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HEAVY MACHINE OPERATOR



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CBT CURRICULUM

National Vocational Certificate Level 3

Version 1 - November, 2019



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Table of Contents

1. Introduction	1
1.2 Overall objectives of training program:	2
1.3 Competencies to be gained after completion of course:	2
The detail of the competency standards included in this qualification are given below:	2
1.4 Job opportunities:	2
1.5 Entry level of trainees:	3
1.6 Minimum qualification for teachers:	3
1.7. Recommended trainer/trainee ratio	3
1.8 Medium of instruction:	3
1.9 Duration of the course:	4
1.10 Sequence of the modules	4
2. Overview of the Curriculum for Heavy Machine Operator:	5
Module F: Transport Machines	8
Module G: Operate Bulldozer	11
Module H: Operate wheel Loader	15
4. List of Tools and Equipment	18
5. Specification of Machines & Consumable	20
6. Members of the Curriculum Development Committee	26



1. Introduction

In order to build the capacity of technical and vocational training institutes in Pakistan through provision of demand driven competency-based trainings in construction sector the NAVTTTC, and TEVT Sector Support Program (TSSP) have joined hands together to develop qualifications for construction sector. These qualifications will not only build the capacity of existing workers of this sector but also support the youth to acquire skills best fit for this sector. The benefits and impact of development of these qualifications will be on both demand and supply side.

Based upon this demand of industry these competency-based qualifications for Heavy Machine Operator are developed under National Vocational Qualification Framework (NVQF) (Level 1 to 4). The qualifications mainly cover competencies along with related knowledge and professional skills which are essential for getting a job or self-employed.

The qualifications are also in line with the vision of Pakistan's National Skills Strategy (NSS), National TVET Policy and NVQF. This provides policy directions, support and an enabling environment to the public and private sectors to impart training for skills development to enhance social and economic profile. NAVTTTC has approved the nomination of a Qualification Development Committee (QDC). The QDC consists of experts from the relevant industries from different geographical locations across Pakistan and academicians who were consulted during the development process to ensure input and ownership of all the stakeholders. The National Competency Standards could be used as a referral document for the development of curricula to be used by training institutions.

1.1 Purpose of the training program:

The purpose of the training is to produce skilled manpower for improving the existing capacity of the construction sector. This training will equip trainees with the required skills to operate Heavy Machines. It will enable the participants to meet the challenges in the field of construction industry. Further, to improve the skill level of the Operators and prepare them for the construction industry to meet the market competition nationally and internationally. The core purpose of this qualification is to produce employable Heavy Machine Operators who could operate Heavy Machines according to national and international standards. In addition, this qualification will prepare the youth to find employment in the construction sector.



1.2 Overall objectives of training program:

The Heavy Machine Operator qualification level 1-4 consists of theoretical and practical details required to learn operational techniques of Bulldozer, Wheel Loader, Excavator and Grader machines.

1.3 Competencies to be gained after completion of course:

The detail of the competency standards included in this qualification are given below:

National Vocational Certificate level 3, Heavy Machine Operator in (Construction Sector)

1. Apply Work Health and Safety Practices (WHS)
2. Identify and Implement Workplace Policy and Procedures
3. Communicate at Workplace
4. Perform Computer Application Skills
5. Manage Personal Finances
6. Transport Machines
7. Operate Bulldozer
8. Operate wheel Loader

1.4 Job opportunities:

Heavy Machine Operators (HMO) are in demand across the country and abroad. Their services are required for everything from road and bridge construction, bulldozing, loading and grading, to excavating and much, much more. This is a good career opportunity for a reliable and responsible individual with a strong work ethic. Heavy Machine Operators not only work on regular construction building jobs, but also on infrastructure projects (roads, bridges, canals, dams, railway lines and ports, otherwise called non-building construction), and in mining and timber operations.



1.5 Entry level of trainees:

The entry level for National Vocational Certificate level 3, “Heavy Machine Operator” in (Construction Sector) are given below:

Title	Entry requirements
National Vocational Certificate level 3, “Heavy Machine Operator” in (Construction Sector)	Entry for assessment for this qualification is open. However, entry into formal training institute for this qualification is person having National Vocational Certificate level 2, in (Construction Sector) “Heavy Machine Operator” or middle with hands on experience.

1.6 Minimum qualification for teachers:

- Should have completed intermediate and equivalent qualifications.
- Must be a holder of G I certificate in relevant field or DAE in Civil Technology.
- Must be able to communicate effectively both orally and in written form.
- Must have at least two 2 years teaching experience.

1.7. Recommended trainer/trainee ratio

Generally, Trainer/Trainee ratio for CBT courses is 1:20

1.8 Medium of instruction:

English, Urdu and local language.



1.9 Duration of the course:

The proposed curriculum is composed of **08** modules that will be covered in **380** learning hours. It is proposed that the course may be delivered in **Three Months** period.

The distribution of contact hours is given below:

Total	-	380 hours.
Theory	-	76 hours (20%)
Practical	-	304 hours (80%)

1.10 Sequence of the modules

Following is the structure of the course:

NVQF Level	Module #	Title	Category	Theory (hours)	Practical (hours)	Total (hour)	Credits hours	Total Credit Hours
3	A	Apply Work Health and Safety Practices (WHS)	Generic	04	16	20	2	38
	B	Identify and Implement Workplace Policy and Procedures	Generic	02	08	10	1	
	C	Communicate at Workplace	Generic	02	08	10	1	
	D	Perform Computer Application Skills	Generic	02	08	10	1	
	E	Manage Personal Finances	Generic	02	08	10	1	
	F	Transport Machines	Technical	16	64	80	8	
	G	Operate Bulldozer	Technical	28	112	140	14	
	H	Operate wheel Loader	Technical	20	80	100	10	
TOTAL				76	304	380	38	
Percentage.				20%	80%			



2. Overview of the Curriculum for Heavy Machine Operator:

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of Modules
<p>Module A: Apply Work Health and Safety Practices (WHS)</p> <p>Aim: This unit describes the skills to work with safety and participate in hazard assessment activities, follow emergency procedures and participate OHS practices in process</p>	<p>LU1. Implement safe work practices at work place</p> <p>LU2. Participate in hazard assessment activities at a work place</p> <p>LU3. Follow emergency procedures at workplace</p> <p>LU4. Participate in OHS consultative processes</p>	04	16	20
<p>Module B: Identify and Implement Workplace Policy and Procedures</p> <p>Aim: This unit describes the skills and knowledge required to develop and implement a workplace policy & procedures and to modify the policy to suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.</p>	<p>LU1. Identify workplace policy & procedures</p> <p>LU2. Implement workplace policy & procedures</p> <p>LU3. Communicate workplace policy & procedures</p> <p>LU4. Review the implementation of workplace policy & procedures</p>	02	08	10



<p>Module C: Communicate at Workplace</p> <p>Aim: This unit describes the performance outcomes, skills and knowledge required to develop communication skills at workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision.</p>	<p>LU-1: Communicate within the organization LU-2: Communicate outside the organization LU-3: Communicate effectively in workgroup LU-4: Communicate in writing</p>	<p>02</p>	<p>08</p>	<p>10</p>
<p>Module D:</p> <p>Perform Computer Application Skills</p> <p>Aim: This unit describes the skills and knowledge required to use spreadsheet applications, prepare in page documents, develop familiarity with Word, Excel, Access, PowerPoint, email, and computer graphics basics.</p> <p>It applies to individuals who perform a range of routine tasks in the workplace using a fundamental knowledge of spreadsheets, Microsoft office and computer graphics in under direct supervision or with limited responsibility.</p>	<p>LU1. Prepare In-page documents as per required information LU2. Prepare Spreadsheets as per required information LU3. Use MS Office as per required information LU4. Perform computer graphics in basic applications LU5. Create Email account for communications</p>	<p>02</p>	<p>08</p>	<p>10</p>
<p>Module E: Manage Personal Finances</p> <p>Aim: This unit of competency describes the outcomes required to manage develop, implement and monitor a personal budget in order to plan regular savings and manage debt effectively.</p>	<p>LU1. Develop a personal budget LU2. Develop long term personal budget LU3. Identify ways to maximize future finances</p>	<p>02</p>	<p>08</p>	<p>10</p>



<p>Module F: Transport Machines Aim: This module covers the skills and knowledge required to Prepare to load machine and attachments, Load or assist with loading machine and attachments, Assist with securing machine and attachments, Unload or assist with unloading machine and attachments, Prepare rubber-tired machine for road travel and Drive rubber tired machine on public roads.</p>	<p>LU-1: Prepare to load machine and attachments LU-2: Loading machine and attachments LU-3: Securing machine and attachments LU-4: Unload or assist with unloading machine and attachments LU-5: Prepare rubber-tired machine for road travel LU-6: Drive rubber-tired machine on public roads</p>	16	64	80
<p>Module G: Operate Bulldozer Aim: This module covers the skills and knowledge required to Operate Controls, Strip and stockpile surface materials, Cut and fill material, create slopes, create ditches, spread ballast, Rip dense materials, Clear land and Push scraper.</p>	<p>LU-1: Operate controls LU-2: Strip and stockpile surface materials LU-3: Cut and fill material LU-4: Create slopes LU-5: Create ditches LU-6: Spread ballast LU-7: Rip dense materials LU-8: Clear land LU-9: Push scraper</p>	28	112	140
<p>Module H: Operate Wheel Loader Aim: This module covers the skills and knowledge required to Install attachments, Operate controls, Dig, Carry (tram) & Stockpile materials, Place and spread materials, Backfill trenches , excavate and load rucks</p>	<p>LU-1: Install attachments LU-2: Operate controls LU-3: Dig, carry (tram) & stockpile materials LU-4: Place and spread materials LU-5: Backfill trenches & excavate LU-6: Load trucks</p>	20	80	100
TOTAL		76	304	380

HEAVY MACHINE OPERATOR



Module-F
CBT CURRICULUM
National Vocational Certificate Level 3

Version 1 - November, 2019



Module F: Transport Machines

Objective: This module covers the skills and knowledge required to Prepare to load machine and attachments, Load or assist with loading machine and attachments, Assist with securing machine and attachments, Unload or assist with unloading machine and attachments, Prepare rubber-tired machine for road travel and Drive rubber tired machine on public roads.

Duration: 80 Hours

Theory: 16 Hours

Practice: 64 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Load machine and attachments	<ul style="list-style-type: none"> Assess hazards, such as ground and utility lines Prepare machines and attachments for transport, such as clean tracks or wheels or disassemble for transport 	<ul style="list-style-type: none"> Describe type of hazards to be encountered during loading Describe carrying capacities of transport vehicles Describe road, weather and deck conditions Describe preparation of loading sites (ramp) Describe the methods/equipment of lifting up of attachments on the trailer Describe maintenance to be ensured before loading the machine 	Theory- 03 Hrs. Practical- 10 Hrs. Total- 13 Hrs.	<ul style="list-style-type: none"> Ropes Bulldozer Wheel Loader 	Class Room and Workplace



<p>LU2. Load or assist with loading machine and attachments</p>	<ul style="list-style-type: none"> • Avoid hazards, such as uneven ground and utility lines • Load or assist with loading of machines and attachments • Respond to hand signals 	<ul style="list-style-type: none"> • Describe Loading techniques • Describe Tie-down points. • Describe expected hazards • Describe how to avoid hazards while loading • Describe important signals followed while loading 	<p>Theory- 03 Hrs. Practical- 10 Hrs. Total- 13 Hrs.</p>	<ul style="list-style-type: none"> • Ropes • Bulldozer • Wheel Loader 	<p>Class Room and Workplace</p>
<p>LU3. Securing machine and attachments</p>	<ul style="list-style-type: none"> • Protect equipment from damage, such as cover windshield and exhaust pipe • Secure attachments, such as bucket • Assist transport vehicle driver as required, such as secure machines, attach warning flags and reflectors. 	<ul style="list-style-type: none"> • Describe methods of securing machine, parts and attachments • Describe accessories/ attachments to be used for securing • Describe communication signals between trailer driver and Operator 	<p>Theory- 03 Hrs. Practical- 10 Hrs. Total- 13 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer • Wheel Loader 	<p>Class Room and Workplace</p>
<p>LU4. Unload machine and attachments</p>	<ul style="list-style-type: none"> • Assess and adjust to hazards, such as overhead obstructions, narrow landing areas • Unload or assist with unloading machines and attachments. 	<ul style="list-style-type: none"> • Describe unloading techniques • Describe hazards to be encountered during unloading • Describe methods of unloading • Describe special characteristics of the 	<p>Theory- 02 Hrs. Practical- 12 Hrs. Total- 14 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer • Wheel Loader 	<p>Class Room and Workshop</p>



	<ul style="list-style-type: none"> • Assist transport vehicle driver as required, such as remove tie-down, warning flags and reflectors • Clean equipment. 	unloading sites			
LU5. Prepare rubber-tired machine for road travel	<ul style="list-style-type: none"> • Secure attachments in proper position for road travel • Complete inspection, such as check brakes, steering, lights, tires and back-up warnings • Clean equipment 	<ul style="list-style-type: none"> • Explain limitations on public roads, such as speed, overhead restrictions and blind spots • Explain route and destination 	Theory- 02 Hrs. Practical- 10 Hrs. Total- 12 Hrs.	<ul style="list-style-type: none"> • Bulldozer • Wheel Loader • Cloth cleaning 	for Class Room and Workplace
LU6. Drive rubber-tired machine on public roads	<ul style="list-style-type: none"> • Comply with legislation, such as traffic laws • Possess appropriate and valid driver license Read maps • Follow route to destination • Adjust to road and weather conditions, such as adjust speed. • Recognize and avoid potential hazards 	<ul style="list-style-type: none"> • Define applicable legislation, such as traffic laws • Describe reading of road map and following of routes to destination • Describe road conditions and speed limits • Describe travel limitations and hazards 	Theory- 03 Hrs. Practical- 12 Hrs. Total- 15 Hrs.	<ul style="list-style-type: none"> • Bulldozer • Wheel Loader • Road Map 	Class Room and Workshop

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Module-G
CBT CURRICULUM
National Vocational Certificate Level 3

Version 1 - November, 2019



Module G: Operate Bulldozer

Objective: This module covers the skills and knowledge required to Operate Controls, Strip and stockpile surface materials, Cut and fill material, Create slopes, Create ditches, Spread ballast, Rip dense materials, Clear land and Push scraper.

Duration: 140 Hours

Theory: 28 Hours

Practice: 112 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU-1: Bulldozer controls	<ul style="list-style-type: none"> Operate controls smoothly and safely Operate different operating controls simultaneously as required React to changing conditions/situations 	<ul style="list-style-type: none"> Define basic operating functions Describe different operating controls and their functions Describe different situations which an operator can encounter under different conditions Describe smooth and safe handling of controls 	Theory- 04 Hrs. Practical- 08 Hrs. Total- 12 Hrs.	<ul style="list-style-type: none"> Bulldozer 	Class Room and Workshop
LU2. Strip and stockpile surface materials	<ul style="list-style-type: none"> Distinguish waste layer from structural layer Remove waste layer Move full blade load with optimum capacity Clean up windrows and any 	<ul style="list-style-type: none"> Describe types of soils and their characteristics Describe attachments to be used for different types of soil Describe techniques for clearing and scrubbing 	Theory- 03 Hrs. Practical- 08 Hrs. Total- 11 Hrs.	<ul style="list-style-type: none"> Bulldozer 	Class Room and Workplace



	<ul style="list-style-type: none"> remaining waste material • Stockpile waste materials. 	<ul style="list-style-type: none"> • Describe methods for spreading / stock pile of materials 			
<p>LU3.</p> <p>Cut and fill material</p>	<ul style="list-style-type: none"> • Estimate the height of cuts and fills • Apply grade checking instruments • Cut “humps” and create enough loose material to fill blade before pushing to haulage distance • Push material to fill depressions • Match blade load with available power and traction • Perform rough leveling of ground • Eliminate windrows and clean up 	<ul style="list-style-type: none"> • Define capacities & capabilities of Machine • Describe method for estimation of cuts and fill • Describe grade checking instruments • Describe techniques how to cut humps and fill depressions • Describe method of rough leveling of ground 	<p>Theory- 3 Hrs. Practical- 34 Hrs. Total- 37 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer • Heap of soil 	<p>Class Room and Workplace</p>
<p>LU4.</p> <p>Create slopes</p>	<ul style="list-style-type: none"> • Interpret stakes/specifications • Apply grade checking instruments • Cut the slope next to each row of stakes • Perform heavy cuts down hill • Match blade load with available power and traction 	<ul style="list-style-type: none"> • Describe stakes/specifications • Describe grade checking instruments • Describe methods of making slope in different conditions • Describe safety measures to be kept in consideration while working on slopes • Describe problems faced while making slope 	<p>Theory- 03 Hrs. Practical- 14 Hrs. Total- 17 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer 	<p>Class Room and Workplace</p>



	<ul style="list-style-type: none"> • Apply safe practices regarding stability issues • Grade area to a given slope and eliminate windrows and clean up 				
<p>LU5.</p> <p>Create ditches</p>	<ul style="list-style-type: none"> • Identify the required profile using grade checking instrument • Create ditch of specified dimensions • Stockpile or blend in material • Level the ground roughly, eliminate windrows and clean up 	<ul style="list-style-type: none"> • Describe types/shapes of ditches • Describe special attachments to be used for making ditch • Describe problems faced while making ditch • Describe ditches to be made under different environment/conditions • Describe safety measures to be kept in mind while making ditch 	<p>Theory- 03 Hrs. Practical- 14 Hrs. Total- 17 Hrs.</p>	<ul style="list-style-type: none"> • Bulldoze 	<p>Class Room and Workplace</p>
<p>LU6.</p> <p>Spread ballast</p>	<ul style="list-style-type: none"> • Identify dumping location and pattern • Match blade load with available power and traction • Spread material • Grade to requisite level 	<ul style="list-style-type: none"> • Describe types of ballast • Describe methods of spreading of ballast • Describe blade load versus power and traction in different soils conditions • Describe different levels to be maintained during spreading of ballast 	<p>Theory- 03 Hrs. Practical- 06 Hrs. Total- 09 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer • Ballast 	<p>Class Room and Workplace</p>



<p>LU7. Rip dense materials</p>	<ul style="list-style-type: none"> Rip hard strata Balance ripper load depth & load to available power and traction 	<ul style="list-style-type: none"> Describe ripper and its functions Describe techniques/methods to rip dense materials or hard strata 	<p>Theory- 03 Hrs. Practical- 14 Hrs. Total- 17 Hrs.</p>	<ul style="list-style-type: none"> Bulldozer 	<p>Class Room and Workplace</p>
<p>LU8. Clear land</p>	<ul style="list-style-type: none"> Work around obstructions and hazards Clear land in accordance with job specifications 	<ul style="list-style-type: none"> Describe types of obstructions and hazards Describe how to work around obstructions and hazards Describe precautions to be ensured while working around obstructions and hazards 	<p>Theory- 03 Hrs. Practical- 08 Hrs. Total- 11 Hrs.</p>	<ul style="list-style-type: none"> Bulldozer 	<p>Class Room and Workplace</p>
<p>LU9. Push scraper</p>	<ul style="list-style-type: none"> Balance engine power to load and traction Minimize wear & tear impact, track spinning Assess grade and level Remove obstacles and rocks 	<ul style="list-style-type: none"> Describe scrapper and techniques to push it Describe problems faced during pushing of scrapper Describe selection of engine power rating to the desired load and traction 	<p>Theory- 03 Hrs. Practical- 06 Hrs. Total- 09 Hrs.</p>	<ul style="list-style-type: none"> Bulldozer Scraper 	<p>Class Room and Workplace</p>

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Module-H
CBT CURRICULUM
National Vocational Certificate Level 3

Version 1 - November, 2019



Module H: Operate Wheel Loader

Objective: This module covers the skills and knowledge required to Install attachments, Operate controls, Dig, Carry (tram) & Stockpile materials, Place and spread materials, Backfill trenches , excavate and load rucks

Duration: 100 Hours

Theory: 20 Hours

Practice: 80 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Attachments Installation	<ul style="list-style-type: none"> Select appropriate tools Position equipment and attachment for installation Respond to hand signals Install attachments safely 	<ul style="list-style-type: none"> Describe attachments and purpose. Describe tools for installation of attachments Describe procedure for installation of attachments 	Theory- 04 Hrs. Practical- 12 Hrs. Total- 16 Hrs.	<ul style="list-style-type: none"> Bulldozer Dozer attachments 	Class Room and workplace
LU2. Wheel Loader Controls	<ul style="list-style-type: none"> Operate controls smoothly and safely Operate different operating controls simultaneously as required React changing conditions/situations 	<ul style="list-style-type: none"> Define basic operating function. Describe operating controls and their functions Describe situations which an operator can encounter under different conditions Describe smooth and safe handling of controls Describe adjustment technique of bucket 	Theory- 04 Hrs. Practical- 12 Hrs. Total- 16 Hrs.	<ul style="list-style-type: none"> Bulldozer 	Class Room and workplace



<p>LU3. Dig, Carry (tram) & Stockpile Materials</p>	<ul style="list-style-type: none"> • Fill bucket in loose material • Carry loose material to a short distance • Place material in a stockpile • Maintain smooth pit floor/running surface 	<ul style="list-style-type: none"> • Describe types of materials • Describe technique to dig, carry and stockpile materials • Describe balancing of backload with bucket load under different conditions • Describe techniques of safe carrying and dumping of materials • Describe economical use of machine (with respect to haul distance) • Describe capacities & capabilities of machine. 	<p>Theory- 04 Hrs. Practical- 18 Hrs. Total- 22 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer • Soil 	<p>Class Room and Workplace</p>
<p>LU4. Place and Spread materials</p>	<ul style="list-style-type: none"> • Load bucket quickly and fully in loose material • Carry loose material to a short distance • Spread material • Maintain smooth pit floor/running surface 	<ul style="list-style-type: none"> • Describe load carrying capacity of the bucket • Describe procedure of loading the bucket efficiently • Describe safety precautions while carrying materials to a short distance 	<p>Theory- 03 Hrs. Practical- 12 Hrs. Total- 15 Hrs.</p>	<ul style="list-style-type: none"> • Bulldozer • Soil 	<p>Class Room and Workplace</p>



<p>LU5. Backfill Trenches & Excavate</p>	<ul style="list-style-type: none"> Place backfill material Manage piles of imported aggregates to minimize waste Spread materials at work area Excavate soft soil strata 	<ul style="list-style-type: none"> Describe the techniques/methods of back filling Describe safety precautions while backfilling 	<p>Theory- 02 Hrs. Practical- 12 Hrs. Total- 14 Hrs.</p>	<ul style="list-style-type: none"> Bulldozer 	<p>Class Room and Workplace</p>
<p>LU6. Load Trucks</p>	<ul style="list-style-type: none"> Arrange the loading site Maintain the pit floor, level, smooth and clear of obstructions Load smoothly and gently Communicate with signaler Load truck as per capacity 	<ul style="list-style-type: none"> Describe different site conditions for loading trucks Describe methods/techniques of loading trucks Describe coordination/communication to be done between truck driver and Operator Describe capacities of different dump trucks 	<p>Theory- 03 Hrs. Practical- 14 Hrs. Total- 17 Hrs.</p>	<ul style="list-style-type: none"> Bulldozer Dump truck 	<p>Class Room and Workplace</p>



4. List of Tools and Equipment

(FOR A CLASS OF 25 STUDENTS)

Name of Trade		Heavy Machine Operator	
Duration of Course		Months	
Sr. #	Description	Quantity	
1.	Steel-Toed Footwear,	30	
2.	Hard Hat,	30	
3.	Safety Gloves,	30	
4.	Appropriate Safety Glasses,	30	
5.	High Visibility Vest,	30	
6.	Hearing Protection,	30	
7.	Breathing Apparatus,	04	
8.	De-Electric Boots and Gloves for Protection from Electrical Shock.	10	
9.	Fall Protection, And Other Applicable PPE	30	
10.	Site Emergency Response Plan,	30	
11.	Fire Extinguishers,	04	
12.	Fire Blankets,	04	
13.	Respirators, Masks,	30	
14.	Fire Hoses,	08	
15.	First Aid Kits, Stretchers, WHMIS Book, And Other Related Tools and Gear	04 sets	
16.	Basic Tools, Such as Grease Gun, Air Pump Etc.	25 sets	
17.	Hammer,	05	each size
18.	Screwdrivers,	05	each size
19.	Pliers,	05	each



		size
20.	Self-Locking Pliers,	05 each size
21.	Adjustable Wrench,	05 each size
22.	Assorted Other Wrenches, Measuring Tape(100m)	05 each size
23.	Basic Supplies, Such as Grease, Oil, Window Cleaner, Rags, Ice Scraper, Whisk Broom.	05 each
24.	Color-code cards, utility documentation. Logbooks Service Manuals, OHS Regulation,	10 sets
25.	MACHINES	
26	A. Bulldozer. Attachments: - 1. Blades. 2. Ripper	01 each
27	B. Excavator (Wheel & Crawler). Attachments: - 1. Buckets. 2. Grappler. 3. Coupler. 4. Thumbs. 5. Pulverize. 6. Lifter. 7. Rakes. 8. Chuck 9. Blades. 10. Ripper. 11. Forks. 12. Adapter. 13. Hammer. 14. Auger. 15. Compactor. 16. Stump Harvester. 17. Driller	01 each
28	C. Motor Grader. Attachments: - 1. Angle Blade. 2. Lift Group. 3. One-way Plow. 4. Snow Gate. 5. Snow Wing. 6. Straight Blade, 7. UV Angle Blade. 8. V-Plow	01 each
29	D. Wheel Loader. Attachments: - 1. Coupler. 2. Dozer Blade. 3. Boom Poles. 4. Bucket. 5. Fork. 6. Grappler. 7. Snow Blade, 8. Trailer Hitches. 9. Rotary Sweeper. 10. Broadcast Spreader	01 each



5. Specification of Machines & Consumable

A. Bulldozer Specification & Consumable

S.#	Length (mm)	D50A-17	D65A-8	D85-18/D85A	D155A-1
1.	Overall Length	4765	5135	5750	6880
2.	Overall Width	2145	3970	3725	4130
3.	Overall Height	2900	3020	3395	3720
4.	Overall Op Weight	12240	15890	23510	33690
5.	Ground Clearance	315	400	400	500
6.	Track Shoes Width	460	460	560	560
7.	Grade Ability (degree)	30	30	30	30
8.	Ground Pressure (kg/cm ²)	0.62	0.67	0.62	0.77
9.	Horse Power	120	165	220	320
10.	Type of Dozer	Angle	Tilt	Tilt	Tilt
11.	Fuel (LT)	250	320	450	660
12.	Engine Oil-SAE 30 (LT)	30	30	43	71
13.	Hydraulic Oil (LT)	87	108	110	164
14.	Transmission Oil (LT)	18	52	122	185
15.	Cooling Water (LT)	52	63	79	165
16.	Steering Oil (LT)	63	70	Nil	Nil
17.	Final Drive Case Oil (LT)	52 (26 each side)	62 (31 each side)	72 (36 each side)	110 (55 each side)



B. Excavator Specification & Consumable.

S#	Specification	PC 120	PC 150	PC 200
1	Bucket Capacity (m ³)	0.50 m ³	0.55 m ³	0.7 m ³
2	Operating Weight (Kg)	12030 kg	14500 kg	18000 kg
3	Overall Length (mm)	7050	8350	9380
4	Overall Width (mm)	2500	2550	2740
5	Overall Height (mm)	2700	2900	2940
6	Swing Speed (rpm)	20	19.6	13
7	Travel Speed (Km/h)	3 km/h	3.2 km/h	3.5k m/h
8	Grade ability (Degree)	25 % to 30%	35%	35%
9	Ground Pressure (Kg/cm ²)	0.45 Kg/cm ²	0.47 Kg/cm ²	0.47 Kg/cm ²
10	Max. Excavation (mm)	3060	5400	6550
11	Max. Stockpile (mm)	4420 mm	5530 mm	6255 mm
12	Max. Stretch (mm)	7050 mm	8440 mm	9850 mm
13	Horsepower (HP)	85.4 HP	86 HP	106 HP
14	Fuel Capacity (LT)	230 LT	280 LT	540 LT
15	Engine Oil (LT)	11 LT	24 LT	24 LT
16	Hydraulic Oil (LT)	100 LT	250 LT	250 LT
17	Swing case Oil (LT)	2.5 LT	7 LT	8 LT
18	Water (Lt)	15.7 LT	24 LT	24 LT
19	Track Chain Pulley	20 to 25 mm	20 to 25 mm	60 to 100 mm
20	Final Drive	Each side	Each side	Each side
		2.5 LTR	2.5 LTR	7.4 LTR



C. Motor Grader Specification & Consumable.

S.#	Detail	MG 200	MG 330	MG 430	GD-605-A3
1.	Heaped Blade Capacity	3.06 m ³	3.9 m ³	1.01 m ³	3.9 m ³
2.	HP (Horse Power)	115 hp	135 hp	155 hp	145 hp
3.	Op/Weight	9885 kg	10920 kg	12220 kg	12870 kg
4.	Fuel	210 ltr	230 ltr	275 ltr	250 ltr
5.	Engine Oil	12 ltr	13 ltr	13 ltr	24 ltr
6.	Hydraulic Oil	70 ltr	67 ltr	67 ltr	60 ltr R/Fel
7.	Transmission	40 ltr	23 ltr	32 ltr	30 ltr
8.	Water	21 ltr	34 ltr	46 ltr	45 ltr
9.	Tire Pressure	2.25	1.8	2.6	2.45kg
10.	Gear Oil/Final Drive	2.5 ltr	3.4 ltr	3.5 ltr	26 CTR
11.	Tandem Oil	48 ltr	73 ltr	85 ltr	72 tr 36X36



D. Wheel Loader Specification & Consumable

S#	Items	WA 450	WA 320	WA 200	966 F cat	928 F cat
1	Horsepower (HP)	237	165	110	220	120
2	Operating Weight (Kg)	19100	13450	92100	20905	11148
3	Bucket Capacity (m ³)	3.5	2.8	1.7	3.8	2
4	Grade ability (Degree)	30	35	33	35	35
5	Speed/Hour	34-38	38	37	48	45
6	Fuel (LT)	330	228	170	304	189
7	Engine Oil (LT)	32	19.5	24	28	20
8	Hydraulic Oil (LT)	230	89	83	205	100
9	Transmission Oil (LT)	61	74	35	59	30
10	Cooling Water (LT)	65	20	38	48	41
11	F/R Axle oil (LT)	120	48	34	47	50
12	Tire Pressure (Kg/cm ²)	2.8	2.5	2.5	2.8	2.5



5. List of Stationary

Sr. #	Description
1.	Handbooks
2.	Design books
3.	Pencils
4.	Rubber
5.	Sharpener
6.	Paper cutter
7.	Scissors
8.	Colours
9.	White charts
10.	Brown sheets
11.	White board markers
12.	Permanent markers
13.	File cover and files



6. Members of the Curriculum Development Committee

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