

GOVERNMENT OF THE PUNJAB

**TECHNICAL EDUCATION & VOCATIONAL
TRAINING AUTHORITY**



CURRICULUM FOR
SHUTTERING AND SCAFFOLDING
(3 – Month Course)

Developed August 2024

CURRICULUM SECTION
ACADEMICS DEPARTMENT

96-H, GULBERG-II, LAHORE

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TRAINING OBJECTIVES:

This course aims to develop the skillful work force in the field of concrete construction as construction industry is facing a lot of difficulties for doing the shuttering & scaffolding works in the construction field without the trained man power. The work of shuttering & scaffolding is of paramount important in the field of concrete constructions in the specific areas/works. It is one of the major areas of skills, which is still ignored for formal training. Presently they learn the skill, from senior artisan by working with them for many years as helper. This course covers all the related topics of studies & practicals enabling the job market to have skillful persons resulting into better results for timely & safely completion of the civil works specially for concrete construction.

CURRICULUM SALIENT:

Entry level	:	Middle (Preference will be given to matriculation)
Duration	:	3 – Month
Total Training Hrs	:	400 Hrs
	:	7 hours/day – 5 Hours on Friday 6 days a week
Training methodology	:	Theory 10 %
	:	Practical 90 %
Medium of Instruction	:	Urdu / English

SKILL PROFICIENCY DETAILS:

On successful completion of this course, a trainee should be able to:

1. Apply all safety precautions, personal protective equipment.
2. Operation of wood table saw.
3. Measure, and cut steel pipe to given size
4. Construct and use of steel joints for scaffolding.
5. Use spirit level and plumb line for maintaining structural alignment
6. Erect steel scaffolding to any height for construction and repair works
7. Construct steel form work for roof slab with beam and projection and staircase.
8. Erect timbering of trenches.
9. Make centering for arches e.g. segmental, semicircular and inverted.
10. Operation of Pneumatic hammer.
11. Use of pipe level for leveling the scaffolding.
12. Operation of core cutting machine.
13. Use the scaffolding ratchet.
14. Erect tabular scaffolding to any height for construction work.
15. Erect steel form work for roof slab, beam estimate and walls
16. Read & interpret structural drawing and calculate number and sizes of form work / shuttering components.
17. Ability to chair lift shuttering (Hydraulic Shuttering)
18. Ability to uses of PPE and safety requirements.

KNOWLEDGE PROFICIENCY DETAILS:

On successful completion of this course, a trainee should be able to:

1. Define the reading and interpreting drawings & sketches
2. Define the building components and their sequence of construction
3. Describe the covered area calculations of buildings
4. Define between shuttering and Scaffolding and importance.
5. Describe the thumb rules for material and cost estimation
6. Identify the types of steel joints and be able to develop and construction frame.
7. Express the types of nut and bolts commonly used in the trade.
8. Express the wood table saw.
9. Explain the method of marking and cutting ply wood for form work.
10. Explain the different types of joints and their uses
11. Explain the method of erecting timbering for trenches
12. Describe the method of constructing centering for various types of arches
13. Identify the types and importance of shuttering for concrete construction.
14. Introduction and importance of PPE.

SCHEME OF STUDIES
Shuttering & Scaffolding
(3-Month Course)

Sr. No	Main Topics	Theory Hrs.	Practical Hrs.	Total Hrs.
1.	Trade Related Math	05	34	39
2.	Reading Drawing	05	13	18
3.	Wood Working	03	21	24
4.	Scaffolding	07	128	135
5.	Shuttering (Form Work)	12	158	170
6	Occupation Health and Safety	02	-	2
7	Work Ethics	-	06	06
8	Soft Skills	06	-	06
Total		40	360	400

Detail of Course Contents**Shuttering & Scaffolding**

(3 - Month Course)

Sr. No	Detail of Topic	Theory Hrs.	Practical Hrs.
1.	Trade Related Mathematics		
	1.1 Basic Mathematic	1	7
	1.1.1. Additions & subtraction of whole number		
	1.1.2 Multiplication and division of whole numbers		
	1.1.3 Multiplication & division of fraction		
	1.1.4 Addition & subtraction of fraction		
	1.1.5 Addition & subtraction of decimal fraction		
	1.1.6 Multiplication & division of decimal fraction		
	1.1.7 Percentage: change number to percent, change percent to decimal and fraction		
	1.1.8 Solve problems related to addition, subtraction, multiplication, division and percentage		
	1.2 Measurement System	1	
	1.2.1 Foot pound system of measurement		
	1.2.2 Parts / fraction of inches and foot		
	1.2.3 Metric system of measurement		
	1.2.4 Multiples and parts of units		
	1.2.5 Conversion of foot pound to metric system vise versa		

	1.2.6 Exercise to solve problems related to conversion, addition, subtraction and multiplication & division of measurements		6
1.3	Angles	0.5	4
	1.3.1 Angle and its units		
	1.3.2 Types of angles		
	1.3.3 Calculation (addition and subtraction etc.)		
1.4	Surface Area	1	6
	1.4.1 Surface area of rectilinear plane figures (square, rectangle, triangle, trapezium, rhombus & parallelogram etc.		
	1.4.2 Surface area of angular plane figures (circle, segment, sector etc.)		
	1.4.3 Practice in calculating area of different geometrical figures		
	1.4.4 Pythagoras theorem and its application		
	1.4.5 Area and perimeter of composed figures		
	1.4.6 Practice in calculating areas and perimeter of composed figures		
	1.4.7 Practice in calculating covered area of building from working drawing		
1.5	Volume	0.5	
	1.5.1 Volume and unit of volume		
	1.5.2 Volume of geometrical solids		

	1.5.3 Surface area of geometrical solids 1.5.4 Quantity of liquid in container 1.5.5 Practice in calculating volume and surface areas of different geometrical solid 1.6 Estimation & Wastage 1.6.1 Estimating cost of form work on the basis of surface area 1.6.2 Calculating wastage on the basis of area and length 1.6.3 Practice of solving problem regarding estimating cost of Form work	1	5 6
2.	Reading Drawing 2.1 Introduction Of Drawing 2.1.1 Necessity & importance of drawing 2.1.2 Types of engineering drawing	1	2

	2.3 Technical Term Used In Building	1	2
	2.3.1 Structural terms		
	2.3.2 House planning term (corridor, balconies, powder, pantry etc.)		
	2.4 Building Drawing	1	3
	2.4.1 Presentation & Working drawings		
	2.4.2 Brief introduction to plans, elevation & section		
	2.4.3 Reading exercise of working and structural drawings of different buildings		
	2.5 Introduction Of Building Materials	1	3
	2.5.1 Cement; types and properties		
	2.5.2 Sand; types and properties		
	2.5.3 Aggregate; types and properties		
	2.5.4 Bricks; types and properties		
	2.5.5 Reinforcement; types and properties		
	2.6 Components Of Building	1	3

	4.6	Practice to erect steel of trenches	2	12
	4.7	Practice to erect steel scaffolding for wall construction, demonstration from relevant industry expert	2	15
	4.8	Practice to erect steel scaffolding for column	2	20
	4.9	Requirements common to all scaffolds, capacity, stability	1	18
	4.10	Safety precautions work at height, Fall hazards, Fall protections and prevention methods	1	6
	4.11	Anchoring of full body harness		3
5.	Shuttering (Form Work)		2	
	5.1	Shuttering for lintels & arches		
	5.1.1	Lintel, bearing, thickness of lintel and components of shuttering		
	5.1.2	Shuttering for sunshade		
	5.1.3	Arches, components & centering procedure		
	5.1.4	Practice to erect shuttering for lintel and sunshade		15
	5.1.5	Practice to erect shuttering / centering for arches		16
	5.2	Reinforcement Placing	2	
	5.2.1	Types of reinforcement bars		
	5.2.2	Location of reinforcement bars in structure (main & distributor bar)		
	5.2.3	Concrete cover, spacer etc		
	5.2.4	Practice of placing reinforcement in		14

	intel & sunshade etc.	3	
5.3	Form Work For Frame Structure		
5.3.1	Introduction to frame structures		
5.3.2	Types of beams; tee beam, isolated beam, inverted beam etc		
5.3.3	Types of roof slab; R.C.C slab, Ribbed roof slab, R.B slab etc.		
5.3.4	Column and column base		

	5.3.5	Concrete walls		
	5.3.6	Components of form work for beam, slab, column & wall		
	5.3.7	Practice to construct form work for isolated beam		6
	5.3.8	Practice to construct / erect wooden form work for R.C.C roof slab		8
	5.3.9	Practice to erect formwork for roof slab with beams		8
	5.3.10	Practice to erect formwork for roof slab with beam and projection		8
	5.3.11	Practice to dismantle above formwork		6
	5.3.12	Practice to erect steel formwork for column		4
	5.3.13	Practice to erect formwork for roof slab having beams by using steel plates		08
	5.3.14	Practice to dismantal steel formwork		6
	5.3.15	Practice to construct formwork for ribbed roof slab		13
	5.3.16	Practice to construct formwork for concrete wall		08
	5.4	Form Work For Stair	3	
	5.4.1	Types of stairs		
	5.4.2	Components of stairs		
	5.4.3	Components of formwork for concrete stair		
	5.4.4	Calculating slope and layout of stair		6
	5.4.5	Practice to make shuttering for single flight concrete stair		8

	5.4.6 Practice to make shuttering for dog legged stair 5.5 Shell Roof Formwork 5.5.1 Introduction to shell roof 5.5.2 Components of formwork for shell roof 5.5.3 Hoisting devices 5.5.4 Visit of under construction shells 5.6 Hydraulic Shuttering/Form work System 5.6.1 Introduction to hydraulic shuttering system 5.6.2 Components of hydraulic shuttering system 5.6.3 Visit of under construction hydraulic shuttering system project	2	12
			12
6.	Work ethics		06
7	Soft Skills Communication Skills Attitude Team Work Networking Problem Solving Professionalism	06	
Total		40	360

LIST OF MACHINERY / EQUIPMENT

**For the Class of 25 Students
(3-Month Course)**

The following machinery / equipment etc. would be required for effective and comprehensive training of the trainees at the institute level/ their timely modifications, improvements and innovations are also recommended miniature sectional working models of plants machinery / equipment are preferred.

Sr#	Name of Items	Quantity	Unit
1	Steel Pipe 20ft	50	length
2	Screw Jack Base	20	Nos.
3	Caster	20	Nos.
4	Double Couplers	150	Nos.
5	Swivel coupler	50	Nos.
6	Half Coupler	50	Nos.
7	Board Retaining Coupler	10	No.
8	Inner Joint Coupler	10	No.
9	Joint pin Coupler	50	Nos.
10	Steel plate	200	Nos.
11	Claw Hammer	10	Nos.

12	Harness & Lanyard	25	Nos.
13	Measuring Tape(30m)	12	Nos.
14	Scaffolder Ratchet (Size 7/8 " or 22mm)	12	Nos.

Sr#	Name of Items	Quantity	Unit
15	Nut	100	kg
16	Standard pipe 6.5 feet length Dia 48.3mm	8	Nos.
17	Ledger pipe 2m length	8	Nos.
18	Cross bracing length 8.5ft	8	Nos.
19	Screw Jack Base	8	Nos.
20	Wooden ply (1ftx1ft)	8	Nos.
21	Base Plate	8	Nos.
22	Circular saw	1	Nos.
23	Drill machine (pedestal type)	1	Nos.
24	Steel rule	25	Nos.
25	Hand drill	6	Nos.
26	Bit set	12	set
27	Ball Peen Hammer	25	Nos.
28	Zambur	25	Nos.
29	Tabular scaffolding steel pipe 1 1/2 inch 20 feet length	1000	ft
30	fixed joints	20	kg
31	universal joints	10	kg
32	crow bar	12	Nos.
33	spanner set	6	set
34	screw wrench 12"	25	Nos.
35	hammer	6	Nos.
36	electric welding set	4	set

Sr#	Name of Items	Quantity	Unit
37	rectangular Column shuttering Cross section dimension 225mm x 225mm/150kg x 2 No. Cross section dimension 225mm x 300mm/125kg x 2 No.	260	kg
		270	kg
		290	kg
38	rectangular Column shuttering Cross section dimension 225mm x 225mm/150kg x 2 No.	240	kg
39	rectangular Column shuttering Cross section dimension 225mm x 300mm/125kg x 2 No.	250	kg
40	rectangular Column shuttering Cross section dimension 300mm x 300mm/130kg x 2 No	260	kg
41	rectangular Column shuttering Cross section dimension 375mm x 375mm/135kg x 2 No	270	kg
42	rectangular Column shuttering Cross section dimension 450mm x 450mm/145kg x 2 No	290	kg
42	circular Column shuttering	240	kg
		250	kg
		260	kg
		270	kg
39	Form work (Plate)	150	kg
		170	kg
		190	kg
		210	kg
		750	kg
40	PLY WOOD SHEET	20	sheet

41	Wooden Batten	30	Nos.
42	Wooden Table Saw	1	Nos.
43	Plumb bob with dori	25	Nos.
44	Core cutting machine	01	Nos
45	Pneumatic hammer	01	Nos
46	Pipe level	100	Rft

LIST OF CONSUMABLE MATERIAL

Sr. no.	Item name	qty	unit
1	Nut and Bolts	100	kg
2	Safety jackets	25	no
3	Safety Helmet	25	no
4	Safety Gloves	25	pair
5	Safety Shoes	25	pair
6	Wooden Ply (1 ft *1 ft)	8	no
7	Base Plate (Toe Board)	2	no
8	Welding rod	5	pkt
9	Used engine oil	20	liter
10	Angle iron	40	kg
11	Red oxid	10	pkt
12	Doori cotton	24	roll
13	Packing tape	24	roll
14	Wire brush buff	12	No.

MINIMUM QUALIFICATION OF TEACHERS

D.A.E in civil with five years experience in relevant field.

OR

Atleast 8 -years relevant Field Experience for worker/ craftsman in same area

EMPLOYABILITY OF PASS OUTS

The pass-outs of this course can find job/ employment opportunities in the following sectors / areas:-

1. Communication & works department
2. Govt. development authorities
3. Civil contractors
4. Pak P.W.D
5. Military engineering services MES
6. NES PAK and other consulting firms
7. National logistic cell, NLC
8. Frontier works organization FWO.
9. DESCON Engineering,DTI