

# Model Curriculum

## Tractor Mechanic

**SECTOR: AGRICULTURE & ALLIED**  
**SUB-SECTOR: AGRICULTURE CROP PRODUCTION**  
**OCCUPATION: FARM MACHINERY EQUIPMENT  
OPERATION & MAINTENANCE**  
**REF ID: AGR/Q1108, V1.0**  
**NSQF LEVEL: 4**



## Certificate

### CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**AGRICULTURE SKILL COUNCIL OF INDIA**

for the

### MODEL CURRICULUM

Complying to National Occupational Standards of  
Job Role/Qualification Pack: **'Tractor Mechanic'** QP No. **'AGR/Q1108 NSQF Level 4'**

Date of Issuance: February 28<sup>th</sup>, 2017

Valid up to: March 31<sup>st</sup>, 2020

\* Valid up to the next review date of the Qualification Pack



Authorised Signatory  
(Agriculture Skill Council of India)

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# Tractor Mechanic

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Tractor Mechanic”, in the “Agriculture & Allied” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Tractor Mechanic		
Qualification Pack Name & Reference ID.	AGR/Q1108		
Version No.	1.0	Version Update Date	
Pre-requisites to Training	Class 10, Preferably		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> <li>▪ <b>Identify/familiarize with Tractors &amp; Its Applications:</b> Understand the working of different Tractor aggregates like Engine, Clutch, Gear box, Rear axle, Hydraulics, Steering &amp; Electrical systems. Understand the tractor applications &amp; implements used.</li> <li>▪ <b>Carryout Routine maintenance in Tractor:</b> procedure to do periodical checking, servicing and maintenance in Tractor</li> <li>▪ <b>Undertake overhauling and repair of Tractor Engine:</b> Diagnosing and rectifying the defects in Tractor Engine</li> <li>▪ <b>Undertake overhauling and repair of Tractor Transmission, Hydraulics &amp; Electricals:</b> Diagnose and rectify the defects in Tractor transmission, hydraulics ,steering &amp; Electrical systems</li> <li>▪ <b>Practice health &amp; safety at the work place:</b> Well versed with health and safety measures in terms of personal as well as others’ safety and introduction to Dangerous Machinery Regulation Act.</li> </ul>		



		<p>Commercial –Haulage, compressor, alternator etc.</p> <ul style="list-style-type: none"> <li>• Recognize the purpose &amp; types of different Implements/attachments- Cultivator, Harrow, Rotary Tiller, MB Plough, Disc plough, Seed drill ,planter, sprayer, reaper, Tractor mounted harvester, Thresher, baler, 2 Wheel Trailer, 4 Wheel trailer, Tipping trailer, Air Compressor.</li> <li>• Recommend the compatible implement (type &amp; size) as per the Tractor HP, Soil condition &amp; Farmer’s need</li> <li>• Read Operator manual and follow the instructions</li> <li>• Read Decals in the tractor for the safe and proper operation of the tractor.</li> <li>• Properly hitch the implement using Top link &amp; RH Levelling rod</li> <li>• Recommend the required mast height &amp; Top link angle while hitching (Top link should be down ward in front end).</li> <li>• Recommend the correct hitching hole for the top link ( as per the soil condition –Hard/medium or soft)</li> <li>• Operate the tractor &amp; all the controls –Especially Hydraulic levers &amp; PTO lever</li> <li>• Use and recommend the correct hydraulic lever usage to the farmer as per the implement. <ul style="list-style-type: none"> <li>- Draft lever/Draft Mode -Primary tillage implements like MB Plough, Disc plough, Sub-soiler, Cultivator.</li> <li>- Position lever/Position mode – Other implements like Harrow, Rotary tiller, Seed drill, planter, while hitching trailer in toe hook.</li> </ul> </li> <li>• Use and also recommend the correct gear selection, Engine rpm &amp; PTO RPM selection as per the manufacturer recommendation &amp; implement</li> <li>• Recognize the different standards used in General tools – Metric (mm)&amp; Imperial(Inches)</li> <li>• Select &amp; Use the General tools properly – Ring spanner, Open end spanner, Socket (Box spanner),T rod, speed handle, Screw driver, Circlip plier, Nose plier, cutting plier, Mallets &amp; Hammers.</li> <li>• Select &amp; use of special service tools</li> <li>• Use the reconditioning tools –File, Hack Shaw, Taps etc.,</li> <li>• Use the following measuring tools</li> <li>• Steel rule, Measuring tape, Depth gauge, tyre pressure gauge, Feeler gauge, Tyre pressure gauge, Tacho meter, Torque wrench, Dial gauge, Vernier caliper, Micrometer , Dial bore gauge, hydrometer &amp; multimeter.</li> <li>• Use the equipment -machine vice, Air compressor, washing machine ,power cutter, drilling machine ,hydraulic jack, pneumatic tools</li> </ul>	<p>,power cutter, hand drilling machine, hydraulic jack, welding machine &amp; Pneumatic tools</p>
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		<ul style="list-style-type: none"> <li>• Replace Brake oil seal</li> <li>• Replace PTO oil seal</li> <li>• Bleeding of air in the hydraulic system</li> <li>• Find and resolve the Front wheel rim Run out</li> <li>• Inspect the battery using hydrometer</li> <li>• Do Water ballasting in Rear wheels</li> </ul>	
4	<p><b>Carry out overhauling and repair of engine</b></p> <p><b>Theory Duration</b> (hh:mm) 05:00</p> <p><b>Practical Duration</b> (hh:mm) 35:00</p> <p><b>Corresponding NOS Code</b> AGR/N1128</p>	<ul style="list-style-type: none"> <li>• Recognize Types, construction, working principles and parts of tractor Engine</li> <li>• Understand working of a four-stroke diesel engine</li> <li>• Get acquainted with construction, working principle and parts of fuel supply system, air intake and exhaust system, cooling system, lubrication system, Timing gear &amp; valve operating systems.</li> <li>• Diagnose the defects and causes by observing symptoms</li> <li>• Conduct engine compression test to decide on Overhaul</li> <li>• Dismantle the engine with proper Special service tools &amp; hand tools and by following proper sequence</li> <li>• Undertake Visual Inspection of the parts for any abnormality</li> <li>• Inspection of following engine parts using measuring tools:             <ul style="list-style-type: none"> <li>▪ Cylinder Bore Diameter</li> <li>▪ Maximum permissible cylinder liner wear</li> <li>▪ Maximum permissible ovality cylinder</li> <li>▪ Taper of cylinder bore</li> <li>▪ Cylinder liner protrusion</li> <li>▪ Cylinder block surface flatness</li> <li>▪ Skirt to cylinder wall clearance</li> <li>▪ Grading diameter of the piston</li> <li>▪ Protrusion of the piston</li> <li>▪ Ring clearance – Land clearance &amp; End clearance of all rings</li> <li>▪ TAPPETS-Tappet diameter</li> <li>▪ Permissible tappet guiding portion cylindricity</li> <li>▪ Tappet bore</li> <li>▪ CRANK SHAFT-Main journal diameter</li> <li>▪ Big end journal diameter</li> <li>▪ Main journal wear limits</li> <li>▪ Fillet radius</li> <li>▪ Crank shaft rear oil seal journal diameter</li> <li>▪ Crank shaft end float</li> <li>▪ MAIN BEARING BORE MEASUREMENT:</li> <li>▪ Main bearing shell inside diameter</li> <li>▪ Main bearing working clearance</li> <li>▪ Main bearing wear limit</li> <li>▪ Run-out of rear main oil seal</li> <li>▪ Run-out of fly wheel</li> <li>▪ CAM SHAFT:</li> </ul> </li> </ul>	<p>In Class room - Laptop, white board, marker, projector, video films &amp; Presentations</p> <p>In Workshop :</p> <p>Tractor, Engines with stands, General tools set, Special service tools set, Measuring tools set, Service manual.</p> <p>Equipment like Water Washing unit, Greasing gun, Air compressor, Hydraulic or mechanical jack</p>





		<ul style="list-style-type: none"> <li>• DILUTION - It is mixing of diesel and engine oil. Diesel is noticed to be in sump and lub oil appear to be thinner</li> <li>• Mixing - Water mixing with oil ,Oil mixing with water, Lub oil is noticed in radiator</li> <li>• Knocking sound – Mechanical or due to Misfiring</li> <li>• MISFIRING- firing does not take place at the right time</li> </ul>	
5	<p><b>Carry out overhauling and repair of transmission, hydraulic and tractor electrical systems</b></p> <p><b>Theory Duration</b> (hh:mm) 10:00</p> <p><b>Practical Duration</b> (hh:mm) 60:00</p> <p><b>Corresponding NOS Code</b> AGR/N1129</p>	<ul style="list-style-type: none"> <li>• Recognize Types, construction, working principles of Tractor clutch -Single, dual &amp; Independent clutch</li> <li>• Separate the tractor unit using splitting rail to examine clutch assembly</li> <li>• Inspect the clutch release lever height and Release bearings</li> <li>• Dismantle the clutch assembly from fly wheel and asses the Fly wheel, Clutch disc, pressure plate, Clutch spring &amp; cover assembly for wear limit and to check for abnormality</li> <li>• Assemble the clutch unit with correct settings using general &amp; special service tools</li> <li>• Trouble shoot the clutch for following complaints:             <ul style="list-style-type: none"> <li>▪ Clutch Slippage</li> <li>▪ Clutch pedal is hard to operate</li> <li>▪ Clutch is noisy</li> <li>▪ Clutch vibrates/Judder</li> </ul> </li> <li>• Gear box - Recognize Types, construction, working principles of Gearbox – Sliding mesh, constant mesh &amp; Synchromesh /8+2 speed, 8+4 speed, 9+3 speed etc.,</li> <li>• Understand gear ratio and it's importance wrt speed and torque of the tractor</li> <li>• Explain the power flow in different gears</li> <li>• Diagnose the gear box and taking the decision on partial or complete dismantling</li> <li>• Inspect the shaft, gears, bearings, seals for any abnormality – Endplay, backlash, damage, wear etc.,</li> <li>• Take corrective actions by repairing or replacing the parts</li> <li>• Assemble the Gear box with correct settings and sequence using General &amp; special service tools</li> <li>• Trouble shoot the Gearbox for following complaints:             <ul style="list-style-type: none"> <li>▪ Hard shifting</li> <li>▪ Slips out of gear</li> <li>▪ Repeated gear Failure</li> <li>▪ Noise in gear box</li> <li>▪ Loss of drive</li> <li>▪ Double gear engagement</li> </ul> </li> </ul>	<p>In Class room - Laptop, white board, marker, projector , video films &amp; Presentations</p> <p>In Workshop :</p> <p>Tractor, Tractor aggregates with stands</p> <ol style="list-style-type: none"> <li>1.Clutch –Single, Dual &amp; Independent,</li> <li>2.Gear box,</li> <li>3.Rear axle,</li> <li>4.Hydraulics,</li> <li>5.Steering –Mechanical &amp; power steering units,</li> <li>6.Hydraulic power lift unit</li> </ol> <p>Service manual or Training handout for reference</p> <p>General tools set, Special service tools set, Measuring tools set</p> <p>Equipment mechanical jack, Tractor splitting rail, hydraulic pressure gauge, Jib crane</p>



		<ul style="list-style-type: none"> <li>• Trouble shoot the hydraulics for the following complaints: <ul style="list-style-type: none"> <li>▪ Failure to Lift in all conditions</li> <li>▪ Failure to Lift under Load</li> <li>▪ Excessive corrections in the Raised or Transport position</li> <li>▪ Hydraulic power lift fails to maintain the implement working depth as required, excessive or insufficient working depth</li> <li>▪ The hydraulic power lift fails to maintain the transport position</li> <li>▪ Too high oil temperature</li> <li>▪ Hydraulic stuck in either lower or upper position</li> </ul> </li> <li>• Recognize Types, construction, working principles of Steering –Mechanical steering –Recirculating ball type &amp; Worm and roller type; Power steering –hydrostatic steering</li> <li>• Dismantle the mechanical and power steering parts</li> <li>• Inspect the parts for any abnormality –wear, damage etc.,</li> <li>• Assemble the Mechanical &amp; Power steering parts with correct sequence &amp; settings using general &amp; special service tools</li> <li>• Recognize Types, construction, working principles of Front axle – 2 Wheel drive front axle (Non live axle) &amp; 4 wheel drive front axle</li> <li>• Dismantle the 2wd front axle &amp; 4 WD front axle</li> <li>• Inspect the parts for any abnormality –wear, damage etc.,</li> <li>• Trouble shoot the Steering &amp; Front axle for following complaints <ul style="list-style-type: none"> <li>▪ Steering Hard</li> <li>▪ Steering wobbling</li> <li>▪ Tractor pulling on one side</li> <li>▪ Noise, leakage, loss of drive from 4WD front axle</li> </ul> </li> <li>• Recognize different electrical parts &amp; its working principle– Alternator, Starting motor, Fuses, Battery, Lights, Switches &amp; wiring harness</li> <li>• Do Basic trouble shooting of electrical: <ul style="list-style-type: none"> <li>▪ Battery not charging</li> <li>▪ Gauges, switches not functioning</li> <li>▪ Continuity of wiring harness</li> <li>▪ Starter motor doesn't crank or insufficient cranking</li> <li>▪ Checking the fuses</li> <li>▪ Checking &amp; Charging the battery</li> </ul> </li> </ul>	
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6	<p><b>Carry out assembly of repaired and serviced parts</b></p> <p><b>Theory Duration</b> (hh:mm) 05:00</p> <p><b>Practical Duration</b> (hh:mm) 10:00</p> <p><b>Corresponding NOS Code</b> AGR/N1130</p>	<ul style="list-style-type: none"> <li>• carry out precise cleaning of fast moving parts/shafts and bearings</li> <li>• carry out lubrication of parts where necessary</li> <li>• follow the reverse sequence as in dismantling</li> <li>• assemble parts in reverse sequence of dismantling</li> <li>• check for any leakages and tighten loose parts if any is detected</li> <li>• Carry out the pre-start check in the tractor &amp; aggregates</li> <li>• Start the engine and observe functioning of all aggregates for a certain period of time</li> </ul>	<p>General service tool set, Special service tools set, Washing machine, Diesel, Grease.</p>
7	<p><b>Maintain Health &amp; Safety at the work place</b></p> <p><b>Theory Duration</b> (hh:mm) 10:00</p> <p><b>Practical Duration</b> (hh:mm) 10:00</p> <p><b>Corresponding NOS Code</b> AGR/N9903</p>	<ul style="list-style-type: none"> <li>• Maintain a clean &amp; efficient workplace</li> <li>• Get acquainted with Dangerous Machinery Regulation Act</li> <li>• Render appropriate emergency procedures</li> <li>• Report to appropriate person on time.</li> <li>• Practice general safety and first aid</li> </ul>	<p>Laptop, white board, marker, projector, , Personal protective equipment Like:          Helmet / head gear, Cotton / woollen safety gloves, Safety boots,          Safety Harness;          First Aid Kit: Bandages, Adhesive bandages, Betadine Solution / ointment, Pain relief spray / ointment, Antiseptic liquid;          Phone directory, Search lights, fire extinguisher</p>
	<p><b>Total Duration:</b></p> <p><b>Theory Duration</b> (hh:mm) <b>50:00</b></p> <p><b>Practical Duration</b> (hh:mm) <b>170:00</b></p>	<p><b>Unique Equipment Required:</b>          Tractors, Tractor aggregates with stands – Engine, clutch, Gear box, Rear axle, Hydraulic power lift, steering (mechanical &amp; power steering), Front axle (2WD &amp; 4WD), Cultivator, Harrow, Rotavator, MB Plough &amp; Disc plough.</p>	

Grand Total Course Duration: **220 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by [Agriculture Skill Council of India](#))*

## Trainer Prerequisites for Job role: “Tractor Mechanic” mapped to Qualification Pack: “AGR/Q1108, v1.0”

Sr. No.	Area	Details
1	<b>Description</b>	Trainer is responsible for educating the trainees – Tractor maintenance & repair, Function of different aggregates of tractor, tractor usage, Safety & hygiene at the workplace
2	<b>Personal Attributes</b>	Trainer should be Subject Matter Expert. He/ she should have good communication, leadership, observation and practical oriented skills.
3	<b>Minimum Educational Qualifications</b>	Diploma/ITI in Agriculture /Mechanical/Automobile engineering
4a	<b>Domain Certification</b>	Certified for Job Role: “Tractor Mechanic” mapped to QP: “AGR/Q1108, v1.0”. Minimum accepted score is 80%.
4b	<b>Platform Certification</b>	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted % as per respective SSC guidelines is 80%.
5	<b>Experience</b>	<ul style="list-style-type: none"> <li>• M. Tech (Ag. Engg/Mech/Auto Engg./ Farm Mechanization)</li> <li>• B. Tech (Ag. Engg/Mech/Auto Engg./ Farm Mechanization) with 1 Year of total work experience out of which 6 months of relevant experience</li> <li>• B Sc Agriculture with 2 years of relevant work experience</li> <li>• Diploma (Ag. Engg/Mech/Auto Engg.) with 3 Years relevant experience</li> <li>• Diploma in Agriculture with 5 years of relevant work experience</li> <li>• ITI/ Vocational pass out tractor mechanic/ Agricultural machinery/Mechanical/MMV/Diesel mechanic with 4 years’ experience in relevant field</li> </ul>



Assessment outcomes	Assessment criteria	Marks Allocation			
		Total Marks	Out Of	Theory	Skills Practical
1. AGR/N1126 Prepare for carrying out tractor repair and maintenance	PC1. identify types of tractor, their components and agricultural/commercial applications		9	3	6
	PC2. identify, understand and monitor working of:		10	3	7
	• types of clutches ( single, dual and independent) and actuation mechanisms				
	• working and types of gear box				
	• chassis				
	• IC engine, lubrication, cooling system, air and exhaust system				
	• fuel supply and transmission systems				
	• front and rear axle				
	• steering systems				
	• wheel and tyres				
	• brakes ( both dry and oil immersed)				
	• tractor electrical system ( charging, starting, wiring harness, instrument cluster,etc)				
	• types of hydraulics system				
	PC3. carry out field trial measurement and check fuel consumption, coverage and depth		9	3	6
PC4. identify the different applications of a tractor – agricultural and non-agricultural		9	3	6	
PC5. identify and study different agriculture implements		9	3	6	
• seed bed preparation - tillage implements –mb plow,disc plow,cultivator etc.,					
• sowing implements – seed drill, planter etc.,					
• crop care implements – sparyers,irrigation pumps,ridger etc.,					
• harvesting implements/quipments – reaper,harvertor etc.,					
• post harvesting implements – thresher,baler etc.,					
PC6. select implement as per tractor by checking tractor versus implement compatibility		9	2	7	















	in accordance with workplace procedures.				
			100	30	70
<b>Total</b>		<b>600</b>	<b>600</b>	<b>180</b>	<b>420</b>
<b>Percentage Weightage:</b>				<b>30%</b>	<b>70%</b>
<b>Minimum Pass% to qualify (aggregate):</b>				<b>70%</b>	