipment & machinery.
- (2) Carry out routine maintenance.
- (3) Handle fire fighting equipment.
- (4) Store paints and painter tools & equipment.
- (5) Prepare estimate for labour and materials and find out costs for painting work.

104 .....Revision and Test.....

.....Revision and Test.....

**FINAL ACHIEVEMENTS :** The trainees should be able to :

- (a) Carry out simple jobs in the trade of Carpenter, Sheet Metal, Plumber's, Electrician.
- (b) Handle simple hand tools & identify different machine tools.
- (c) Prepare surfaces of various materials for varnishing & painting.
- (d) Carry out finishing, varnishing & polishing of wooden furniture.
- (e) Distemper and paint buildings including fittings.

### 38 Painter (G)

- (f) Carry out sign painting with paints & water colour viz. Poster charts, advertisements, silk screen painting.
- (g) Carry out spray painting of different metal surfaces with good finish.
- (h) Handle machinery & equipment for mixing paints.
- (i) Prepare Estimate.
- (j) Handle storage of paints & painter tools and equipment including fire fighting equipment.

**Note :—**

(1) For practical training in allied trades the facilities available in the Institute for other trades as per syllabus should be utilised. Out of a batch of 16 trainees, one or two trainees at one time, may be permitted to work with the trainees of different sections to receive practical training. The trainees may be rotated according to a schedule prepared in consultation with the Instructors/Group Instructors of different trade concerned. No additional tools & equipment for practical training in allied trades have been provided separately for this trade.

(2) The syllabus given above is a guide line for the Instructors and the schedule of training will depend on the facilities available in the Institute concerned.

**TRADE—PAINTER**  
**LIST OF TOOLS & EQUIPMENT FOR A BATCH/UNIT OF 16 TRAINEES**

TRAINEES TOOL KIT:	FOR INSTRUCTOR	FOR TRAINEES
1. Rule wooden 4 fold 60 cm	1	16 Nos.
2. Divider steel 150 mm	1	16
3. Plumb bob 2 oz	1	16
4. Brush Dadger softner 25 mm	1	16
5. Brush stencilling	1	16
6. Brush writing	1	16
7. Brush Flat wall 50 mm	1	16
8. Brush Can paint	1	16
<b>TOOLS, MEASURING INSTRUMENT &amp; GENERAL SHOP OUTFIT :</b>		
1. Square 150 mm Blade		4
2. Scriber		4
3. Sliding T – Bevel		4
4. Marking Gauge		4
5. Wing Compass		4
6. Hand Saw 450 mm		2
7. Tennon Saw 300 mm to 375 mm		2

40

8. Jack Planes	4
9. Smoothing Plane	4
10. Mallet	4
11. Carpenter's Hammer	4
12. Chisel Firmer 6 mm, 25 mm set	2 sets
13. Chisel Mortise 9 mm	4
14. Bradwel	4
15. Trying Plane	4
16. Rachet Plane	2
17. Grooving Plane 3 mm., 6 mm. each plough	1 set of each
18. Firmer Gauge 6 mm. , 9 mm. & 19 mm. each	1 each
19. Bracer	2 Nos.
20. Brace bits 3 mm x 12 mm by 1.5 mm	1
21. Auger hand 19 mm. , 22 mm. , 25 mm	1
22. Trammel	2
23. Spoke shave 63 cutter	2
24. Gimlet 3 mm. and 7.5 mm	2
25. Oil stone 150x50x25mm	2
26. Blow Lamp 500 ml	4
27. Brush varnish 25 mm. oval bevalled	4
28. Brush distemper 25 mm	4

41



29. Brush round 9 mm. paint or varnish	4
30. Brush Hog Hair Fitch	4
31. Brush Flat 12 mm. varnish	4
32. Brush Dusting	4
33. Brush White Wash	4
34. Knife Put Glazier	8
35. Knife Chisel	8
36. Knife Stopping	8
37. Knife Hacking	4
38. Knife Palette	8
39. Scraper Daper Hanger	2
40. Strainer Paint	3
41. Pliers Insulated	2
42. Paint Burner (Acetylene Gas)	1
43. Screw Driver 200 mm	2
44. Steps Painter	2
45. Trestle Painter with stools	16
46. Aerograph (Air Brush)	1
47. Spraying Mask	4
48. Working Bench 240 cm x 120 cm x 75 cm	2
49. Carpenter Vice 225 mm	4
50. Bench Vice 125 mm. jaw	2

51. Combs (Steel)	4
52. Stencil Knife	16
53. Pallets	16
54. Beam Compass (Stencil cutting)	1
55. Trimming Knife	2
56. Metal straight edge with cutting wheel	2
57. Lay Brush	2
58. Physical Balance with weight box	1
59. 100 ml. Graduated Glass Cylinder	2
60. Weight per litre cup	2
61. For 1 cup No. 4 for viscosity measurement	2
62. Stop Watch	1
63. Mild steel panels 150 mm x 100 mm (18x22 SWG)	24Nos
(to be made in Institute.)	
64. Mild steel panels 300 mm x 200 mm (18x22 SWG)	24 Nos
—Do—	
65. Sand or shot blasting equipment complete with accessories (Smallest size available)	1 No.
—Do—	
66. Porcelain Basin 450	6
67. Porcelain Basin 300	6
68. Porcelain Basin 200	6
69. Marble Slab 750x300	2

70. Stoving Oven	1
71. Fire Extinguisher	2
72. Fire Buckets with stand	4
73. Steel Lockers with 8 drawers	2
74. Metal Shelving Rack open type 1800x900x500 with 4 adjustable shelves.	1
75. Desk	1
76. Black Board with easel	1
77. Stool	1
78. Pneumatic chippers	2
79. Orbital wire brushes	2
80. Pneumatic needle gun	2
81. Flame cleaning grill	2
82. Flatter Roller	6
83. Portable Electrical hand grinder	1
84. Face Mask & Respirator	6
85. Disc grinder set	1
86. Goggles	6 sets
87. Gloves	6 „
88. Ladder	1
89. Tresler	1

90. Scaffolder	1
91. Mandrell	1
92. Glossometer	1
93. Scratch hardness tester	1
94. Resistivity - Meter	1
95. Grinding Gauge	1

#### GENERAL INSTALLATIONS

- |  |   |
|--|---|
| 1. Gun spray with gravity feed cup complete with accessories<br>and portable electric air compressor | 4 |
| 2. Airless spray-gun with complete accessories   | 1 |
| 3. Electrostatic spray-gun with accessories  | 1 |
| 4. Pressure Feed Container 20 litres capacity  | 1 |

- N.B. 1. The specifications of a number of items in the above list have been given in Metric Units. Measuring Instruments such as Steel Rule which are graduated both in English and Metric units may be procured, if available.
2. Indian Standard Norms may be followed by the Instructional staff in respect of instructional materials and material specifications for training purpose as far as possible.

# THE NATIONAL APPRENTICESHIP TRAINING SCHEME

*Syllabus For the Trade of*

## **PAINTER [GENERAL]**

*1. Total Duration of Training :* 3 Years.

*2. Period of Basic Training :* 2 Years

*3. Ratio of Apprentice to worker :* 1 : 7

*4. Minimum Educational  
Qualification :*

*5. Rebat in Training Period :* 2 Years to those who  
have passed painter

(General)  
Conducted by NCVT  
under the Craftsmen  
Training Scheme.

*6. N.C.O. Code No.* 932.10

## A — SYLLABUS FOR PRATICAL TRAINING

FIRST & SECOND YEAR: Same as that for the trade of painter (General) under craftsmen Training Scheme.

### THIRD YEAR - SHOP FLOOR TRAINING

1. Instruction in safety precautions on the shop-floor.
2. Practice in free hand sketching of human figures, animal figures, geometrical figures, land scopes etc. in pencil, oil & water media.
3. Practice in using of graphs for accurate drawing & enlarging of small units.
4. Practice in painting of letters for name plates, road signs, signals and various types of advertisements.
5. Practice in preparing of sign-board paintings, posters, banners, festoons of different sizes and natures.
6. Preparation of industrial & commercial paintings and preparation of big hordings on different surfaces like playboard, tin, mosnite board etc.
7. Preparation of cinema posters in multi-colour including lettering and drawing of portraits on it.
8. Preparation and use of single or multiple plate stencils positive and negative according to need.
9. Practice in preparing of metal surface by rubbing with emery, scraping, wire brushing and manual chipping.
10. Preparing of metal surfaces with mechanical pneumatic chippers.
11. Preparing of surfaces of steel body by portable grinder.
12. Descaling of metal surfaces by vacuum blast machine.
13. Flame cleaning of rusted surfaces.
14. Pre-treatment of ferrous and non-ferrous surfaces by degreasing, etching, pickling and solvent wiping.
15. Cleaning and wiping of the different surfaces to be painted to the required standard.

2

16. Preparing of adhesive compound like putties, fillers and metal cements and applying them on metal and wooden surfaces.
17. Selecting, mixing & preparing of all types of oil paints & water paints.
18. Selecting, mixing and preparing of all types of synthetic paints and such other paints to obtain specific colours.
19. Sand or grit blasting of metal surfaces for painting by sand blasting machines.
20. Pre-treatment, applying of primer coats and spray painting of surfaces on car body and finishing by different processes.
21. Pre-treatment and spray painting of surfaces on scooters and motor cycles.
22. Pre-treatment, applying of primer coats and spray painting of surfaces on refrigerators/domestic appliances.
23. Pre-treatment, applying of primers and spray painting on the surfaces of steel furniture like Almírah, Chairs, Tables, Trays, Racks etc.
24. Practice in stove enamelling of different articles such as cycle, fan, typewriter parts etc. for novelty finish including air drying.
25. Practice in silk screen painting, use of mask and templates.
26. Practice in staging work, scaffolding and painting at height.
27. Handling of different types of spray painting machines in different types of painting booth including spray guns.
28. Rectifying the common coating failures and repairing of various painting defects.
29. Testing of different paints and varnishes regarding fluidity, spreading, density, viscosity, adhesiveness, drying, harding etc.

3

30. Interpretation of the layout or design and subsequent adoption of them for painting.
31. Practice in cleaning and maintaining of all tools and equipment required for painting.
32. Practice in safe way of storage of paints and varnishes.
33. Maintenance of painting schedules and following I. S. I. Specifications and other painting regulations.

## B. - Syllabus For Related Instruction

Related Instruction should be imparted to all the apprentices during the entire period of training including basic training. The syllabus given for Related Instruction should be considered as a guide.

The subjects to be taught to the apprentices in Related Instructions are :

1. TRADE THEORY
2. WORKSHOP CALCULATION & SCIENCE
3. ENGINEERING DRAWING
4. SOCIAL STUDIES

### FIRST AND SECOND YEAR

The content of the syllabus for the apprentices during first and second year of training will be the same as the content of the first and second year of the two-year course for I. T. I. trainees in the trade.

4

### THIRD YEAR

#### 1. TRADE THEORY : (3 hours per week or 150 hours per year approximately)

1. Safety at work - accidents do not happen, they are caused.
2. Instructions in safety precautions against fire, explosion and poisoning hazards, danger in breathing of fumes, gases & dust.
3. Knowledge in special types of brushes & hand tools used for different types of painting jobs-application technique & care.
4. Knowledge in other tools & equipment for the trade such as Pneumatic Chippers, hammers, portable grinders, scrapers, sand/grit blasting machine, vacuum blasting machine, flame cleaning unit, stove enamelling etc - their operation and application techniques.
5. Knowledge in spray painting equipment with compressed air and airless spray-gun, their correct operating techniques and application.
6. Corrosion - definition, causes and remedies.
7. Putties, fillers, metal cements - their physical properties, composition and application.
8. Classification of pigments according to their derivation of lead, zinc, iron, manganese etc. and different properties of pigments such as oils, enamels, varnishes, diluents, synthetic resins etc.
9. Different types of paints & varnishes including synthetic paints-Brief description of their manufacturing processes and uses. Methods of testing paints & varnishes.
10. Paint consumption corresponding to covering capacity of paints - loss in application. Knowledge in estimating the cost and method of evaluating the job.
11. Mixing of paints, colour matching by mixing of different colours for getting different shades in different media - brief description of processes.

5

12. Pre-treatment processes of various surfaces of cars, scooters, refrigerator, furniture and domestic appliances—brief description.
13. Knowledge in Paint Remover—Precautions taken.
14. Scientific storage of paints & varnishes—precautions taken.
15. Brief description of paints components.  
(a) Base (b) Filler (c) Vehicles (d) Solvent (e) Drier (f) Pigment and their uses.
16. Paint failures such as wrinkling, runs or sags, blistering, bleeding and reasons thereof—causes and remedies.
17. Knowledge in various colour codes, I.S.I. and International Standards. Standard specification of paints as per I.S. Norms.
18. Application techniques of paints in various types of surfaces including irregular surfaces by brushing, rolling, spraying, dipping etc. – brief description. A comparison of different painting system.
19. Physical properties of paints and varnishes – viscosity, flash point, film thickness, spreading time, drying interval, curing time etc. – their definition and brief description.
20. Primer, undercoating, finishing – basic principles and their importance.
21. Utility and importance of staging scaffolding and rigging practice use of ladders, craddles etc.
22. Modern developments in the trade – new techniques & processes.
23. Introduction to work simplification – job study, job analysis including planning sequence of operation. Critical approach and method of working. Estimation of time and material.
24. Quality and finish of work – importance of quality and finish of job at all stages—protection of finished surfaces. Economical use of material.  
The importance of application, controls and use of proper system and ancillaries for best results.

6

Total period of instruction for  
Trade Theory subject for Third Year .....150 hrs.

## II. WORKSHOP CALCULATION & SCIENCE ( 1 Hour per week or 50 hours per year approximately )

1. Revision of previous two years' work.
2. Problems connected with estimation of time and materials.
3. Further problems as applicable to the trade.
4. Further problems on mensuration, work, power & energy.
5. Descriptive explanation of expansion of solids, liquids and gases due to heat—coefficient of expansion. Brief description of transference of heat – conduction, convection and radiation.
6. Heat and temperature. Thermometric Scales—Fahrenheit and Centigrade—Conversion of fahrenheit scale to centigrade scale and vice-versa. Measurement of temperature. Name and brief description of simple temperature measuring instruments used in the workshop.
7. S.I. Units—basic, derived and supplementary units.

Total period of instruction for workshop  
Calculation & Science for Third Year ..... : 50 hrs.

## III. ENGINEERING DRAWING (Two hours per week or 100 hours per year approximately)

1. Revision of previous two years' work.
2. Advance Blue Print Reading.

7

3. Code of practice for general engineering drawing according to I.S.I. (IS: 696-1960).
4. Free-hand sketching of actual parts of the equipment related to the trade.
5. Isometric drawing of simple objects
6. Free-hand sketching and preparation of layout drawings and composition alongwith lettering and typography.

Total period of instruction for  
Engineering Drawing for Third Year..... .. 100 hrs.

- IV. SOCIAL STUDIES (1 hour per week or 50 hours per year approximately)  
The syllabus has already been approved and is same for all the trades.

#### LIST OF TOOLS AND EQUIPMENTS FOR FIRST & SECOND YEAR

The list of tools & equipment for 1st & 2nd year is same as that for the trade of painter (General) under craftsman training scheme.

### 8 Painter (G)