Model Curriculum

Fitter-Mechanical Assembly

Fitter-Mechanical Assembly

SECTOR:	**CGSC**
SUB-SECTOR:	**Machine Tools** **Tools Dies and Press tools** **Plastics Manufacturing Machinery** **Textile Manufacturing Machinery** **Process Plant Machinery** **Electrical And Power Machinery** **Light Engineering Goods**
OCCUPATION:	**Fitting And Assembly**
REFERENCE ID:	**CSC/Q 0304**
NSQF LEVEL:	**3**

CGSC
CAPITAL GOODS SKILL COUNCIL

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Fitter-Mechanical Assembly

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Fitter-Mechanical Assembly", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Fitter-Mechanical Assembly**		
Qualification Pack Name & Reference ID.	CSC/Q 0304		
Version No.	1.0	**Version Update Date**	24 – 12 – 2015
Pre-requisites to Training	Minimum qualification 10th Standard		
Training Outcomes	**After completing this programme, participants will be able to:** • **Carry out preparations for general machining, fitting or assembling operations:** determine job requirements of raw material or components required, dimensions, limits and tolerances, surface texture, sequence of operations, shape, cutting, bending and rolling allowance etc. establish procedures, obtain appropriate calibrated equipment. • **Carry out marking of the components:** prepare /determine suitable datum, apply marking medium by using appropriate marking methods and equipment. • **Perform general fitting operations:** cut and shape material to required specifications by using range of hand fitting methods using range of manually operated machines for performing machining operations. • **Perform assembly operations**: fasten components using engineering fasteners, adhesives, soldering, blazing, drilling, tapping and reaming as per job specifications. Dismantle mechanical assemblies without damage to components or sub-assemblies. • **Measure and check components:** perform necessary checks for dimensional accuracy using appropriate measuring equipment. • **Work safely following health and safety standards:** understand risks and hazards in workplace, use of PPE, identify job –site hazards and apply good housekeeping practices etc		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "CSC/Q 0304" Qualification Pack issued by "Capital Goods Skill Council".

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1	Perform fitting and assembly operations on metal components	80:00	220:00	• Understand various fitting activities like file flat, square an curved surfaces to achieve smooth surface finish; selection and setting of saw blades, use of hand dies to produce threads; tightening with torque wrenches; determine drill size etc • Understand methods of holding the workpiece for hand fitting, drilling, threading activities • Understand methods of mounting the workpiece like by pressure, expansion or contraction, securing components using threaded fasteners, securing components using spring clips, securing components using rivets, applying sealing compounds, electrical bonding and torque setting of nuts etc. • Understand methods of aligning, adjusting and positioning components before securing them. • Understand application of cutting fluids and compounds with regards to range of different materials like carbon steel, stainless steel, cast iron, tool steel, hard	CSC/N 0110	Lathe Machines , Cutting tools measuring tools , Hand Tools , Power tools , PPE , Drawing Tools , Drilling Machines , Cutting Machines , Hand Grinders , GD&T , Etc.

				metals, bronze, aluminum, copper and copper alloys. • Understand use of the work piece and measuring equipment like external micrometers, Vernier/digital/dial calipers, surface finish equipment, rules, squares, protractors, depth micrometers, DTI, CMM etc. • Determine job requirements like raw material (type, quality, quantity) dimensions, limits and tolerances, surface texture, shape or profiles to be fabricated, cutting, bending and rolling allowance, instruments and tools, interdependencies, timelines and sequence of operations from detailed drawings, approved sketches, national and international standards, reference tables / charts etc. • Determine and obtain appropriate equipment, parts and accessories like rollers and skates, crowbars, pull-lifts, lubricated plates, assembly structure (framework, support, casing, panels), pre-machined components, shafts, levers, springs,		

				chains, keys, belts, bearings, couplings gaskets, seals, sprockets etc for general machining and fitting or assembling operations. • Obtain and use calibrated measuring equipment like external micrometers, Vernier/digital/dial caliper, surface finish equipment, rules, squares, protractors, depth micrometers, depth Vernier, feeler gauges, harness tester, dial test indicators (DTI), surface roughness tester, coordinate measuring machine (CMM) etc. • Mark out range of features like datum lines, cutting lines, squares and rectangles, circular and radial profiles, angles, holes, linearly positioned and boxed on pitch circles etc on the components using suitable marking medium, datum and appropriate marking methods like directing marking using instruments/ templates or traces /transfer method using range of marking tools like rules, tapes, dividers, scribers, punches, scribing blocks, squares, protractors, permanent markers etc • Cut and shape material		

				to required specifications using hand fitting methods like cutting out rough profile using saws (hacksaw, band saw) cutting a screw thread (tapping or dieing) filing (flat, square, curved) drilling holes, reaming of holes, scrabbling of parts using manually operated machines like manual grinding machines (Ag4, wolf grinding machine etc) drills (power drills, pedestal drills), punching machines, threading machines etc • Assemble and secure the components and sub-assemblies in their correct positions using methods like assembling components with interface fits (eg. by pressure, expansion or contraction); securing components using threaded fasteners (eg. nuts, bolts, machine screws, cap screws); securing components using spring clips (eg. external circlips, internal circlips, special clips); using locking and retaining devices (eg. tab washers, locking nuts, wire locks, special purpose types); securing components using rivets (eg. countersunk, roundhead, blind, special purpose types); applying sealing		

				compounds or adhesives; electrical bonding of components; setting and adjusting components to give correct working parameters (eg. shimming and packing); torque setting of nuts and bolts. Fasten components permanently using engineering fasteners, adhesives, soldering and brazing. Produce components which are free from false cuts, burrs and sharp edges; dimensional tolerances +/-0.20mm, flatness and squareness of 0.05mm, angles within +/-1 degree, screw threads to fit as per standards; reamed and bored holes within interference -0.025mm (hole)+0.025mm shaft, transition -0.1mm (hole)+0.1 (shaft) clearance 50 microns, radius 0.5r, surface finish 63µm or 1.6µm • Dismantle mechanical assemblies without damaging components or sub-assemblies using procedures for isolation and locking off a device / system. • Check dimensional accuracy by measuring linear dimensions (length, depth), diameters (external and internal), flatness,		

				squareness, angles, profiles, hole size and position, thread size and fit.		
2	Use basic health and safety practices at the workplace	30	70	• Understand importance of complying health safety and environmental regulation at work place. • Understand the hazards of using power tools, trailing leads or hoses, damaged or badly maintained tools and equipment, using files with damaged or poor fitting handles, using machine tools, handling o foils and grease, misuse of tools, not following laid-down procedures. Benefits of using tools and equipment, power cables etc in safe and usable condition. • Understand: Different types of fire; use of appropriate fire extinguishers risk and accidents; safe working practices and methods of accident prevention at work place • Importance of using protective clothing like leather or asbestos gloves, flame proof aprons, flame proof overalls buttoned to neck, cuffless (without folds), trousers, reinforced footwear, helmets/hard hats, cap	CSC/ N 1335	Helmet, gloves, earplugs, goggles, Shoes, node mask, Apron Etc.

				and shoulder covers, ear defenders/plugs, safety boots, knee pads, particle masks, glasses/goggles/visors ,hand shields, machine guards, residual current devices, shields, dust sheets, respirator etc.		
3	Work effectively with others	40	60	• Able to receive and pass information from and to authorised persons and seeking clarification from authorized persons where required. • Able to communicate by avoiding use of abusive language; display respect to others. Respect others time by completing given task in time, avoiding gossip and avoid conflict. • Understand and practices active listening, teamwork, effective communication; understands the barriers to effective communication and common reasons for interpersonal conflict.	CSC/N 1336	

	Total Duration: 500	**Theory 150**	**Practical 350**	**Unique Equipment Required:**
				Lathe Machines , Cutting tools measuring tools , Hand Tools , Power tools , PPE , Drawing Tools , Drilling Machines , Cutting Machines , Hand Grinders , GD&T , Etc.
				Helmet, gloves, earplugs, goggles, Shoes, node mask, Apron Etc.

Grand Total Course Duration: **500 Hours 00 Minutes**

(This syllabus/ curriculum has been approved by Capital Goods Skill Council)

Annexure1: Assessment Criteria

Assessment Criteria for Fitter Mechanical Assembly	
Job Role	**Fitter Mechanical Assembly**
Qualification Pack	**CSC/Q 0304**
Sector Skill Council	**Capital Goods Skill Council (CGSC)**

Sr. No.	**Guidelines for Assessment**
1	Criteria for assessment for Qualification Pack has been created based on the NOSs and performance criteria by CGSC. Each Performance Criteria (PC) has been assigned marks proportional to its importance within NOS and weightages have also been given among the NOSs accordingly. CGSC has laid down the proportion of marks for Skills (Practical) , Theory/Knowledge and Behaviour for each PC.
2	The assessment of the theory/knowledge will be based on written test/viva-voce or both while skill test shall be hands on practical.
3	The assessment shall be done as per the assessment guides devised by CGSC in coordination with the assessment agencies. Assessment guides consists of a unique question papers for theory/knowledge and the method of assessments and evidence collection and detailed marking.
4	To pass the Qualification Pack, every trainee should score a minimum of 70% in Skill, 60% in Knowledge OR as per guidelines applicable from time to time.
5	…..
6	…..

Sr. No.	**NOS No.**	**NOS Name**	**Total Marks**	**Marks Allocation: Skills**	**Marks Allocation: Knowledge**	**Marks Allocation: Behaviour**
1	CSC/ N 0304	Perform fitter and assembly operations on a metal components	100	90	10	..
2	CSC/N 1335	Use basic health and safety practices at the workplace	100	64	36	..
3	CSC/N 1336	Work effectively with others	100		30	70
	Total:		**300**	**154**	**76**	**70**
	Percentage Weightage:			**70**	**20**	**10**
	Minimum Pass% to qualify:			**70%**	**60%**	**60%**

Annexure2: Trainer Prerequisites for Job role: "Fitter Mechanical Assembly " mapped to Qualification Pack: "CSC /Q 0304"

Sr. No.	Area	Details
1	**Job Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "CSC/Q 0304".
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	**Minimum Educational Qualifications**	Preferably Diploma/Degree in Mechanical Engineering
4a	**Domain Certification**	Certified for Job Role: "CNC Operator Turning" mapped to QP: "CSC /Q 0304" with Minimum acceptance score of 85 %.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "SSC/1402" with Minimum accepted score of 85%. Alternatively, must have successfully undergone a CGSC organized TOT workshop on "How to Trainer".
5	**Experience**	Minimum 3 to 4 years of industry experience in relevant job role and a Minimum of 3 to 4 years and Training experience in relevant job role.

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