

**FARM MACHINERY OPERATOR (FMOP)**  
**Core Qualification File Syllabus**

**Details of Theory & Practical Syllabus**

Sl. No	CONTENT	DETAILS	Hrs
<b>1</b>	<b>Apply safe working practices - 8 hrs</b>		
	<b>THEORY</b> - Occupational safety		<b>8</b>
	1.1. Basic safety introduction & Personal protection 1.2. Basic injury prevention & elementary first aid 1.3. Safety sign for Danger, Warning, caution and personal safety message 1.4. Use of Fire extinguishers 1.5. Concept of Standards		
<b>2</b>	<b>Identify different components of tillage, sowing, transplanting, harvesting and threshing implements - 38hrs</b>		
	<b>THEORY</b> - Farm machines and their operation		<b>22</b>
	2.1 Farm Mechanization: Definition, Need for farm mechanization, status of farm mechanization in West Bengal I.2 Tillage system - indigenous plough, mould board plough, disc plough, disc harrow, cultivator, rotatiller, rotavator I.3 Sowing and transplanting – seed drill, planters, seed drill calibration, drum seeder, paddy transplanter, potato planter, multi-crop seeder I.4 Irrigation pumps – components of a pump-set, classification of wells, pumps. Working principle of motor and pumps, selection of pumps, capacity calculation I.5 Harvesting and threshing – principle of crop harvesting, cutting tools, sickles, power reaper, combine harvester		
	<b>PRACTICAL</b> - Identification of farm power and machinery systems		<b>4</b>
	4.1 Familiarization with sources of farm power with their specifications 4.2 Familiarization with operation specific farm machinery and implements with their specifications 4.3 Identification of power capacity of prime movers. 4.4 Specifying of tillage, sowing, harvesting and threshing implements based on with of operation, volume of operation, area coverage and operational speed.		
	<b>PROJECT I- 12 hrs (Any One)</b>		<b>12</b>
	1. Field operation of rotatiller for tilling dry/ wet land with power tiller		
	2. Sowing operation using seed cum fertilizer drill following seed rate calibration.		
<b>3</b>	<b>Identify different components of IC Engine, tractor, power tiller and farm implements - 30 Hrs</b>		
	<b>THEORY</b> - Systems of tractor and power tiller		<b>14</b>
	3.1 Engine – Types, working principle, parts, dismantling and assembling		

	3.2 Fuel supply system – Need for fuel system, components, working 3.3 Cooling system – Importance, types, components, working principle 3.4 Lubrication system – use, types, components 3.5 Power Transmission system – types, components, efficiency, differential, PTO, Drawbar 3.6 Tractor Hydraulic System – Use, Three-point system	
	<b>PRACTICAL</b> - Study of Systems of tractor and power tiller	<b>16</b>
	5.1 Study of working of four stroke engine; 5.2 Study of different components of I.C. Engine 5.3 Exploration of various systems of a tractor viz. fuel, lubrication, cooling, electrical with their working flow chart 5.4 Exploration of various systems of a power tiller viz. fuel, lubrication, cooling, electrical and transmission systems with their working flow chart 5.5 Identification of transmission, hydraulic & final drive system.	
4	<b>Identify different components of control systems of prime movers for hitching of implements and safe driving. – 36 hrs</b>	
	<b>THEORY</b> - Operational Controls and safe driving of prime movers	<b>10</b>
	4.1 Operational control of tractor – steering, clutch, brake, hydraulic levers, gear levers 4.2 Controls of power tiller – steering clutch, handle, rotatilling controls 4.3 Safety rules for driving a tractor - Precautions while driving a tractor 4.4 Checking the Tractor before driving – condition of different systems, tire inflation etc 4.5 Steps for driving a tractor – getting in and out of a tractor, driving procedure 4.6 Fuel saving tips	
	<b>PRACTICAL</b> - Driving of prime movers	<b>14</b>
	(4.1) Controls used while driving a tractor and a power tiller. (4.2) Components and functions of different components of steering system, clutch, brake, accelerator and hydraulic controls. (4.3) Position and function of speed control levers. (4.4) Precautionary measures while starting and stopping the tractor. (4.5) Safe driving following proper steps.	
	<b>PROJECT II</b>	<b>12</b>
	Harvesting of paddy with power reaper by using all operational controls.	
5	<b>Demonstrate different adjustments for tractor and implement for using in different crop and soil conditions – 20 Hrs</b>	
	<b>THEORY</b> - Adjustments of farm implements	<b>4</b>
	1.1 Need for implement adjustments. 1.2 Adjustments in MB plough - horizontal and vertical suction; 1.3 Disc plough – disc angle and tilt angle; 1.4 Adjustments for harvesting and threshing machines- cutter bar, cylinders etc.	
	<b>PRACTICAL</b>	<b>4</b>
	5.1 Familiarization with hitching devices 5.2 Measurement of specifications of drawbar and PTO shaft 5.3 Study of components of three point linkage	

	5.4 Placing the implement on a plane ground 5.5 Connecting the lower arms and then top arm of linkage of implement to the associated linkage of tractor 5.6 Making safety lock by safe clips.	
	<b>PROJECT III</b>	<b>12</b>
	Hitching of cultivator with three-point linkage of tractor.	
<b>6</b>	<b>Demonstrate Hitching of farm implements with three point linkage. – 20 hrs</b>	
	<b>THEORY</b> - Hitching of farm machinery	<b>6</b>
	6.1 Drawbar 6.2 Three-Point hitch system 6.3 Power take off shaft 6.4 Hitching procedure 6.5 Safety measures while implement hitching	
	<b>PRACTICAL</b> - Field operation with farm machines	<b>14</b>
	6.1 Familiarisation with tractor controls, road signs, traffic rules, road safety 6.2 Starting & stopping practice of the tractor 6.3 Driving of tractor in forward and reverse gears 6.4 Field planning and field operation of farm machinery. 6.5 Field operation and estimation of field capacity and field efficiency 6.6 Study, maintenance and operation of power tiller 6.7 Field operation and adjustments of seed drill/planter/sprayer 6.8 Field operation and adjustment of power thresher	
<b>7</b>	<b>Identify the possible troubles, their causes and remedy and their routine maintenance of tractor, power tiller and implements – 16 hrs</b>	
	<b>THEORY</b> - Trouble shooting of farm machinery Routine Maintenance of farm machinery	<b>8</b>
	7.1 Trouble shooting of tractors 7.2 Trouble shooting of power tiller 7.3 Trouble shooting of farm implements 7.4 During operation 7.5 Daily maintenance 7.6 Periodical maintenance 7.7 During offseason	
	<b>PRACTICAL</b> - Routine Maintenance of tractor and farm machinery	<b>8</b>
	7.1 Check tire inflation pressure and set to manufacturers recommended level. 7.2 Check the lubrication oil level using dip stick 7.3 Check water level in the radiator 7.4 Check fuel level and fill if necessary 7.5 Check for any loose nuts and bolts or chain connections with the implements. 7.6 Remove cables from battery terminals 7.7 Replace the screws/fasteners to the new battery to secure it in place 7.8 Reconnect the battery cables in the reverse order 7.9 Lubricate/ apply grease to the moving parts of implement and prime	

	movers. 7.10 Clean the implements with water after returning from field. 7.11 Clean the tires of prime movers with high pressure water. 7.12 Follow other periodic maintenance from user's manual after using certain periods (50, 75, 100, 200, 500 hours of operation).	
<b>TOTAL</b>	<b>THEORY+PRACTICAL (72Hrs+96Hrs)</b>	<b>168</b>

### **Details of Project (Any two)**

Sl. No.	Content (Any two, each 12 hrs)	Details
1.	Project I	Field operation of rotatiller for tilling dry/ wet land with power tiller.
2.	Project II	Sowing operation using seed cum fertilizer drill following seed rate calibration.
2.	Project III	Hitching of cultivator with three-point linkage of tractor.
3.	Project IV	Harvesting of paddy with power reaper by using all operational controls.

## **OUTCOMES**

Outcomes to be assessed	Assessment criteria for the outcome
1. Apply safe working Practices	(1.1) Assessor will note whether the trainee is maintaining procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements according to site policy. (1.2) Assessor will judge the trainee on his ability to recognize any unsafe situations according to site policy, and assess his report accordingly. (1.3) Assessor will ask the trainee to demonstrate Safety sign for Danger, Warning, caution and personal safety message accurately. (1.4) Assessor will assess the report/record submitted by trainee to supervisor/ Competent of authority in the event of accident or sickness of any staff, including accident details according to site accident/injury procedures. (1.5) Trainee will be asked to demonstrate basic first aid & CPR and use them under different circumstances. (1.6) Trainee will be asked to identify different fire extinguishers and to use the same as per requirement in a mock drill.

<p>2. Identify different components of tillage, sowing, transplanting, harvesting and threshing implements</p>	<p>(2.1) Trainee will be asked to define tillage, explain its types and name associated implements.</p> <p>(2.2.) Assessor will examine whether the trainee can able to identify different tillage farm implements (indigenous plough, mould board plough, disc plough, disc harrow, cultivator, rotatiller, rotavator)</p> <p>(2.3) Assessor will examine whether the trainee can able to identify different sowing, plant protection machines (seed drill, planters, seed drill calibration, drum seeder, paddy transplanter, potato planter, multi-crop seeder).</p> <p>(2.4) Trainee will be asked to demonstrate seed drill calibration procedure.</p> <p>(2.5) Assessor will examine whether the trainee is able to change different settings of disc and tilt angles of disc plough.</p> <p>(2.6) Assessor will examine whether the trainee is able to change different settings of horizontal and vertical suction of mould-board lough.</p> <p>(2.7) Trainee will be asked to identify different harvesting and threshing machines and their components.</p> <p>(2.8) Trainee will be asked to identify components of electric motor and pump-set.</p> <p>(2.9) Trainee will be asked to explain Working principle of motor and pumps, selection method of pumps and their capacity calculation</p> <p>(2.10) Assessor will examine whether the trainee is able to differentiate between seed drill, planter and transplanter.</p> <p>(2.11) Trainee will be asked to identify cutter-bar, feeding reels, threshing cylinder, shaking sieves and blower of a combine harvester.</p> <p>(2.12) Assessor will examine whether the trainee is able to demonstrate Field operation of rotatiller for tilling dry/ wet land with power tiller.</p> <p>(2.13) Assessor will examine whether the trainee is able to demonstrate Sowing operation using seed cum fertilizer drill following seed rate calibration</p>
<p>3. Identify different components of IC Engine, tractor, power tiller and farm implements</p>	<p>(3.1) Assessor will examine whether the trainee can able to identify different parts of an IC engine, tractor and power tiller systems.</p> <p>(3.2.) Assessor will examine whether the trainee can able to identify an engine as Petrol engine or Diesel engine.</p> <p>(3.3) Trainee will be asked to demonstrate the differences between a diesel engine and a petrol engine.</p> <p>(3.4) Trainee will be asked to compare the differences between a two stroke engine and a four stroke engine.</p> <p>(3.5) Assessor will examine whether the trainee can able to describe the necessity of cooling system for an IC engine.</p>

	<p>(3.6) Trainee will be asked to describe different parts of water cooling system used in IC engine.</p> <p>(3.7) Trainee will be asked to describe the location and function of different parts of fuel supply system in tractor and power tiller.</p> <p>(3.8) Assessor will examine whether the trainee can able to describe the purpose and types of lubrication system used for tractor and power tiller.</p> <p>(3.9) Trainee will be asked to explain the air-cleaning and exhaust systems of tractor and power tiller.</p> <p>(3.10) Trainee will be asked to explain the function of a carburetor.</p> <p>(3.11) Assessor will examine whether the trainee can able to explain the layout of different elements of an transmission system used in a tractor.</p> <p>(3.12) Assessor will examine whether the trainee can able to explain the layout of different elements of an transmission system used in a motor vehicle.</p> <p>(3.13) Assessor will examine whether the trainee can able to explain the components and functions of tractor drawbar and three-point hitch system.</p>
4. Identify different components of control systems of prime movers for hitching of implements and safe driving.	<p>(4.1) Trainee will be asked to state about different types of controls used while driving a tractor and a power tiller.</p> <p>(4.2) Trainee will be asked to explain different components and functions of different components of steering system, clutch, brake, accelerator and hydraulic controls.</p> <p>(4.3) Trainee will be asked to explain the function of speed control levers and their positions.</p> <p>(4.4) Trainee will be asked to explain the steps of safe driving.</p> <p>(4.5) Assessor will examine whether the trainee is able to demonstrate different precautionary measures while starting and stopping the tractor.</p> <p>(4.6) Assessor will examine whether the trainee is able to carry out safety measures and checks while operating farm implements using tractor.</p> <p>(4.7) Assessor will examine whether the trainee is able to identify the different Controls used while driving a tractor and a power tiller.</p> <p>(4.8) Assessor will examine whether the trainee is able to illustrate the method of Harvesting of paddy with power reaper by using all operational controls.</p>

<p>5. Demonstrate different adjustments for tractor and implement for using in different crop and soil conditions</p>	<p>(5.1) Assessor will examine whether the trainee is able to explain the purpose of horizontal and vertical suction of mould board plough.</p> <p>(5.2) Assessor will examine whether the trainee is able to explain the purpose of disc and tilt angles of disc plough.</p> <p>(5.3) Trainee will be asked to identify the locations of draft and position control levers and demonstrate their use for implement control.</p> <p>(5.4) Trainee will be asked to check the condition of a battery and replace a new battery in a tractor.</p> <p>(5.5) Trainee will be asked to identify different hitching devices, components of three point linkage</p> <p>(5.6) Trainee will be asked to calculate Measurement of specifications of drawbar and PTO shaft.</p> <p>(5.7) Trainee will be asked to demonstrate Connecting the lower arms and then top arm of linkage of implement to the associated linkage of tractor and Making safety lock by safe clips.</p>
<p>6. Demonstrate Hitching of farm implements with three point linkage.</p>	<p>(6.1) Assessor will examine whether the trainee is able to identify the components of hitching systems like drop arm, upper link, lower arms, swing chain, bottom links etc.</p> <p>(6.2) Assessor will examine whether the trainee is able to place the implement on a levelled ground and drive back the tractor in line with the implement.</p> <p>(6.3) Trainee will be asked to demonstrate the connecting of any mounted implement with the three-point linkage.</p> <p>(6.4) Trainee will be asked to demonstrate Starting &amp; stopping practice of the tractor, Driving of tractor in forward and reverse gears.</p> <p>(6.5) Trainee will be asked to demonstrate field operation and adjustments of seed drill/planter/sprayer and power thresher.</p> <p>(6.6) Trainee will be asked to illustrate field operation and estimation of field capacity and field efficiency.</p>
<p>7. Identify the possible troubles, their causes and remedy and their routine maintenance of tractor, power tiller and implements</p>	<p>(7.1) Assessor will be asked to tell about the possible troubles that may be faced during tractor engine starting and driving.</p> <p>(7.2) Assessor will be asked to tell about the possible troubles that may be faced during power tiller starting and operation.</p> <p>(7.3) Assessor will be asked to demonstrate about the possible troubles that may be faced during power tiller starting and operation.</p> <p>(7.4) Trainee will be asked to explain how to come out of the field with implement when there is wheel skidding.</p> <p>(7.5) Trainee will be asked to check the tire inflation, leakage in fuel line and proper setting on the radiator cap and water</p>

	<p>coolant, any loose nuts and bolts or chain connections with the implements.</p> <p>(7.6) Trainee will be asked to state about different daily maintenance of tractor and power tiller.</p> <p>(7.7) Trainee will be asked to state about the daily maintenance of the farm machinery after use in field.</p> <p>(7.8) Trainee will be asked to explain the importance of periodic maintenance of tractor and power tiller.</p> <p>(7.9) Trainee will be asked to state time specific periodic maintenance of tractor.</p> <p>(8.0) Assessor will examine the knowledge of the trainee on seasonal maintenance and care for the implements.</p>
--	---