SUBJECT: FARM MACHINERY AND OPERATOR (FMAO)

CLASS XII

SEMESTER III

THEORY

FULL MARKS:30

[MCQ Type (1 Mark) Questions]

UNIT	Topic	No of periods assigned	Marks
1	Introduction: Farm mechanization	5	3
2	Farm machines and their operation	12	8
3	Internal combustion (IC) engines	12	8
4	Operationalcontrols and safe driving of tractor	8	6
5	Operational controls of power tiller	8	5
	Total	**45**	**30**

DETAIL SYLLABUS

UNIT	Topic / Sub Topic	No of periods assigned
1	**Introduction:** Farm Mechanization-meaning, needs, status, farm power availability, advantages of improved implements over conventional tools, field capacity of farm implements, machinery for different farm operations	5
2	**Farm machines and their operation:** Tillage system- indigenous plough, mould board plough, disc plough, disc harrow, cultivator, rotary tiller, rotavetor; Sowing and transplanting – seed drill, planters, seed drill calibration, drum seeder, paddy transplanter, potato planter, multi-crop seeder; Tools for intercultural operation – hoe, weeder, wheel hoe, power weeder; Harvesting and threshing – principle of crop harvesting, cutting tools, sickles, power reaper, combine harvester	12
3	**Internal Combustion (IC) engines:** Engine–definition, types, working principle of CI and SI engines, engine parts; Dismantling and assembling; Fuel supply system–need for fuel system, components, working; Cooling system–importance, types, components, working principle; Lubrication system–use, types, components;Power transmission system–types, components, efficiency, Differential hydraulic system – use, controls	12
4	**Operation controls and safe driving of tractor:** Operational control of tractor–steering, clutch, brake, hydraulic levers, gearlevers; Safety rules for driving a tractor- Precautions while driving a tractor; Checking the tractor before driving–condition of different systems, tire inflation etc.; Steps for driving a tractor–getting in and out of a tractor; Driving procedure; Fuel saving tips	8
5	**Operational controls of power tiller:** Controls of power tiller –steering clutch, handle, levers(operational, directional, engine related); attachment with power tiller, specifications and working of rotary tiller, power tiller driving	8
	Total	**45**

FARM MACHINERY AND OPERATOR (FMAO)
CLASS XII
SEMESTER IV

THEORY

FULL MARKS: 30

[SAQ (2 Marks) and LAQ Type (4 Marks) Questions]

UNIT	Topic	No of periods assigned	Marks
1	Irrigation Systems	10	4
2	Pump set for irrigation	10	6
3	Adjustments of farm implements	8	4
4	Hitching of farm machinery	7	2
5	Troubleshooting of farm machinery	10	6
6	Routine maintenance of farm machinery	10	4
7	Mechanization hubs and custom hiring	8	4
	Total	**63**	**30**

DETAILED SYLLABUS

UNIT	Topic / Sub Topic	No of periods assigned
1	**Irrigation Systems:** Types of irrigation systems, drip system -advantages, components, installation and maintenance; sprinkler system - advantages, components, installation and maintenance	**10**
2	**Pump set for irrigation:** Irrigation pumps–components of apump-set, classification of wells, pumps; working principle of motor and pumps; selection of pumps, capacity calculation	**10**
3	**Adjustments of farm implements:** Need for implement adjustments; adjustments in MB plough- horizontal and vertical suction; disc plough–disc angle and tilt angle; adjustable parameters for harvesting and threshing machinery	**98**
4	**Hitching of farm machinery:** Hitching–meaning, devices;Drawbar–use and specifications; Three-point linkage–use and components; Power take off (PTO) shaft–use, configuration and different speeds; Hitching procedure; Safety measures while implement hitching	**7**
5	**Troubleshooting of farm machinery:** Troubles during field operation–possible causes and remedies; Trouble shooting of tractors; Trouble shooting of power tiller; Trouble shooting ofFarm implements	**10**
6	**Routine maintenance of farm machinery:** Maintenance– needs and required frequency, daily, periodic; Maintenance during off-season	**10**
7	**Mechanization hubs and custom hiring:** Cooperative farming, Implement hubs, Custom hiring–needs, feasibility, operational conditions; Subsidy schemes, RKVY programs on farm mechanization schemes	**8**
	Total	**63**

PRACTICAL AND PROJECT
CLASS XII

FULL MARKS: 50 (Practical) + 20 (Project)

NO. OF PERIODS ASSIGNED: 144 (120 for Practical+24 for Project)

DETAILED SYLLABUS

Sl. No.	Topic	No. of periods
	SEMESTER III	
1	Familiarization with sources of farm power	8
2	Familiarization with different farm machinery and implements	8
3	Calculation of field capacity of various farm machinery	4
4	Demonstration on working of 4-stroke engine	6
5	Study of different components of IC Engine	6
6	Demonstration on various systems of a tractor *viz*. fuel, lubrication, cooling and electrical systems	8
7	Identification of transmission, hydraulic and final drive system	6
8	Study of MB plough and its different parts	4
9	Study of disc plough and its parts	4
10	Study of secondary tillage implements- disc harrow and cultivator	6
	Total	**60**
	SEMESTERIV	
1	Study of seed-*cum*-fertilizer drills	2
2	Demonstration and calculation of seed drill calibration	4
3	Familiarization with tractor controls, traffic rules and road safety	4
4	Field planning and operation of farm machinery (cultivator, MB plough)	4
5	Field operation and estimation of field capacity and field efficiency	4
6	Study, maintenance and operation of power tiller	6
7	Study, maintenance and operation of tractor	4
8	Driving of power tiller with and without rotary tiller attachment	6
9	Driving of tractor in forward and reverse gears	4
10	Study and practicing the hitching of implements (three-point linkage)	4
11	Field operation and adjustments of seed drill/planter/sprayer	6
12	Field operation of power reaper	4
13	Visit to mechanization hub and custom hiring centers (CHC)	4
14	Studies of farm machineries suitable for custom hiring	4
	Total	**60**
	PROJECT	**24**
	Total	**84**
	Class XII Total	**144**

PROJECT (20 marks: Two Projects, 10 marks each)

Sl. No.	Project	Details	Marks
1	Project I (12periods)	Make detailed classification of Internal Combustion (IC) engines based on number of stroke per cycle and type of fuels, and explain different systems of IC engines with flow charts and diagrams	10

2	Project II (12periods)	List a set of tractor operated equipments suitable for land preparation during *kharif* and *rabi* cultivation and estimate their operational cost for one hectare of land	10
3	Project III (12periods)	List a package of power tiller operated farm machinery recommended for cultivation of rice crop and estimate their operational cost for one hectare land area	10
4	Project IV (12periods)	Prepare the tractor maintenance schedule and calculate yearly maintenance cost for a 45 hp tractor	10

Note: The school may develop other Projects as per their needs, choices or available resources.