DRAFT – For internal circulation only

Multi Skill Curriculum
NSQF L3-L4

Job Title
Multi Skill Technician (General Engineering)

Job Roles Covered
Fitter, Welder, Fabricator



Developed by

Rashtriya Madhyamik Shiksha Abhiyaan (Maharashtra)

Maharashtra State Board of Secondary & Higher Secondary Education

In Collaboration with

PSS Central Institute of Vocational Education (PSSCIVE) Bhopal

Course: Multi-Skill Technician (General Engineering) - GE

Job Role Covered - Fitter, Welder and Fabricator					
NSQF - Multi-Skill Technician- Level 3 - Class 11th - Curriculum					
Sr. No.	**Unit code**	**Unit Title**	**Approved Qualification Pack (from Construction SSC)**	**NOSs**	**Duration**
1	**L3-MST-GE-1**	**Working Safely**	CON/Q1205 Construction Fitter	CON/N9001: Work according to personal health, safety and environment protocol at construction site	30 hours
2	**L3-MST-GE-2**	**Basic Engineering Drawing**	CON/Q1205 Construction Fitter	CON/N1208: Carry out marking on structural steel elements to complete the fitup in accordance with shop drawing	30 hours
3	**L3-MST-GE-3**	**Welding - I**	CON/Q1251 Tack Welder	CON/N1252: Carry out pre heating of materials before cutting and welding process	30 hours
4	**L3-MST-GE-4**	**Welding - II**	CON/Q1251 Tack Welder	CON/N1251: Perform tack welding operations on structural steel elements	90 hours
5	**L3-MST-GE-5**	**Fitting and Assembly Techniques**	CON/Q1205 Construction Fitter	CON/N1209: Carry out fitup of assemblies in fabrication yard	120 hours
6	**L3-MST-GE-6**	**Entrepreneurship Development - I**	Not Applicable		
					Total: 300 hours
NSQF- Multi-Skill Technician - Level 4 Class 12th - Curriculum					
Sr. No.	**Unit code**	**Unit Title**	**Approved Qualification Pack (from Construction SSC)**	**NOSs**	**Duration**
7	**L4-MST-GE-1**	**Maintenance and organization of workshop**	CON/Q1206 Fabricator	CON/N8001: Work effectively in a team to deliver desired results at the workplace	30 hours
8	**L4-MST-GE-2**	**Surface Preparation**	CON/Q1206 Fabricator	CON/N1210: Inspect and check the fabrication materials and their preparation	60 hours
9	**L4-MST-GE-3**	**Joint Preparation**	CON/Q1206 Fabricator	CON/N1211: Oversee fabrication activities	60 hours
10	**L4-MST-GE-4**	**Repair Fabricated Components**	CON/Q1206 Fabricator	CON/N1211: Oversee fabrication activities	90 hours
11	**L4-MST-GE-5**	**Structural Steel Assemblies**	CON/Q1206 Fabricator	CON/N0717: Erect structural steel assemblies at construction sites	60 hours
12	**L4-MST-GE-6**	**Entrepreneurship Development - II**	Not Applicable		Not a stand alone module. Part of each relevant unit.
					Total: 300 hours

NSQF- Multi-Skill Technician - Level 3 - Class 11th - Curriculum

Unit Code	Unit Title	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
L3-MST-GE-1	**Working Safely**	Work safely on machines and in the workshop	Describe - meaning of “hazards” and “risks” - health and safety hazards commonly present in the work environment and related precautions - possible causes of risk and accident: reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness) - safe working practices when working with tools and machines - where to find all the general health and safety equipment in the workplace - various dangers associated with the use of electrical equipment - preventative and remedial actions to be taken in the case of exposure to toxic materials ingested, contact with skin, inhaled Preventative action: ventilation, masks, protective clothing/equipment); Remedial action: immediate first aid, report to supervisor Toxic materials: solvents, flux, lead - importance of using protective clothing/equipment while working - various causes of fire: heating of metal; spontaneous ignition; sparking; electrical heating; loose fires (smoking, welding, etc.); chemical fires	- identify protective clothing/equipment for specific tasks and workconditions - state the name and location of people responsible for health and safety in the workplace - state the names and location of documents that refer to health and safety in the workplace - identify job-site hazardous work and state possible causes of risk or accident in the workplace (sharp edged and heavy tools; heated metals; oxyfuel and gas cylinders; welding radiation; hazardous surfaces (sharp, slippery, uneven, chipped, broken, etc.); hazardous substances(chemicals, gas, oxy-fuel, fumes, dust, etc.); physical hazards(working at heights, large and heavy objects and machines, sharp and piercing objects, tolls and machines, intense light, load noise, obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc.) electrical hazards (power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.) - carry out safe working practices while dealing with hazards to ensure the safety of self and others Safe working practices: using protective clothing and equipment; putting up and reading safety signs; handle tools in the correct manner and store and maintain them properly; keep work area clear of clutter, spillage and unsafe object lying casually; while working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of control equipment, dry work area, switch off the power supply when not required, etc.; safe lifting and carrying practices; use	Interactive lecture on workshop safety
L3-MST-GE-2	**Basic Engineering Drawing - I**	Extract and use information from engineering drawings and related specifications in relation to work undertaken	Identify various basic, compound and solid shapes as per dimensions given Basic shapes: square, rectangle, triangle, circle Compound shapes: involving squares, rectangles, triangles, circles, semicircles, quadrants of a circle Solid shapes: cube, rectangular prism, cylinder Surface areas and volume: cube, rectangular prism, cylinder Identify the various geometrical shapes such as angularity, surface finish, Symmetry	Draw the various geometrical shapes - Sketch the component drawings in third/first angle method	Interactive lecture on Engineering drawing - Practical sessions on drawing shapes - Practical session on technical drawing and geometrical tolerance for operations on welding, bending, machining, turning etc.

Unit Code	Unit Title	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
L3-MST-GE-3	**Welding - I**	Demonstrate the knowledge of preheating of materials	Describe the precautions to be taken while using welding machines and materials - different gases employed in the process - requirements and necessity of preheating - effects of heating a painted or oily surface - why is positioning of body important for proper heating - effects of overheating the metals - .importance of shape of flame in heat transfer	Should ensure that there is no leakage in gas pipelines - ensure that proper purging is done prior to welding the pipelines or tube sections - ensure that flash arrestor is installed and functioning properly - ascertain the location of pre heat - ascertain the required temperature - Carry out preheating of structural components/members using heating torches (oxy fuel torch)	Interactive lecture on welding - Practice sessions on job related to preheating
L3-MST-GE-4	**Welding - II**	Perform Tack welding operations on structural steel elements	Describe the process for arc welding - need and importance of tack welding - basic concepts of fabrication - preparation of weld joints - disease that can occur due to using improper welding	Perform tack welding operations by arc welding on mild steel, stainless steel and other ferrous alloys - . maintain proper electrode extension length to avoid defects	Interactive lecture on welding - Practice sessions on job related to application of various welding methods
L3-MST-GE-5	**Fitting and Assembly Techniques**	Demonstrate the knowledge of basic fitting and assembly	Describe - how to interpret first and third angle drawings - estimate requirements of number of clamps and fixture - ideal conditions for an anchor point - need and importance of Tack welding - what is root gap, why is it required - different methods and process for making connections in metal sections - how to operate different jacks, vices, clamps and other fixtures - different equipment's used for load lifting and shifting - procedures employed to correct distortion - types of bending machines, their application and limitations	Work according to standard health and safety requirements - Place and fix the components as per marking - Carry out adjustments such that the components are properly aligned and accurate - Check the dimensions post tack welding and offer the same for quality check prior to welding - Repair any defects found in the components	Interactive lectures on various fitting operations - Practice sessions on marking and fitting operations - Practice sessions on fitting and assembly

Unit Code	Unit Title	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
L3-MST-GE-6	**Entrepreneurship Development - I**	Demonstrate the knowledge of entrepreneurship and characteristics of entrepreneurs	Describe entrepreneurship, risks and rewards	Demonstrate the knowledge of entrepreneurship, risks and rewards Give examples of entrepreneurship	Interactive lecture on Entrepreneurship
		Demonstrate the knowledge of challenges facing small business	Describe challenges facing small businesses like Financing , Access to markets, Government policies , Inadequate managerial skills	Identify a small business and list its challenges and scope for improvement	Interactive lecture on Small businesses - Community Survey and interview with a workshop owner
		Explain the factors that affect the development of entrepreneurship	Describe the factors that affect the development of entrepreneurial spirit in people	Identify own entrepreneurial spirit and give reasons to be or not to be an entrepreneur	Calculate the costs of the jobs done in class. Do marketing and sales of the product.

NSQF- Multi Skill Technician- Level 4 -Class 12th Curriculum					
Unit Code	**Unit Title**	**Learning Outcome**	**Knowledge Evaluation**	**Performance Evaluation**	**Teaching and Training Method**
L4-MST-GE-1	**Maintenance and organization of workshop**	Demonstrate the knowledge of maintenance and organization of workshop	Describe the importance of cleanliness of workshop - Describe the importance of maintaining and organizing tools and equipment - Describe the importance of 5S and kaizen in organizing and managing a workshop	Demonstrate cleanliness and organization of tools and equipments in the workshop	Practical demonstration on maintenance and organization of workshop - Daily practice of organization of the workshop
L4-MST-GE-2	**Surface Preparation**	Inspect and check the fabrication materials and their preparation	Describe: - concept of a heat number, its significance and use - how to identify distortions and methods of measuring distortion - organizational procedures relating to inspection of incoming materials - different load lifting apparatus like slings, hooks, belts, chains etc. and their area of applications - different types of impurities - different procedures for cleaning the surface of the materials - .different procedures for scalloping and drilling the materials	Demonstrate knowledge of - ensure that material shifting is done safely and following standard practices - inspect the surface of the material to identify the types of impurities on it - oversee the application of procedures like heating, chemical cleaning, scrubbing, water jet etc. as per requirements - . identify the method for scalloping and bevelling such as Punch and Nibble Method, Peeling and Shearing Method or Milling and Routing Method as required - compliance of prepared surface with technical details or instructions	Interactive lecture and practical on surface preparation - Visit to the field to see material shifting
L4-MST-GE-3	**Joint Preparation**	Oversee joint preparation activities	Describe: welding terminologies like arc, flux, slag etc. - different types of sections, plates etc. - different materials used in fabrication - different welding parameters	Identify the components of the assemblies as per drawings or instructions - customize suitable jigs and fixtures - inspect materials before placing on fabrication platform for any distortions - ensure that allowance for shrinkage is maintained for joints that are to be welded - measure the sections to identify the locations fixtures - identify the locations for clamping the sections to the bed in order to restrict their movement - inspect the root gaps of the joints as required - identify the locations for tack welding - ensure that joints for connections of different components of assemblies are complying with the specifications and drawings	Interactive lecture and practical on joint preparation

Unit Code	Unit Title	Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
L4-MST-GE-4	**Repair Fabricated Components**	Describe how to repair fabricated components	Describe different defects arising in the fabricated section - different methods employed for correction of defects - identification and disposal of waste and scrap materials - .basic maintenance of different tools, tackles and equipment	Inspect the proposed component/ assemblies for distortions, change in dimensions or other defects - identify the most suitable method for correcting the defects encountered - estimate the time required for competing the repair activity - oversee the operations like grinding, welding, heating, jacking etc. - ensure that the tools and equipment are correctly used, maintained and stored	Practical and interactive lecture on repairing fabricated components
L4-MST-GE-5	**Structural Steel Assemblies**	Demonstrate knowledge required to erect structural steel assemblies at construction sites.	Describe - basic sketches / schematic working drawing relevant to rigging works - how to interpret lifting plans and schedules - applicable tolerance to respective erection job - sequence of erection works as per proposed work method statement - checks to be carried out to ensure readiness of base of erections - how to check alignment of erected elements using measuring tools and instruments - technique of positioning of elements to their locations within tolerance limits - how to fill up check lists, permits applicable to erection operations	Check and ensure that preparatory works are completed as per work requirement prior to erection - check for survey marks and reference points and carry out necessary measurement to ascertain exact location of erection - check for provisions for bolting, welding, post-tensioning connections - ensure designed area of bearing in the platform or support is available for efficient erection of the components - install shoring, bracing and guying materials - place the steel assemblies/ components to its accurate location - ensure proper alignment of the erected steel assembly/ component by carrying out required measurement - ensure installation of temporary connections - install expansion bolts	Visit a construction site to observe steel assembly Interactive lecture and practical on measurement and installation of steel assembly
L4-MST-GE-6	**Entrepreneurship Development**	Demonstrate the knowledge of entrepreneurship	Describe entrepreneurship, risks and rewards	Demonstrate the knowledge of entrepreneurship, risks and rewards Give examples of entrepreneurship	Interactive lecture on entrepreneurship
	Project Proposal	Demonstrate the knowledge of making a project proposal	Describe steps used to make project proposal	Make a basic project proposal for a given entrepreneurship idea. Try and integrate the jobs performed and community needs	Practical proposal making by meeting local businessmen in engineering.
	Project Execution	Implementation of project proposal	- Prepare a plan to implement the project proposal in real life - Mobilize resources for launch of the project - Launch and make the project proposal operational	Execute the proposed entreprenerial idea	Analysis of the execution and identification of improvements