B.Voc (Farm Equipment Operation and Maintenance)

Scheme of Examinations

July 2018 – Onwards

	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks		
						CFA	ESE	TOTAL
SEMESTER – I :Agricultural Machinery Operator	18FEMV0101	GEC	Principles of Agriculture	3	3	**40**	**60**	**100**
	18ENGU01G2	GEC	General English I	3	3	**40**	**60**	**100**
	18FEMV0102	GEC	Workshop calculation and science–I	3	3	**40**	**60**	**100**
	18FEMV0103	GEC	Engineering Drawing–I	3	--	**60**	**40**	**100**
	18FEMV0104	SDC	Farm Power and Machinery	4	3	**40**	**60**	**100**
	18FEMV0105	SDC	Selection and Operation of Agricultural Machineries	6	--	**60**	**40**	**100**
	18FEMV0106	SDC	Operation and Maintenance of Power Tiller	6	--	**60**	**40**	**100**
	18FEMV0107	SDC	Operational Safety and Health Education	2	2	**20**	**30**	**50**
			Total	**30**				**750**

	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks		
						CFA	ESE	TOTAL
SEMESTER – II : Agricultural Machinery Technician	18ENGU02G2	GEC	General English–II	3	3	**40**	**60**	**100**
	18FEMV0208	GEC	Workshop calculation and science–II	3	3	**40**	**60**	**100**
	18FEMV0209	GEC	Engineering Drawing–II	3	--	**60**	**40**	**100**
	18FEMV0210	GEC	Basic Workshop	3	--	**60**	**40**	**100**
	18FEMV0211	SDC	Service and Maintenance of Tillage Equipments	3	--	**60**	**40**	**100**
	18FEMV0212	SDC	Service and Maintenance of Sowing and Weeding Equipments	3	--	**60**	**40**	**100**
	18FEMV0213	SDC	Service and Maintenance of Plant Protection Equipments	3	--	**60**	**40**	**100**
	18FEMV0214	SDC	Service and Maintenance of Soil Forming and Land Shaping Equipments	3	--	**60**	**40**	**100**
	18FEMV0215	SDC	Inplant Training – I	6	--			**100**
			Total	**30**				**900**

	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks		
						CFA	ESE	TOTAL
SEMESTER – III : Tractor Operator	18EVSU0001	GEC	Environmental Studies	4	3	**40**	**60**	**100**
	18SHSU0001	GEC	Shanti Sena	1	---	**50**	**--**	**50**
	18CSKU0201	GEC	Soft Skills	2	---	**50**	**--**	**50**
	18FEMV0316	GEC	Engineering Survey	3	---	**60**	**40**	**100**
	18FEMV0317	GEC	Operation and Maintenance of Micro Irrigation System	2	--	**30**	**20**	**50**
	18FEMV0318	SDC	Tractor Engine Systems	4	3	**40**	**60**	**100**
	18FEMV0319	SDC	Tractor Operation and Safety Measures	6	---	**60**	**40**	**100**
	18FEMV0320	SDC	Repair, Maintenance and Storage of Tractor	4	---	**60**	**40**	**100**
	18FEMV0321	SDC	Operation and Maintenance of Tractor Hitch System	4	---	**60**	**40**	**100**
			Total	**30**				**800**

	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks		
						CFA	ESE	TOTAL
SEMESTER – IV : Tractor Mechanic	18CSAU04A1	GEC	Computer Fundamentals and office Automation	4	3	**40**	**60**	**100**
	18SPOU0001	GEC	Sports and Games	2	---	**50**	**--**	**50**
	18YOGV0001	GEC	Yoga Education	2	---	**50**	**--**	**50**
	18FEMV0422	GEC	Employability Skills	4	4	**40**	**60**	**100**
	18FEMV0423	SDC	Repair and Overhauling of Tractor Engine	3	---	**60**	**40**	**100**
	18FEMV0424	SDC	Tractor Transmission and Hydraulic System	3	---	**40**	**60**	**100**
	18FEMV0425	SDC	Service and Maintenance of Electrical and Control Board System	3	---	**60**	**40**	**100**
	18FEMV0426	SDC	Repair and Maintenance of Tractor tyre, Front axle and Four Wheel Drive	3	---	**60**	**40**	**100**
	18FEMV0427	SDC	Inplant Training - II	6	---	---	---	**100**
			Total	**30**				**800**

	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks		
						CFA	ESE	TOTAL
SEMESTER – V : Harvester Operator	18FEMV0528	GEC	Post Harvesting Equipments	4	**3**	**40**	**60**	**100**
	18FEMV0529	GEC	Safety Testing of Agricultural Machinery	4	**3**	**40**	**60**	**100**
	18FEMV0530	GEC	Renewable Energy Appliances	4	**3**	**40**	**60**	**100**
	18FEMV0531	SDC	Operation and Maintenance of Vertical Conveyor Reaper	6	**---**	**60**	**40**	**100**
	18FEMV0532	SDC	Operation and Maintenance of Crop Harvesters	6	**---**	**60**	**40**	**100**
	18FEMV0533	SDC	Operation and Maintenance of Combine Harvester	6	**---**	**60**	**40**	**100**
			Total	**30**				**600**

	Course Code	Category	Title of Course	No. of Credits	Duration of ESE Hours	Marks		
						CFA	ESE	TOTAL
SEMESTER – VI : Agricultural Machinery Entrepreneur	18CSAU0634	GEC	Computer Tally	3	-	**60**	**40**	**100**
	18FEMV0635	GEC	Entrepreneurship Development	3	3	**40**	**60**	**100**
	18FEMV0636	GEC	Book Keeping	3	3	**40**	**60**	**100**
	18FEMV0637	GEC	Agri Business and Project Management	3	3	**40**	**60**	**100**
	18FEMV0638	SDC	Agro Based Entrepreneurship Activities	6	-	**60**	**40**	**100**
	18FEMV0639	SDC	Function and Management of Agro Service Centre	4	-	**60**	**40**	**100**
	18FEMV0640	SDC	Function and Management of Custom Hiring Centre	4	-	**60**	**40**	**100**
	18FEMV0641	SDC	Project Work	4	-	**60**	**40**	**100**
			Total	**30**				**800**

FIRST SEMESTER

18FEMV0101- PRINCIPLES OF AGRICULTURE (3 credits)

OBJECTIVE:

- To teach different types of soils and climate suitable for raising different agricultural crops.
- To teach different agricultural practices and the recommendations of inputs for raising the crops.

UNIT–1: Introduction to Agriculture **:** Agriculture – art, science and business – branches of agriculture scope of agriculture in India and Tamil Nadu –History of agricultural development – development of scientific agriculture in world. National and International Institutions / Centers on agriculture research – Agronomy - definition and relationship with other disciplines.

UNIT–2: Soil Properties and Management: Physical Properties of Soils; Physical properties of soils-texture-mechanical components and structure. Physical constants-true and apparent specific gravity, pore space, soil colour, soil air, soil temperature - significance of physical properties in relation to plant growth. Chemical properties of soils; Chemical properties of soils- Chemical composition-Soil reaction-Buffering capacity of soils-Soil colloids-Soil pH – Problem soils their reclamation and management.

UNIT–3: Crop Adaptation and Distribution **:** Origin of crops, crop distribution and production; origin of crop species, agronomic classification of crops – their economic importance – major crops of India and Tamil Nadu – adaptation and distribution. Factors affecting crop distribution and production. Soils and agriculture seasons of India and Tamil Nadu.

UNIT–4: Farming Systems **:** Systems of farming – wet, irrigated, dry and rainfed farming. Factors governing choice of crops and varieties. Intensive cropping – crop rotation – advantages. Cropping pattern and cropping systems in India and Tamil Nadu. Concepts and principles of sustainable agriculture – Integrated Farming System (IFS) – organic farming – Natural farming – Eco-friendly agriculture and conservation agriculture –LESIA.

UNIT–5: Basics of Agricultural Operations**:** Principles and practices of agriculture operations. Tillage and tilth – types of tillage – modern concepts of tillage – tools, implements and machineries for different agricultural operations. Seeds and sowing- factors affecting germination – seed rate – seed treatment – methods of sowing – nursery methods and transplanting – plant population and geometry time and methods of application and INM, harvesting – threshing – drying and storage.

LECTURE SCHEDULE:

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	• Introduction of agriculture; Branches of agriculture Scope of agriculture. • History of development of agriculture; Agriculture research institutions available in India and Abroad. • Definition and other relationship of Agronomy; Physical properties of soil; soil texture-mechanical components and structure
4th to 6th Week	• Apparent specific gravity, pore space, colour of soil, air of soil, temperature of soil • Significance of physical properties in related to plant growth, chemical properties of soil, Chemical composition, buffering capacity of soil and soil colloids & Soil pH • Problem of soil their reclamation and management, origin of crop & crop species, crop distribution and production

7th to 10th Week	• Major crops of TamilNadu and India (adaptation and distribution) and also know about Soils and agriculture seasons of India and Tamil Nadu • **8th week : Mid-Semester Examinations** • Systems of farming, wet, irrigated, dry and rainfed farming. • Cropping pattern and concepts and principles of sustainable agriculture TamilNadu and India
11th to 13th Week	• Organic farming, natural farming. • Eco-friendly agriculture, conservation agriculture, principles and practices of agriculture operations. • Operations of Tillage and tilth, types of tillage, modern concepts of tillage – tools, implements, machineries for different agricultural operations
14th to 16th Week	• Seeds and sowing- factors affecting germination; Seed rate & seed treatment, Methods of sowing, methods of nursery and transplanting and also know about plant population and geometry • Methods of weeding, machineries using time and methods of application. • Harvesting, threshing, drying and storage of harvested things

REFERENCES:

1. Balasubramaniyan, P and SP. Palaniappan. 2002. Principles and Practices of Agronomy, Agrobios (India), Jodhpur.
2. Dahama.A.K. 1996. Organic farming for sustainable Agriculture. Agro Botanical Publishers (India), Bikaner.
3. Gopal Chandra De. 1997. Fundamentals of Agronomy. Oxford and IBH Publishing Co.Pvt.Ltd., New Delhi.
4. ICAR. 1996. Handbook of agriculture. Indian Council of Agriculture Research, New Delhi.
5. Reddy. S.R. 1999. Principles of Agronomy. Kalyani publishers, New Delhi.
6. Sankaran, S. and V.T. Subbiah Mudaliar, 1997. Principles of Agronomy. The Bangalore Printing and publishing Company Ltd., Bangalore.
7. Singh. S.S. 1998. Principles and Practices of Agronomy. Kalyani publishers, New Delhi.
8. Somasundaram, E and A. Arokiaraj. 2002. Text book on Principles of Agronomy. Crystal Printers, Tiruchirappalli, Tamil Nadu.

LEARNING OUTCOME

- Students learn about different types of soils and climate suitable for raising different agricultural crops.
- Students learn about different agricultural practices and the recommendations of inputs for raising the crops.

18ENGU01G2: GENERAL ENGLISH I

(Language II Course – 3 Credits/ 3 Hours/wk.)

OBJECTIVES:

- To improve the English language skills of students with very limited abilities to use the language; and
- To focus on the language skills of the learners in a graded manner.

UNIT–I: Grammar

- What is Grammar?
- The Capital Letter
- Nouns & Pronouns

UNIT–II: Listening

- Teacher Narrations

UNIT–III Speaking Skills

- Self-Introduction
- Descriptions of persons, objects, places

UNIT–IV Reading & Vocabulary

- Graded reading comprehension passages

UNIT–V Writing Skills

- Sentence Construction
- Descriptive Paragraph writing

Textbook:

General English I Textbook/Course Material - Prepared by the School.

Reference Book:

Seaton, Anne & Y.H. Mew. *Basic English Grammar Book 1.* Irvine: Saddleback, 2007. Print.

18FEMV0102 - WORKSHOP CALCULATION AND SCIENCE – I (3 credits)

OBJECTIVE:

- To teach basic engineering mechanics for understanding agricultural machinery working principles.

UNIT–1: Machine **:** Machine – definition, farm machines – mechanical advantage, efficiency of the machine and velocity ratio – definition and calculation

UNIT–2: Motion: rotary motion; velocity – uniform velocity and variable velocity; acceleration –laws of motion – calculations

UNIT–3: Force**:** Force **–** definition of force, types of force Mass, Equilibrium, Pressure, Pressure in hydraulic systems, Hooke's law, Practical applications.

UNIT–4: Work**:** Work energy, power– Definition and calculation of Work, Power and Work done by a torque, Conservation of energy, Energy equation, Kinetic energy.

UNIT–5: Engine Power: Engine power – terminology used – bore, stroke, stroke bore ratio, swept volume, compression ratio; power – indicated power, brake power, belt power, drawbar power, power takeoff power – definition; measurement of engine power by using dynamometer – determination of specific fuel consumption, mechanical efficiency and thermal efficiency.

LECTURE SCHEDULE

No. of week (3 hrs. per week)	**Topics covered**
1st to 3rd Week	• Definition of machines and types of machines, lever and wheel and its applications • Calculate the mechanical advantage and efficiency of the machine • calculate the velocity ratio
4th to 6th Week	• the translator motion and its types of rectilinear motion and curvilinear motion • Definition and calculation of rotary motion; • Definition and calculation of uniform velocity and variable velocity • Definition and calculation of acceleration and variable acceleration
7th to 10th Week	• Definition and types of forces • Measurements of force by using spring balance • **8th week : Mid-Semester Examinations** • Calculate Direct forces, Attractive forces, Explosive forces and Describing forces, • Graphical representation of a force, Addition of forces, Parallelogram of forces, Triangle of forces and Resolution of forces. • Definition Mass, Equilibrium, Pressure, Pressure in hydraulic systems, Hooke's law and its Practical applications

11th to 13th Week	• Definition and calculation of Work energy and power • Different forms of energy - Potential energy, Chemical energy and Conservation of energy, • Law of conservation of energy and centre of gravity • Energy of a falling body, Kinetic energy of rotation
14th to 16th Week	• The terminologies connected with engine power - bore, stroke, stroke bore ratio, swept volume, compression ratio • Calculate the indicated power, brake power, belt power, drawbar power and power takeoff power • Function of drawbar dynamo meter and its types • Calculate the specific fuel consumption, mechanical efficiency and thermal efficiency

REFERENCES

1. O.P. Singhal, 1998. Agricultural Engineering, Aman Publishing House, Merut(UP)
2. Sreevastave, A.C., 1990. Elements of Farm Machinery, Oxford and IBH Publication Co., New Delhi.
3. Senthilkumar, T., R. Kavitha and V.M.Duraisamy 2015. A Text Book of Farm Machinery**,** Thannambikkai Publications, Coimbatore. ISBN: 978-9381102305
4. Jagadishwar Sahay, 2010. Elements of Agricultural Engineering**.** Standard Publishers Distributors, New Delhi. ISBN: 978 – 818040440
5. Workshop Calculation and Science 2015 published by National Instructional Media Institute, Directorate General of Employment & Training, Chennai.

LEARNING OUTCOME

- Students will learn basic engineering mechanics for understanding agricultural machinery working principles.

18FEMV0103 - ENGINEERING DRAWING–I (3 credits)

OBJECTIVE:

- To teach the construction of geometrical figures and projection of 1D, 2D, 3D elements and sectioning of solids and development of surfaces

UNIT–1: Scales - Recommended scales, reduced & enlarged Drawing Sheet sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheet, sizes of title block and its contents. Using drawing instruments to draw straight lines, rectangles, squares, circles, polygons.

UNIT–2: Lettering and Dimensioning - Types of Lettering, Guide Lines for lettering, Recommended sizes of letters and numbers, Single stroke letters, Dimensioning - rules and systems of dimensioning – dimensioning a given drawing.

UNIT–3: Identify the alphabet of lines- Read and Interpret the meaning of various line types with examples- Object Lines, Hidden Lines, Center Lines, Phantom Lines, Dimension Lines, Extension Lines, Leaders, Break Lines -Long-break Line, Round, Solid, Hollow Cross Section, Section Lines – Common Manufacturing Materials, Cutting Plane Lines

UNIT–4: Geometric Construction - Bisecting a line - perpendiculars - parallel lines - division of a line; Angles - bisection, trisection, Tangent lines touching circles internally and externally Polygons - Regular polygons - circumscribed and inscribed in circles. Conic sections - Definitions of focus, directrix, eccentricity, Construction of Ellipse by Concentric circles method, Construction of parabola by rectangular method.

UNIT–5: Orthographic Projection - Definition - Planes of Projection - Four quadrants – Reference Line, First angle projection - Third angle projection. Isometric Projection - Definition - Isometric axes, lines and planes, Isometric Scale - Isometric view. Drawing of isometric views of plane figures, Drawing of isometric views of prisms and pyramids, Drawing of isometric view of cylinders and cones Development of Surfaces - Need for preparing development of surface, Concept of true length - Principal methods of development, Development of simple solids like cubes, prisms, cylinders, pyramids, cones.

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	• Basic concept of Engineering Drawing
4th to 6th Week	• Learning of lettering and dimension
7th to 10th Week	• Read and interpret the lines • **8th week : Mid-Semester Examinations**
11th to 13th Week	• Construct of different geometric figures
14th to 16th Week	• Construction of first angle, third angle and isometric projection of lines, planes and solids.

TEXT BOOKS:

1. K.V. Natarajan, 2006 A text book of engineering graphics, Dhanalakshmi Publishers, Chennai.
2. M.B. Shah and B.C. Rana, 2005, Engineering drawing, Pearson education.

REFERENCES:

1. N.D. Bhatt, 2003, Engineering Drawing, Chaotar publishing house 46th edition.
2. K.R. Gopalakrishnan.1998 Engineering Drawing (Vol. I & II) Subhas Publications
3. Luzadder and Duff, 2001, Fundamentals of Engineering Drawing Prentice Hall of India Pvt Ltd XI edition
4. K. Venugopal, 2002. Engineering graphics, New Age International (P) Limited.
5. Engineering Drawing Workbook (2014) by National Instructional Media Institute, Directorate General of Employment & Training, Chennai.

LEARNING OUTCOME

- Student conversant with the construction of geometrical figures and projection of 1D, 2D, 3D elements and sectioning of solids and development of surfaces

18FEMV0104 – FARM POWER AND MACHINERY (4 credits)

OBJECTIVE:

- To teach sufficient theoretical knowledge about sources of farm power and tractor power.
- To teach farm implements used in agriculture, their cost of operation and selection.

UNIT–1: Farm Power and Tractors**:** Farm power in India - sources, IC engines – working principles, two stoke and four stoke engines, IC engine terminology, different systems of IC engine. Tractors – types and utilities.

UNIT–2: Tillage Machinery**:** Tillage – ploughing methods – primary tillage implements – mould board, disc plough and chisel plough – secondary tillage implements – cultivators, harrows and rotovators – wetland equipment – puddlers, tramplers and cage wheels.

UNIT–3: Sowing and Planting Machinery**:** Sowing methods; Broadcasting device, seed drills, seed-cum-fertilizer drill, seed planter; direct paddy sector, paddy transplanter – hand operated and self propelled.

UNIT–4: Weeding and Inter-Culturing Machinery: Classification of weeding tools on the basis of source of power; Dryland weeders, cono weeder, power weeder and brush cutter.

UNIT–5: Plant Protection Machinery : Functions of sprayers; classification of sprayers; Compressed and lever operated knapsack sprayer, foot rocker sprayer and power operated sprayer; Rotary duster and power operated duster.

LECTURE SCHEDULE

No. of week (4 hrs. per week)	**Topics covered**
1st to 3rd Week	• Different sources of farm power in India – human, animal, mechanical and electrical energy sources and their use in agriculture. • Working principles of two stroke and four stroke engines, applications – types, power and efficiency. • Explain the functions of tractor, identification of different components of tractor
4th to 6th Week	• Different type of primary tillage implements and its applications. • Different type of secondary tillage implements and its applications • Explain the basic principle and functions of rotavator, puddler and cage wheels and its applications
7th to 10th Week	• Different type of sowing machineries and its applications. • **8th week – Mid-Semester Examinations** • Applications of dry land and wet land weeders. • Explain the basic principle and process of sprayers and its applications
11th to 13th Week	• Explain the basic principle and process of dusters and its applications. • Explain the basic principle and functions of paddy reaper and its applications. • Explain the basic principle and functions of combined harvester and its applications

14th to 16th Week	• Explain the basic principle and functions of harvesting machinery for ground-nut, tuber crops and sugar-cane and its applications. • Explain the basic principle and functions of dozers, levelers, JCB and its applications. • Select of tractor and its implements and calculate the cost required for different agricultural operations

TEXT BOOKS

1. Senthilkumar, T., R. Kavitha and V.M.Duraisamy 2015. A Text Book of Farm Machinery**,** Thannambikkai Publications, Coimbatore. ISBN: 978-9381102305
2. Jagadishwar Sahay, 2010. Elements of agricultural engineering. Standard Publishers Distributors, New Delhi. ISBN: 978 – 818040440

REFERENCES

1. Ojha, T.P and A.M.Michael 2005. Principles of Agricultural Engineering, Vol.1, Jain Brothers, New Delhi. ISBN: 978-8186321638
2. Nakra C.P 1970. Farm Machinery and Equipment**:** Dhanpat Rai Publishing Company Ltd, New Delhi ISBN : 978-8187433231
3. Sricastava, A.C., 1991. Elements of farm machinery**.** Oxford & IBH Publishing Co Pvt Ltd, New Delhi. ISBN: 978-8120405134

WEB RESOURCES:

www.agricoop.nic.in/dacdivision/Machinery/directory.htm

www.farmmachineryshow.org

www.tnauagriportal

LEARNING OUTCOME

- Students learn the basics of tractor and its utilities
- Students able to select suitable agricultural machineries to be used for different farm operations.

18FEMV0105 - SELECTION AND OPERATION OF AGRICULTURAL MACHINERIES
(6 credits)

OBJECTIVE:

- To teach selection and operation of agricultural machineries used in farming operations.

Identify different components, suitability according to the crop and soil conditions and learn the adjustments of depth and width control of the following farm machineries of the following farm machineries.

UNIT–1: Chisel plough, Disc plough, Mould board plough and Reversible plough.

UNIT–2: Spring tyne cultivator, Rigid tyne cultivator, Five bottom plough and Disc harrow

UNIT–3: Rotavotor, Ridger, Bund former, Cage wheel and Leveller.

UNIT–4: Seed drill, Seed cum fertilizer drill, Seed planter and Transplanter

UNIT–5: Dry land weeder, Cono weeder, Wire brush cutter, Power weeder, Power sprayer and Duster.

PRACTICAL SCHEDULE

No. of week (6 hrs. per week)	Topics covered
1st to 3rd Week	• Select, care and use of PPE while dismantling and assembling of Chisel plough, Disc plough, Mould board plough and Reversible plough. • Select tools and materials for the job and make this available for use in a timely manner. • Use the tools and equipment in the way specified by manufacturers to dismantle and assembles of machineries. • Identify the common fault and take corrective action for machineries system as per technical manual
4th to 6th Week	• Select, care and use of PPE while dismantling and assembling of Spring tyne cultivator, Rigid tyne cultivator, Five bottom plough and Disc harrow • Select tools and materials for the job and make this available for use in a timely manner. • Use the tools and equipment in the way specified by manufacturers to dismantle and assembles of equipment. • Identify the common fault and take corrective action for machineries system as per technical manual
7th to 10th Week	• Select, care and use of PPE while dismantling and assembling of Rotavotor, Ridger, Bund former, Cage wheel and Leveller • **8th Week: Mid-Semester Examinations** • Select tools and materials for the job and make this available for use in a timely manner. • Use the tools and equipment in the way specified by manufacturers to dismantle and assembles of machineries. • Identify the common fault and take corrective action for machineries system as per technical manual

11th to 13th Week	• Select, care and use of PPE while dismantling and assembling of Seed drill, Seed cum fertilizer drill, Seed planter and Transplanter • Select tools and materials for the job and make this available for use in a timely manner. • Use the tools and equipment in the way specified by manufacturers to dismantle and assembles of machineries. • Identify the common fault and take corrective action for machineries system as per technical manual
14th to 16th Week	• Select, care and use of PPE while dismantling and assembling of Dry land weeder, Cono weeder, Wire brush cutter, Power weeder, Power sprayer and Duster • Select tools and materials for the job and make this available for use in a timely manner. • Use the tools and equipment in the way specified by manufacturers to dismantle and assembles of machineries. • Identify the common fault and take corrective action for machineries system as per technical manual

REFERENCE BOOKS

1. Er. Sanjay Kumar, Er. Vishal Kumar and Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8

2. Ojha, T.P and A.M.Michael 2005. Principles of Agricultural Engineering Vol I. Jain Brothers, New Delhi. ISBN: 978-8186321638

LEARNING OUTCOME:

- Students able to select farm machinery according to the soil and crop condition
- Students able to lean the adjustments needed in the farm machineries according to the soil condition inorder to achieve good tilth.

18FEMV0106 – OPERATION AND MAINTENANCE OF POWER TILLER (6 Credits)

OBJECTIVES:

- To teach different components of power tiller and its functions.
- To teach operation and maintenance of power tiller.

UNIT–1: Familiarizing the tools for maintaining the power tiller–Identifying the different system of power tiller and its functions.

UNIT–2: Dismantling and assembling of the power tiller engine-Overhauling of steering clutch and brake of the power tiller

UNIT–3: Adjustment of clutch assembly- Adjustment of transmission system

UNIT–4: Dismantling, checking, repairing and assembling of rotavator- Replacement of tynes of the tiller

UNIT–5: Periodical maintenance of the power tiller-Preventive maintenance of the power tiller- common troubles and remedies- Field operations of the power tiller with suitable attachments

PRACTICAL SCHEDULE

No. of week (6 hrs. per week)	Topics covered
1st to 3rd week Demonstrate major assemblies of power tiller.	• Ascertain and select tools and materials for the job and make this available for use in a timely manner. • Plan work in compliance with standard safety norms. • Perform daily checks before starting the engine. • Start the engine and allow it to warm up • Check for proper functionality of different systems. • Stop the engine.
4th to 6th Week Overhauling of Diesel Engine of Power Tiller	• Ascertain and select tools and materials for the job and make this available for use in a timely manner. • Plan work in compliance with standard safety norms. • Drain coolant and lubricants from the engine and Remove Accessories of engine. • Service cylinder head assembly • Service oil sump and oil pump • Service piston and connecting rod assembly • Service flywheel, crank shaft, camshaft and its bearings and gear • Service cylinder block • Check and adjust valve clearances as per procedure and recommended specification • Refit all the accessories • Refill all the required coolant and lubricants as per standard specification • Start the engine and observe reading of dashboard gauges and record Engine Performance
7th to 10th Week Overhaul clutch, gearbox transmission and brake of power tiller.	• Ascertain and select tools and materials for the job and make this available for use in a timely manner. • **8th Week : Mid-Semester Examinations** • Plan work in compliance with standard safety norms. • Remove major assemblies of power tiller • Dismantle transmission, clutch and brake • Servicing and replace / repair components of transmission, clutch and brake • Assemble transmission, clutch and brake components • Carry out field operation of power tiller without implements.

11th 13th Week	
Identify and check functionality of major components and assemblies of rotavator	• Select, care and use of PPE while dismantling and assembling of rotavator. • Select tools and materials for the job and make this available for use in a timely manner. • Use the tools and equipment in the way specified by manufacturers to dismantle and assembles of rotavator. • Carryout their dismantling and assembling of machineries by reviewing: ❖ technical data ❖ removal and replacement procedures • Carry out workshop adjustments of rotavator. • Adjust the tynes components correctly where necessary to ensure that they operate to meet the specified operating requirements.
14th to 16th Week	
Periodical maintenance and troubleshooting of power tillers.	• Identify the common fault and take corrective action for power tiller as per technical manual. • Conduct appropriate and target oriented discussions with higher authority, where an replacement is uneconomic or unsatisfactory to perform. • Use testing methods that comply with the manufacturer's requirements • Adjust the unit's components correctly where necessary to ensure that they operate to meet the specified operating requirements. • Ensure replaced components and assemblies conform to the specified operating specification. • Carry out field operations of power tiller with implements.

REFERENCES

1. Repair, Maintenance & Operation of Power Tiller, March 2011 Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
2. Mechanic Tractor, February 2016 Sector : Automobile, Common for Mechanic Tractor / Mechanic Agriculture Machinery, Trade: Practical, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
3. R K Ghosh & S Swain, 1993, Practical Agricultural Engineering, Naya Proksah publications, Kolkata, ISBN: 81-85421-15-3

LEARNING OUTCOME

- Students learn the components and its functions of power tiller.
- Students learn to operate the power tiller with suitable attachment in field conditions.
- Students learn to know the reasons for common trouble occur and how to rectify in the power tiller.

18FEMV0107 – OPERATIONAL SAFETY AND HEALTH EDUCATION (2 Credits)

OBJECTIVES:

- To teach safety precautions while handling farm equipments.
- To teach first aid methods and practice it on and off the field

UNIT–1 : Safety & Health **:** Introduction to Safety Management, Safety Policy under Factories 1948 Act, Dangerous Machineries Act, Safety Committee, Safety Review, Responsibility of Management, Safety Officers Duties & Responsibilities, Safety Targets, Objectives, Standards, Practices and Performances. Motivation & Communication as part of Safety Programme

UNIT–2: Occupational Hazards **:** Basics Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/Disorders & its prevention

UNIT–3: Accident & Safety **:** Need for Personal Protection Equipment, Selection, Use, Care & Maintenance of Respiratory and Non-respiratory Personal Protective Equipment, Non-respiratory Protective Devices of the operator, Accident Insurance Schemes

UNIT–4: First Aid **:** Burns, Fractures, Toxic Ingestion, Bleeding, Wounds and Bandaging, Artificial Respiration, Techniques of Resuscitation.

UNIT–5: Safety Health Practices **:** Health – Cleanness, Disposal of Waste , Ventilation and Temperatures, Dust & Fumes, Drinking Water, Lighting, Latrines & urinals. Safety - Fencing of machineries, Work on or near machinery in motion, Hoists and lifts, Pressure plants, Floors, Stairs and means of escape, Protection against fumes & gases, Safety offers. Welfare - Washing facilities in Dry clothing, Storing, Sitting, First Aid Appliances, Canteen, Shelters for rest & lunch, Crèches, Welfare offers, Right & Obligation of workers.

LECTURE SCHEDULE

No. of week (2 hrs. per week)	Topics covered
1st to 3rd Week	• Safety & Health • Introduction to Safety Management, • Safety Policy under Factories 1948 Act, Dangerous Machineries Act, • Safety Committee, Safety Review, Responsibility of Management, Safety Officers Duties & Responsibilities, Safety Targets, Objectives, Standards, Practices and Performances. Motivation & Communication as part of Safety Programme
4th to 6th Week	• Occupational Hazards **:** Basics Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic and Occupational Diseases / Disorders and its prevention
7th to 10th Week	• Accident & Safety **:** Need for Personal Protection Equipment, Selection, Use, Care & Maintenance of Respiratory and Non-respiratory Personal Protective Equipment, Non-respiratory Protective Devices of the operator, Accident Insurance Schemes

	• **8th Week : Mid-Semester Examination**
11th to 13th Week	• The practices of First Aid for Burns, Fractures, Toxic Ingestion, Bleeding, Wounds and Bandaging, Artificial Respiration and Techniques of Resuscitation
14th to 16th Week	• Safety Health Practices for Health, Cleanness, Disposal of Waste , Ventilation and Temperatures, Dust & Fumes, Drinking Water, Lighting, Latrines & urinals. • Fencing of machineries, Work on or near machinery in motion, Hoists and lifts, Pressure plants, Floors, Stairs and means of escape, Protection against fumes & gases, Safety offers. • Welfare - Washing facilities in Dry clothing, Storing, Sitting, First Aid Appliances, Canteen, Shelters for rest & lunch, Crèches, Welfare offers and Right & Obligation of workers.

REFERENCES

1. Preventive and Social Medicine, Published by Benarus Publication, 23rd Edison, Author: Parle & Parle
2. First Aid, Published by Jaypee Publication – 2nd Edison, Author: Ahuja
3. Operational safety and health education 2015 published by National Instructional Media Institute, Directorate General of Employment & Training, Chennai.

LEARNING OUTCOME

- Students able to learn the safety guidelines while handling farm equipments.
- Students able to handle first- aid methods to safeguard the injured person.

SECOND SEMESTER

18ENGU02G2: GENERAL ENGLISH II

(Language II Course – 3 Credits/3 Hours/wk.)

Objectives:

- To build on the English language skills of students initiated in the previous semester; and
- To focus on the language skills of the learners in a graded manner.

UNIT–I: Grammar

- Adjectives
- Determiners
- Verbs & Tenses
- Subject-Verb Agreement

UNIT–II Listening

- Teacher/Peer Readings
- Story Narrations

UNIT–III Speaking Skills

- Basic conversation
- Narration of events

UNIT–IV Reading & Vocabulary

- Graded reading comprehension passages

UNIT–V Writing Skills

- Narrative paragraphs
- Note Making

Textbook:

General English II Textbook/Course Material - Prepared by the School.

Reference Book:

Seaton, Anne & Y.H. Mew. *Basic English Grammar Book 1.* Irvine: Saddleback, 2007. Print.

18FEMV0208 – WORKSHOP CALCULATION AND SCIENCE–II (3 Credits)

OBJECTIVE:

- To teach the principles of lever, moments, friction, heat and temperature, basic electricity and capacitors

UNIT–1: Levers and moments **:** The principle of moments - the bell crank lever, a practical application of the bell crank lever in vehicle. Axle loadings, a steering mechanism as a machine

UNIT–2: Friction **:** Definition of friction, Coefficient of friction, Static friction, Sliding friction; Making use of friction – Clutch- Torque & power transmitted by a plate clutch and Example calculation, Belt drive- Torque & power transmitted by a belt drive and Example calculation, speed ratio of belt drive.

UNIT–3: Heat and temperature **:** Definition, units, differences, boiling point, melting point, temperature measuring instruments, specific heat, transmission of heat, expansion of solids, liquids, gaseous, quantity of heat with practical examples - thermal conductivity.

UNIT–4: Basic Electricity **:** Introduction, sources of electricity, uses of electricity, classification, types of electric current, advantages, simple electric circuits, ohms law, insulating materials, electrical conductors, electric power, horse power, work and energy, concept of earthing**.**

UNIT-5: Capacitors - Capacitance, Capacitors in circuits- Contact breaker ignition circuit – Electronic principles- Introduction, Semiconductors- Effect of dopants, Electrons and holes; Light Emitting Diode (LED)- Voltage and current in an LED, Basic operation of transistor, Current gain in transistor, Current flow in transistors; Transistor circuit used in automotive applications- Voltage amplifier, Darlington pair, Heat sink.

LECTURE SCHEDULE

No. of week (3 hrs. per week)	**Topics covered**
1st to 3rd Week	• Formulae for Perimeter and Area of Plane figure. • Rectangle, Square, Parallelogram, Triangle, Hexagon, any regular polygon, Trapezium, Circle, sector, Fillet, Ellipse, segment of a circle; Formulae for Volume and surface area of solids. • Rectangular solid, Prism, cylinder, pyramids and cones, Frustum of pyramid and cones, sphere, Hollow sphere, segment of sphere, circular ring, spherical sector. • Calculation of volume and weight of simple solid bodies such as cubes, square and hexagonal prism-shop problem.
4th to 6th Week	Heat and temperature; • Thermodynamic temperature scale (Kelvin); • Cooling system temperature; • Standard temperature and pressure (STP); • Thermal expansion with calculation; • Heat- Sensible heat, Latent heat, Specific latent heat, Specific heat capacity, Quantity of heat with calculation; Heat transfer • Conduction, Convection, Radiation
7th to 10th Week	• Heating, expansion and compression of gases • Absolute pressure, Absolute temperature

	• **8th Week : Mid-Semester Examinations** • Laws relating to the compression and expansion of gases • Heating a gas at constant volume, Heating a gas at constant pressure, Charles' law. • Expansion or compression at constant temperature - isothermal
11th to 13th Week	• Internal combustion engines- • Engine power-Brake power, Horsepower, Mean effective pressure, Calculation of indicated power, • Cylinder pressure vs. crank angle, Mechanical efficiency of an engine, Volumetric efficiency, • Torque vs. engine speed, Specific fuel consumption vs. engine speed, Brake power, torque and SFC (Specific Fuel Consumption) compared, Brake mean effective pressure • Thermal efficiency, Indicated thermal efficiency, Brake thermal efficiency petrol vs. Diesel.
14th to 16th Week	• Fuels and combustion • Calorific value, Combustion-Products of combustion, Relevant combustion equations. • Air–fuel ratio-Petrol engine combustion, Detonation, Preignition, Octane rating, Diesel fuel, Flash point, Pour point, Cloud point, Biofuels, Liquefied petroleum gas (LPG), • Hydrogen, Zero emissions vehicles (ZEVs)

TEXT BOOKS

1. Sanjay Kumar, 2007, A Text Book of Tractor at a Glance, International book distributing company, Lucknow
2. Senthilkumar, T., R. Kavitha and V.M.Duraisamy, 2015. A Text Book of Farm Machinery**,** Thannambikkai Publications, Coimbatore. ISBN: 978-9381102305
3. Jagadishwar Sahay, 2010. Elements of Agricultural Engineering**.** Standard Publishers Distributors, New Delhi. ISBN: 978 – 818040440
4. Workshop Calculation & Science, 2015, NIMI Publications, Chennai

LEARNING OUTCOME

- Students learn the basic principles of lever, moments, friction, heat and temperature, basic electricity and capacitors
- Students learn to calculate the moment, torque, thermal conductivity, heat loss and heat gain, simple electric circuit, electric power, work and energy

18FEMV0209 – ENGINEERING DRAWING–II (3 Credits)

OBJECTIVE:

- To read and interpret drawings, identify different drawing projections, free hand sketching of machine and tractor engine systems.
- To acquire knowledge about the free hand sketching of farm machineries.
- To simulate the shape and size of the components proportionately to the original

UNIT–1 : Read and interpret drawings- Determine information from the title block, Read and interpret industrial prints, Read and interpret detailed and assembly drawings, Identify casting drawings and machining drawings, Read and interpret diagrams, Distinguish between a mono detail and a multi detail drawing.

UNIT–2: Drawing of I.C. engine – Diesel and their parts. Sketching of Diesel cycle, valves and valve timing diagram. Free hand sketch of piston assembly, Free hand sketching of piston gudgeon pins rings and connecting rod. Free hand sketching of crank shaft and cam shaft showing all parts. Free hand sketching of cylinder block and cylinder head, cylinder liners.

UNIT–3: Free hand sketching of different cooling system -showing all necessary parts such as water pump, thermostatic valve, Radiator etc. Free hand sketching of lubrication system, showing all necessary parts such as filters, oil pump, pressure release valve etc. Free hand sketching of power take off (PTO) system. Freehand sketching of steering system. Free hand sketching of charging system and solenoid switch circuit.

UNIT–4: Free hand sketching of different tillage implements and their components; Free hand sketching of rotavator, harrows, cultivators and their components.

UNIT–5: Free hand sketching of seed drills and seed planters and their components; Free hand sketching of weeders, bund former, ridger and their components.

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	Read and interpret detailed and assembly drawings
4th to 6th Week	Free hand sketching of different IC engine components
7th to 10th Week	Free hand sketching of different components in tractor systems **8th Week : Mid-Semester Examinations**
11th to 13th Week	Free hand sketching of different tillage implements
14th to 16th Week	Free hand sketching of sowing and weeding implements

REFERENCES:

1. Sanjay Kumar, 2007, A Text Book of Tractor at A Glance, International book distributing company, Lucknow
2. K.V. Natarajan, 2006 A text book of engineering graphics, Dhanalakshmi Publishers, Chennai.
3. M.B. Shah and B.C. Rana, 2005, Engineering drawing, Pearson education.
4. K.V. Natarajan, 2006 A text book of engineering graphics, Dhanalakshmi Publishers, Chennai.
5. N.D. Bhatt, 2003, Engineering Drawing, Chaotar publishing house 46th edition.
6. K.R. Gopalakrishnan.1998 Engineering Drawing (Vol. I & II) Subhas Publications
7. Luzadder and Duff, 2001, Fundamentals of Engineering Drawing Prentice Hall of India Pvt Ltd XI edition
8. K. Venugopal, 2002. Engineering graphics, New Age International(p) Limited.

LEARNING OUTCOME

- Students can read and interpret drawings, identify different drawing projections, free hand sketching of machine and tractor engine systems
- The student will be able to understand the shape and size of the components of the tractor, power tiller, tillage implements, rotavator, harrows, cultivator, seed drills, weeders, bund former and ridger

18FEMV0210 – BASIC WORKSHOP (3 Credits)

OBJECTIVE:

- To familiarize with the basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
- To familiarize with the production of simple models in the above trades.

UNIT–1: Welding**:** Tools and equipments - Arc welding of butt joint, tap joint, tee fillet, etc, Demonstration of gas welding. Heat treatment process-annealing, normalizing, hardening and tempering.

UNIT–2: Fitting**:** Tools and equipments - Practice in chipping, filing, drilling, grinding, making vee joints, square and dove tail joints. Tap and dies and hand reamers.

UNIT–3: Carpentry**:** Tools and equipments - Planning Practice - making halving joint and dove tail joint models, limits, fits, and tolerances with examples used in auto components

UNIT– 4: Plumbing**:** Tools and equipments - types of joints, treading fitting for different types of pipes-GI, PVC, HDPE. Study of different type of screws, nuts, studs, bolts and locking devices.

UNIT–5: Smithy: Tools and equipments-Demonstration of making simple parts like keys, bolts, etc. sheet metal operations-shearing, banding, drawing and squeezing

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	Manufacture components with different types of welding process in the given job.
4th to 6th Week	Perform basic fitting operations used in the workshop practices and inspection of dimensions
7th to 10th Week	Perform carpentry operations used in the workshop practices and inspection of dimensions **8th Week : Mid-Semester Examinations**
11th to 13th Week	Perform plumbing operations used in the workshop practices and inspection of dimensions
14th to 16th Week	Produce sheet metal components using various sheet metal operations

REFERENCES:

- S.K. Hajra Choudhury, A.K. Hajra Choudhury and Nirjhar Roy, 2001, Elements of Workshop Technology-Vol.1; Manufacturing processes, Media Promoters and Publishers Pvt, Ltd. Mumbai.

LEARNING OUTCOME

- Students learn the tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
- Students able to produce of simple models in the above trades.

18FEMV0211 – SERVICE AND MAINTENANCE OF TILLAGE EQUIPMENTS (3 Credits)

OBJECTIVES:

- To teach field adjustments for achieving proper ploughing
- To teach replacement of worn out parts.

Identification of the components, adjustments in depth control, dismantling and assembling of the components and method of hitching with tractor / power tillers

UNIT–1: Mould board plough and Chisel plough

UNIT–2: Disc plough and Reversible disc plough

UNIT–3: Rotavator

UNIT–4: Cultivator and Five Bottom plough

UNIT–5: Offset Disc Harrow

PRACTICAL SCHEDULE (3 hrs. per week)

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	• Carryout their dismantling and assembling of Mould board plough and Chisel plough • Carryout hitching of Mould board plough and sub soiler / chisel plough • Identify the common adjustments and take corrective action for machineries system as per technical manual • Ensure replaced components and assemblies conform to the specified operating specification. • Estimate the cost of operation of machineries in field condition.
4th to 6th Week	• Carryout their dismantling and assembling of Disc plough and Reversible disc plough • Carryout hitching of Disc plough and Reversible disc plough • Identify the common adjustments and take corrective action for machineries system as per technical manual • Ensure replaced components and assemblies conform to the specified operating specification. • Estimate the cost of operation of machineries in field condition.
7th to 10th Week	• Carryout their dismantling and assembling of Rotavator • Carryout hitching of Rotavator • **8th Week : Mid-Semester Examinations** • Identify the common adjustments and take corrective action for Rotavator as per technical manual • Ensure replaced components and assemblies conform to the specified operating specification. • Estimate the cost of operation of machineries in field condition.

11th to 13th Week	• Carryout their dismantling and assembling of Cultivator and Five Bottom plough • Carryout hitching of Cultivator and Five Bottom plough • Identify the common adjustments and take corrective action for machineries system as per technical manual • Ensure replaced components and assemblies conform to the specified operating specification. • Estimate the cost of operation of machineries in field condition.
14th to 16th Week	• Carryout their dismantling and assembling of Offset Disc Harrow • Carryout hitching of Offset Disc Harrow • Identify the common adjustments and take corrective action for Offset Disc Harrow as per technical manual • Ensure replaced components and assemblies conform to the specified operating specification. • Estimate the cost of operation of Offset Disc Harrow in field condition.

REFERENCES

1. Repair, Maintenance and Field Operation of Tillage Equipments, March 2011, Sector: Agriculture. For Modular Employable skills developed by National Instructional Media Institute, DGET, Ministry of Labour & Employment, Government of India, Chennai.

2. Ojha, T.P and A.M.Michael 2005. Principles of Agricultural Engineering VOL I. Jain Brothers, New Delhi. ISBN: 978-8186321638

3. Er. Sanjay Kumar, Er. Vishal Kumar and Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8

LEARNING OUTCOME

- Student will acquire skill for adjusting the controls available in the plough, harrows to reach the maximum output
- Students learn to replace the worn out parts in tillage equipments.

18FEMV0212 – SERVICE AND MAINTENANCE OF SOWING AND WEEDING EQUIPMENTS
(3 Credits)

OBJECTIVES:

- To teach skills in handling of different types of seed planters and transplanters.
- To teach on seed calibration.
- To teach operation of different types of weeders in field conditions

Identification of the components, adjustments in depth control, calibration of seed drill, dismantling and assembling of the components and method of hitching with tractor / power tillers

UNIT–1: Manually operated seed drill- Dibbler, Broad casting devices, Direct paddy seeder

UNIT–2: Power tiller drawn seed planter

UNIT–3: Tractor drawn seed planter, Broad bed furrow cum seeder, vegetable planter

UNIT–4: Transplanter- Manually operated rice transplanter and self propelled rice transplanter- Mat nursery, Pro-tray Seeder, Automatic Pro-tray seeder

UNIT–5: Manually operated- Dry land weeders, Cono weeder and Power weeder.

PRACTICAL SCHEDULE (3 hrs. per week)

No. of week (3 hrs. per week)	Topics covered
1st to 5th Week	Identify and check functionality of major components and assemblies and servicing of the following sowing equipments (i) Manually operated seed drill; (ii) Dibbler, (iii) Broad casting devices; (iv) Power tiller drawn seed planter; (v) Tractor drawn seed planter; (vi) Broad bed furrow cum seeder; and (vi) Vegetable planter
6th to 10th Week	Identify and check functionality of major components and assemblies and servicing of the following sowing equipments (i) Direct Paddy Seeder; (ii) Manually operated rice transplanter; (iii) Self propelled rice transplanter; (iv) Mat nursery and Pro-tray Seeder; and (v) Automatic Pro-tray seeder **8th Week : Mid-Semester Examinations**
11th to 16th Week	Identify and check functionality of major components and assemblies and servicing of the following weeding equipments (i) Dry land weeders; (ii) Cono weeder; and (iii) Power weeder

REFERENCES

1. Repair, Maintenance & Field Operation of Seed Drills, March 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai
2. Repair, Maintenance & Field Operation of Planters and Transplanter, May 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
3. Er. Sanjay Kumar, Er. Vishal Kumar and Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8

LEARNING OUTCOME

- Student will acquire skill in handling of different types of seedling, planter, transplanter and practice on field adjustments and operates different types of weeders in field conditions
- Students learn to calibrate the seed drill based on crop.

18FEMV0213–SERVICE AND MAINTENANCE OF PLANT PROTECTION EQUIPMENTS
(3 Credits)

OBJECTIVES:

- To teach different types of sprayers and dusters and its application in field conditions.
- To teach the common troubles occurred in sprayers and its remedies.
- To teach safety operations while handling sprayers.

Identification of the components, adjustments in spraying, dismantling and assembling of the components and selection of suitable sprayer based on the application.

UNIT–1: Lever operated Knapsack sprayer, Foot sprayer, Foot rocker sprayer

UNIT–2: Battery operated Knapsack sprayer, Hand sprayer, Hand held ULV sprayer

UNIT–3: Power sprayer, Power duster, Hand rotary duster

UNIT–4: High volume sprayer, Unimobile sprayer, Avenger ULV sprayer

UNIT–5: Tractor operated Tall tree sprayer

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 5th Week	Identify and check functionality of major components and assemblies and servicing of the following spraying equipments i. Lever operated Knapsack sprayer ii. Foot sprayer iii. Foot rocker sprayer iv. Hand sprayer v. Hand held ULV sprayer
6th to 10th Week	Identify and check functionality of major components and assemblies and servicing of the following spraying and dusting equipments i. Battery operated Knapsack sprayer ii. Power sprayer iii. Power duster iv. Hand rotary duster **8th Week : Mid-Semester Examinations**
11th to 16th Week	Identify and check functionality of major components and assemblies and servicing of the following spraying equipments i. High volume sprayer ii. Unimobile sprayer iii. Avenger ULV sprayer iv. Tractor operated Tall tree sprayer

REFERENCES

1. Repair & Maintenance of Spraying and Dusting Equipments, March 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai
2. Fundamentals of Agricultural Engineering, 2012, Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu, Published by Kalyani Publishers, Chennai ISBN: 978-93-272-2168-8
3. Dr. T. Senthilkumar, Dr. R. Kavitha, Dr. V. M. Duraisamy, 2015, A Text Book of Farm Machinery, Published by Thannambikkai publication, Coimbatore, ISBN: 978-93-81102-30-5

LEARNING OUTCOME

- Student acquire skill in operation and maintenance of different types of sprayers and dusters and its application in field conditions
- Student identify the reasons for repair and learn the remedies of the sprayer and duster
- Student become expert in the operation and field adjustments of these machines

18FEMV0214–SERVICE AND MAINTENANCE OF SOIL FORMING AND LAND SHAPING EQUIPMENTS (3 Credits)

OBJECTIVES:

- To teach operation of soil forming and land shaping equipments.
- To teach field adjustments and maintenance of equipments

Identification of the components, adjustments in depth control, dismantling and assembling of the components and method of hitching with tractor / power tillers

UNIT–1: Earth Moving Equipments: Leveller, Laser Leveller, Terracer, Dumper, Wheel dozer and Chain dozer

UNIT–2: Ridger and Bund Former

UNIT–3: Bed former and Posthole digger

UNIT–4: Plastic mulching equipment

UNIT–5: Wet land equipments- Puddler, Trampler and cage wheel

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 5th Week	Identify and check functionality of major components and assemblies and servicing of the following earth moving equipments (i) Leveller; (ii) Laser Leveller (iii) Terracer (iv) Dumper (v) Wheel dozer (vi) Chain dozer
6th to 10th Week	Identify and check functionality of major components and assemblies and servicing of the following machineries (i) Ridger; (ii) Bund Former; (iii) Bed former; and (iv) Posthole digger **8th Week : Mid-Semester Examinations**
11th to 16th Week	Identify and check functionality of major components and assemblies and servicing of the following machineries i. Plastic mulching equipment ii. Wet land equipments (a). Puddler (b). Trampler (c). Cage wheel

REFERENCES

1. Repair, Maintenance & Field Operation of Land Shaping and Development Machinery, March 2011, Sector: Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
2. Repair, Maintenance & Field Operation of Soil Farming Equipments, March 2011, Sector: Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
3. Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai ISBN: 978-93-272-2168-8
4. Ojha, T.P and A.M.Michael 2005. Principles of Agricultural Engineering VOL I. Jain Brothers, New Delhi. ISBN: 978-8186321638

LEARNING OUTCOME

- Students acquire skill in operation of soil forming and land shaping equipments.
- Student become expert in adjustments and maintenance of machine to reach highest efficiency

18FEMV0215 – IN-PLANT TRAINING – I (6 credits)

OBJECTIVE: To learn skills for specific job role from relevant Industry / Institution.

Students have to undergo four weeks training in any Agricultural Machinery Manufacturing Industry / Training Institutes to acquire relevant skills. The in-plant training may be organized continuously for four weeks or more than one spell within a semester as per the convenience of the Industry/Institutes. During their stay in the industry, they have to maintain a diary on daily basis to record the work assigned, outcome of the work and it has to be countersigned by the student's in-charge. In addition, he/she has to submit weekly report to the department. During the in-plant training period, the Industry / Institute partner will evaluate their performance for 60 marks and the concerned course teacher for 40 marks as given below

INDUSTRY/ INSTITUTE

1	Attitude	10 marks
2	Punctuality	
3	Behavior	
4	Involvement	10 marks
5	Performance (completion of assigned work)	20 marks
6	Contribution to the industry	20 marks
	Total	**60 marks**

COURSE TEACHER

1	Diary /Record	10 marks
2	Weekly report	10 marks
3	Viva –voce	20 marks
	Total	**40 marks**

LEARNING OUTCOME

- Students learn the work culture from the concerned industry
- Students learn to handle special tools used in assembling and dismantling of machinery components.

THIRD SEMESTER

18EVSU0001- ENVIRONMENTAL STUDIES (4 Credits)

OBJECTIVES:

- To teach the importance in conservation of environment and natural resources.
- To teach causes, effects and control measures of environmental pollution.
- To teach the concepts of disaster management and preparedness to overcome

UNIT–1 : Natural Resources : Introduction to Environment and natural resources (Definition, scope and important) – Forest Resources: Use and over-exploitation of forest resources and its impact on forest and tribal people – Water Resources: Use and over-exploitation of water and impact – Land Resources: Land degradation and soil – erosion, desertification – Food Resources: Effects of modern agriculture, fertilizer-pesticide problems – Energy Resources: Growing energy needs renewable and non-renewable energy source-use of alternative energy sources.

UNIT–2: Ecosystem and Biodiversity: Concept of an ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem - Food chains, food webs and ecological pyramids – Types of ecosystem – Biodiversity: genetic, species and ecosystem diversity, India as a mega – diversity nation – Treats to biodiversity : habit loss, poaching of wild life, man-wildlife conflicts; Endangered and endemic species of India – Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT–3: Environmental Pollution: Causes, effects and control measure of: Air pollution, Water pollution, Soil pollution, Noise pollution and Nuclear hazards, Solid waste management, Global environmental problems.

UNIT–4: Social Issues and the Environment : Sustainable development, Rural Urban problems related to environment, Water management and rain water harvesting – Environment ethics: Issues and possible solutions, Environmental Protection Policy, Acts and Legislation, Population and the Environment – Environmental and Population concern: Environment and human health, Environment education at various levels – HIV/AIDS, Women and child welfare, gender issues, gender equity, institutions for gender studies / research.

UNIT–5: Disaster Management: Disaster: Meaning and concepts, types, causes and management – Effects of disaster on community, economy, environment – Disaster management cycle : early response, rehabilitation, reconstruction and preparedness – Vulnerability Analysis and role of community in Disaster Mitigation – The Disaster Management Act 2005 – Disaster Management Authority : National, State and District level – Ill effects of fireworks.

LECTURE SCHEDULE

No. of week (4 hrs. per week)	Topics covered
1st to 3rd Week	• Natural Resources : Introduction to Environment and natural resources (Definition, scope and important) • Forest Resources: Use and over-exploitation of forest resources and its impact on forest and tribal people • Water Resources: Use and over-exploitation of water and impact • Land Resources: Land degradation and soil – erosion, desertification • Food Resources: Effects of modern agriculture, fertilizer-pesticide problems • Energy Resources: Growing energy needs renewable and non-renewable energy source-use of alternative energy sources.

4th to 6th Week	• Ecosystem and Biodiversity: Concept of an ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem - Food chains, food webs and ecological pyramids – Types of ecosystem • Biodiversity: genetic, species and ecosystem diversity, India as a mega – diversity nation • Treats to biodiversity : habit loss, poaching of wild life, man-wildlife conflicts; Endangered and endemic species of India • Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity.
7th to 10th Week	• Causes, effects and control measure of Air pollution, Water pollution, Soil pollution, Noise pollution and Nuclear hazards, Solid waste management, Global environmental problems. • **8th Week : Mid-Semester Examinations**
11th to 13th Week	• Social Issues and the Environment : Sustainable development, Rural Urban problems related to environment, Water management and rain water harvesting • Environment ethics: Issues and possible solutions, Environmental Protection Policy, Acts and Legislation, Population and the Environment • Environmental and Population concern: Environment and human health, Environment education at various levels – HIV/AIDS, Women and child welfare, gender issues, gender equity, institutions for gender studies / research.
14th to 16th Week	• Disaster Management: Disaster - Meaning and concepts, types, causes and management – Effects of disaster on community, economy, environment • Disaster Management Cycle: early response, rehabilitation, reconstruction and preparedness – Vulnerability Analysis and role of community in Disaster Mitigation – The Disaster Management Act 2005 • Disaster Management Authority: National, State and District level–Ill effects of fireworks.

REFERENCES

1. Asthana, D.K., Meera Asthana, 2006, A text book of Environmental Studies, S.Chand & Company Ltd., New Delhi.
2. Benny Joseph, Tata Macgraw, 2005, Environmental Studies, Hill Publishing Company, New Delhi
3. Erach Bharueha, 2005, A text book of Environmental Studies, UGC, University Press, New Delhi.
4. Palanithurai, G, 2009, Panchayats in Disaster: Preparedness and Management, Concepts Publishing company.
5. Thangamani and Shyamala, 2003, A text book of Environmental Studies, Pranav Syndicate, Publication Division, Sivakasi.

LEARNING OUTCOME

- Students able to learn in-situ and ex-situ conservation of bio-diversity
- Students able to learn the control measures of environmental pollution

18SSNU0001 SHANTI SENA (FC)
(Foundation Course: Mandatory for all UG Students)
(1 Credit)

Evaluation: Internal Test and Viva Voce (both components carry equal weightage) by the course teacher

Credit: One **Max. Marks.50**

Objectives:

- To introduce the concept and practice of Shanti Sena (Peace Brigade) to the students.
- To give exposure and training to students in the skills needed for Nonviolent Conflict Resolution through Shanti Sena.

Learning Outcome:
Students will be able to:

- Comprehend the concept of Nonviolence, Shanti Sena and Methods of Peaceful Resolution of conflicts in their personal and social life.
- Shape and evolve themselves as peace makers and promoters of harmony and good will.

Unit I **Shanti Sena:** Meaning and conceptual framework – historical development - Organisation and functions of Shanti Sena: Shanti Kendras, All India Shanti Sena Mandal - Peaceful resolution of conflicts, Peace Making, Alternative to Defense and Violence.

Unit II **Skills and Training for Shanti Sena:** Skills of First Aid and Skills for disaster management, Peace Making Skills(Conflict Resolution and Counseling) and Transforming oneself into a Shanti Sainik.

Unit III **Shanti Sena in India and Abroad:** Contributions of Mahatma Gandhi, Khan Abdul Ghaffar Khan, Vinoba Bhave, Jayaprakash Narayan, Narayan Desai. Dr.G.Ramachandran and S.N.Subba Rao.

Unit IV **Organisations promoting Shanti Sena Studies, Training, Research and Action:** Shanti Sena Vidyalaya (Vedchhi), Unit of Shanti Sena in Gandhigram Rural Institute, Centre for Experiencing Socio-cultural Interaction (CESCI), Madurai, G.Ramachandran Institute of Nonviolence, Thiruvanantapuram, Vinoba Bhave - Venkateshwar Rao Institute of Shanti Sena, Manjeswaram.

Unit V **Experiments in Nonviolent Conflict Management and Peace:** Peace Brigade International, U.N. Peace Keeping Force, War Resisters' International (WRI), Non-killing Global Academy (Honolulu), Quakers Movement (Friends) and Sarvodaya Shramadana Sangamaya Shanti Sena Units, Sri Lanka.

REFERENCES:

- Arunachalam K., (1985), Gandhi - The Peace Maker, Gandhi Smarak Nidhi, Madurai.
- Dennis August Almeida (2007), The Training of Youth In Nonviolence as a way to Peace, Gandhi Media Centre, Delhi and Thiruvananthapuram.
- Narayan Desai, (1972), Towards Non-Violent Revolution, Sarva Seva Sangh Prakashan, Varanasi.
- ……, (1963), A Hand Book for Shanti Sainiks, Sarva Seva Sangh Prakashan, Varanasi.
- ……, (1962), Shanti Sena in India, Sarva Seva Sangh Prakashan, Varanasi.
- Radhakrishnan.N. Dr., (1989), Gandhi and Youth: The Shanti Sena of GRI, Gandhigram Rural Institute, Gandhigram.
- ……, (1997), Gandhian Nonviolence: A Trainer's Manual, Gandhi Smiriti and Darshan Samiti, New Delhi.
- Ravichandran .T., (1999) *Communalism in Tamil Nadu (1979- 1991) and the Way Out,* Gandhi Media Centre, Madurai.
- Ramjee Singh, (2003), Shanti Sena: A Guide, Sarva Seva Sangh Prakashan, Varanasi.
- Suresh Ram, Vinoba and His Mission, Sarva Seva Sangh Prakashan, Varanasi.
- Thomas Weber (1996), Gandhi's Peace Army: The Shanti Sena and Unarmed Peace keeping.
- Vinoba Bhave (1961), Shanti Sena, Akhil Bharat Sarva Seva Sangh Prakashan, Varanasi.
- William Baskaran, M., (1998), Shanti Sena: A Gandhian Vision, Gandhi Media Centre, Madurai.

★★★

18CSKU0201: SOFT SKILLS (For Sciences)

(Compulsory Soft Skills Course – 2 credits – 2 hours/wk.)

Objectives:

- To help the students improve their communication skills; and
- To enhance their holistic development and improve their employability skills.

Unit I

- Introducing Soft Skills
- Effective Communication for Success

Unit 2

- Influencing Skills
- Lateral Thinking Skills

Unit 3

- Time Management
- Presentation Skills

Unit 4

- Effective Team Work Skills
- Inter-personal Skills

Unit 5

- Interviewing Skills
- Negotiation Skills

Textbook:

Antonysamy and Chandra. *Soft Skills and Personality Development: A Handbook of Employability Skills.* Chennai: Vijay Nicole, 2012.

Assessment: There is no ESE. Assessment is totally internal and is performance-based.

18FEMV0316 - ENGINEERING SURVEY (3 Credits)

OBJECTIVE:

- To measure the regular and irregular areas of a agricultural field by using chain survey.
- To prepare contour map and level difference of a given field by using levelling.

UNIT–1: Surveying--definition and purpose; classification of surveying; units of measurement of length and area; scales; measurement of horizontal distance--chains, types of chains, tapes. Ranging rod, arrows, plump bob-its functions and usage.

UNIT–2: Chaining–method of chaining on level ground and on sloping ground; direct method and indirect method of stepping; errors and corrections in chaining; laying out right angles and offsets.

UNIT–3: Cross staff survey; Obstacles in chaining; triangulation method of chain survey; ordinate method –average ordinate, mid ordinate, traphezoidal, and simpson method to determine areas of regular and irregular fields.

UNIT–4: Leveling, definition, terminology, leveling equipments, dumpy level, leveling of dumpy level, leveling staff, methods of calculation of reduced level, the collimation system and the rise and fall system

UNIT–5: Types of leveling simple leveling, and differential leveling, contouring, uses of contours, and method of contouring, grid system, and plotting of contours.

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	• Survey – definition; classification; • units of measurement – length and area; • chains purpose, different types of chains, and chain survey accessories.
4th to 6th Week	• Method of chaining on-level ground and on sloping ground; • Direct and indirect method of stepping; • Calculation of errors and correction in chaining; • Laying out right angles and offsets.
7th to 10th Week	• Work in a team to measurement of regular area by using cross staff survey – purpose and accessories required to conduct survey; • Obstacles in chaining – methods used to overcome the obstacles; • Measurement of irregular area by using ordinate methods – average ordinate, mid-ordinate, trapezoidal and Simpson rule. • **8th Week : Mid-Semester Examinations**
11th to 13th Week	• Leveling - definition, terminology used in leveling; • leveling equipments – dumpy level, leveling staff, its usage and handling methods; • computing the level difference by using rise and fall method and height of collimation methods.
14th to 16th Week	• Types of leveling – simple and compound leveling; • Leveling used to draw contours; Method of contouring – grid system, and • plotting of contours

REFERENCES:

1. Zamir Alvi, 2004. A Textbook of Surveying, Vikas Publishing House Pvt, Ltd, New Delhi.
2. Singhal, O.P. 1998. Agricultural Engineering, Aman Publishing house, Meerut.
3. Dr.Bimal Chandra Mil. 1995. Introduction to soil and water conservation engineering, Kalyani Publishers, Calcutta.
4. Saini, G.S. 1996. A textbook of soil and water conservation, Amman Publishing house, Meerut.
5. Murthy, V.V.N Zoos.2009 Land and water Management, Kalyani Publishing, New Delhi

LEARNING OUTCOME

- Students to know about measuring the regular and irregular areas of a agricultural field by using chain survey.
- Students able to prepare contour map and level difference of a given field by using levelling.

18FEMV0317- OPERATION & MAINTENANCE OF MICRO IRRIGATION SYSTEMS
(2 Credits)

OBJECTIVE:

- To teach skills of designing, installation and maintenance of micro irrigation systems.

UNIT–1: Importance of micro irrigation systems; relations between agronomy and micro irrigation, types of crops, types of soils, types of roots, identification of crop pattern, water requirement of different crops, and type of fertilizers.

UNIT–2: Design and layout plan of micro irrigation systems, survey of field, measurement of field, availability of water resources, shape and slope of field, designing fundamentals, spacing according to crops, and listing of crops to be produced.

UNIT–3: Components of micro irrigation system description and function of water pumps, control valves, filters, head-unit, laterals, emitters, back flow preventers, pressure regulator, flush valve, pipe/drip tape, connectors, micro sprinklers.

UNIT–4: Installation of micro irrigation system, installation of head unit, filters, valves, main and sub main line, trenching, adjusting length of drip line and testing of micro irrigation system.

UNIT–5: Maintenance of micro irrigation system cleaning of filters, pressure gauge readings, air valve and safety, valve cleaning, draining of drip lines, flushing of main line and sub main , changing emitters, removing and reinstallation of micro irrigation system and standard procedures of assembling and dismantling of micro irrigation system.

PRACTICAL SCHEDULE (2 hrs. per week)

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	Importance of micro irrigation system conditions favourable to adopt micro irrigation systems – suitability of crops, soil; water availability; suitable fertilizers for fertigation.
4th to 6th Week	Methods used to determine field area, land slope; Agronomic specifications of field crops; Measurement of water required for designing Micro Irrigation System.
7th to 10th Week	Identification and functions of the major components of drip irrigation and sprinkler irrigation systems; Types of and usage of drip irrigation and sprinkler irrigation systems. **8th Week : Mid-Semester Examinations**
11th to 13th Week	Installation of Micro Irrigation System based on crop / field layout as per the procedure prescribed by the manufacturing companies; After installation, checking the functions of different components involved in Micro Irrigation System
14th to 16th Week	Periodical maintenance and identify remedies for the troubles occur in operation of Micro Irrigation System as per the guidelines mentioned by the manufacturers.

REFERENCES:

1. Sharma, S.K. 1984. Principles and practices of irrigation Engg., S.Chand and Company Ltd., New Delhi.
2. Michael, A.M. and T.P.Ojha. 1987. Principles of Agricultural Engineering. Vol.2. Jain Brothers, New Delhi.
3. Michael, A.M. 1983. Irrigation Theory & Practice, Vikas Publishing house, New Delhi.
4. Sivanappan, R.K. and Karaigowder. 1997. Irrigation and Drainage, Popular Book Depot, Chennai.
5. Basak, N.N. 1999. Irrigation Engineering. TATA McGraw Hill, New Delhi.

LEARNING OUTCOME

Students learn skills of designing, installation and maintenance of micro irrigation systems.

18FEMV0318 - TRACTOR ENGINE SYSTEMS (4 Credits)

OBJECTIVE:

- To teach different systems of the tractor for effective functioning and maintenance.
- To teach components in each systems of a tractor.

UNIT–1: Engine Components – working principle & construction of cylinder heads, types of combustion chambers. Function of Engine Valves. Description & function of connecting rod, importance of big-end split obliquely. Description of crankshaft & Camshafts. Firing order of the engine. Description and function of the fly wheel and vibration damper, Timing mark.

UNIT–2: Fuel system – different parts of the system – working of the system, care of fuel system; air cleaner – types, working principles – governing system – functions, principles of operation and methods of governing system.

UNIT–3: Cooling systems:- Purpose, types, Cooling system components, water pump, function of thermostat, pressure cap, Recovery system & Thermo-switch. Function & types of Radiator;

UNIT–4: Lubrication system: - purposes & characteristics of oil, Type of lubricants, grade as per SAE, & their application, oil additives, type of lubrication system. Lubrication system components- different type of Oil pump, Oil filters & oil cooler. Probable reasons for low / high oil pressure, high oil consumption and their remedies.

UNIT–5: Ignition system – function, classification – CI system and SI system – different components of the system; Electrical system – different components of the system – battery, generator and starter motor; starting troubles and their remedies, battery maintenance

LECTURE SCHEDULE

No. of week (4 hrs. per week)	Topic covered
1st to 3rd Week	• Students able to know different engine components and the working principles, construction of cylinder, and different types of construction chambers. • Students able to know the functions of valves, description and function of connecting rod, importance of big and split obliquely. • Students able to explain the description and functions of crank shaft, com soft, fly wheel, vibration damper, timing mark and firing order of the engine.
4th to 6th Week	• Students able to know different part of fuel system and its working principle. • Students able to know the different types of Air Cleaner and its working principle. • Students able to explain the different types of governing systems and its operating principle and the methods of governing system.
7th to 10th Week	• Students able to know the different types of cooling systems, and its components like water pump, thermostat, pressure cap, recovery system and thermostat radiator, etc. • **8th Week : Mid-Semester Examinations** • Students able to know the different types of lubricants, SAE standards, and their application, oil additives, types of lubrication system, etc.

	• Students able to explain the various components of lubrication system, and different types of oil pumps, oil filters and oil coolers also the probable reasons for low / high oil pressure, high oil consumption and their remedies.
11th to 13th Week	• Students able to know the functions, classification of CI and SI ignition system. • Students able to know the different components of ignition system and electrical system. • Students able to explain the battery, generator, and starter motor and also the starting troubles and their remedies, battery maintenance.
14th to 16th Week	• Students able to know complete transmission system, clutch assembly and their types, gears and their function along with components. • Students able to know the functions and working principle of differential and differential lock. • Students able to explain the functions and components of hydraulic system, controls and their advantages also the different types of hitching of the implements and its operation.

TEXT BOOKS

1. Sanjay Kumar, 2007, A text book of tractor at a glance, International book distributing company, Lucknow
2. Senthilkumar, T., R. Kavitha and V.M.Duraisamy 2015. A text book of farm machinery**,** Thannambikkai Publications, Coimbatore. ISBN: 978-9381102305
3. Jagadishwar Sahay, 2010. Elements of Agricultural Engineering**.** Standard Publishers Distributors, New Delhi. ISBN: 978 – 818040440
4. Sanjay Kumar, 2007, A Text Book of Tractor at a Glance, International book distributing company, Lucknow

REFERENCE BOOKS

1. Ojha, T.P and A.M.Michael 2005. Principles of Agricultural Engineering, Vol I**.** Jain Brothers, New Delhi. ISBN: 978-8186321638
2. Nakra C.P 1970. Farm Machinery and Equipment**:** Dhanpat Rai Publishing Company Ltd, New Delhi ISBN : 978-8187433231
3. Sricastava, A.C., 1991. Elements of Farm Machinery**.** Oxford & IBH Publishing Co Pvt Ltd, New Delhi. ISBN: 978-8120405134

LEARNING OUTCOME

- Students know about different systems of the tractor for effective functioning and maintenance.
- Students able to identify the components in each system of a tractor.

18FEMV0319 – TRACTOR OPERATION AND SAFETY MEASURES (6 Credits)

OBJECTIVE:

- To teach the tractor operation in field conditions
- To teach precautions observed before, during and after tractor operation.

UNIT–1: Method of starting and to stopping a tractor – precautions observed while starting, operating and stopping a tractor

UNIT–2: General precautions observed in tractor systems – cooling, lubrication, air filter, fuel, transmission, hydraulic and electrical system and tyre pressure, dash board observations and noise observations.

UNIT–3: Ploughing of land – Methods of ploughing – Gathering and casting – Continuous ploughing method round and round ploughing – one way ploughing, ploughing with cage wheel and rotavator attachment.

UNIT–4: Periodical maintenance of tractors daily, weekly, monthly- as recommended by tractor manufacturer.

UNIT–5: Safety measures while operating the tractor; general safety and first aid; follow rules for tractor driving.

PRACTICAL SCHEDULE

No. of week (6 hrs. per week)	Topic covered
1st to 3rd Week	• Demonstration of starting and stopping of tractor – various safety measures to be followed.
4th to 6th Week	• Observations on various dash board meters – indications – remedies.
7th to 10th Week	• Noise observations – cause and remedies. • **8th Week : Mid-Semester Examinations**
11th to 13th Week	• Ploughing of field – practice various methods of ploughing
14th to 16th Week	• Daily – weekly – monthly maintenance and General Safety – First aid – rules of driving

TEXT BOOKS

1. Sanjay Kumar, 2007, A Text Book of Tractor at a Glance, International book distributing company, Lucknow
2. Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8
3. Dr. Jagdishwar Sahay, 2013, A Text Book of Elements of Agricultural Engineering, Standard Publishers Distributors, 1705-B, Naisarak, PB No:1066, Delhi-110 006, ISBN: 978-81-8014-204-8

LEARNING OUTCOME

- Students able to learn to operate the tractor with implement in field conditions
- Students able to learn the safety measures while operating the tractor in field conditions

18FEMV0320 – REPAIR, MAINTENANCE AND STORAGE OF TRACTOR (4 Credits)

OBJECTIVE:

- To teach preventive and brake down maintenance of Tractor
- To teach about safe storage of Tractor.

UNIT–1: Preventive maintenance – Steps – Schedule for engine – Tractor systems – Maintenance intervals – Maintenance of intake system of tractor engine.

UNIT–2: Maintenance of fuel system – Servicing fuel filters – Servicing of oil filters, air filters – Servicing of diesel fuel injection system.

UNIT–3: Maintenance of exhaust system – Cooling system – Maintenance of liquid cooling system – Air direct cooling system – General maintenance of ignition system – Lubrication system – Starting system

UNIT–4: Repair and adjustments of clutch – Repair and adjustments of Gear selection lever - Repair and adjustments of differential - Repair and adjustments of brake and steering

UNIT–5: Storage of Tractor – Important points to be taking into account – Maintenance of engine, Battery and tyres when tractor not in use for longer period.

PRACTICAL SCHEDULE

No. of week (4 hrs. per week)	Topic covered
1st to 3rd Week	• Preventive maintenance – Steps – Schedule for engine – Tractor systems – Maintenance intervals – Maintenance of intake system of tractor engine.
4th to 6th Week	• Maintenance of fuel system – Servicing fuel filters – Servicing of oil filters, air filters – Servicing of diesel fuel injection system.
7th to 10th Week	• Maintenance of exhaust system – Cooling system – Maintenance of liquid cooling system – Air direct cooling system – General maintenance of ignition system – Lubrication system – Starting system • **8th Week : Mid-Semester Examinations**
11th to 13th Week	• Repair and adjustments of clutch – Repair and adjustments of Gear selection lever - Repair and adjustments of differential - Repair and adjustments of brake and steering
14th to 16th Week	• Storage of Tractor – Important points to be taking into account – Maintenance of engine, Battery and tyres when tractor not in use for longer period.

REFERENCE BOOKS

1. Dr. Jagdishwar Sahay, 2013, A Text Book of Elements of Agricultural Engineering, Standard Publishers Distributors, 1705-B, Naisarak, PB No:1066, Delhi-110 006, ISBN: 978-81-8014-204-8
2. Tractor Mechanic 2015, published by National Instructional Media Institute, Chennai.

LEARNING OUTCOME

- Students know about different systems of the tractor for effective functioning and maintenance.
- Students learn periodical maintenance of a tractor.
- Students identify troubles and probable reasons for that.
- Students learn to maintain the tractor during storage period.

18FEMV0321 – OPERATION AND MAINTENANCE OF TRACTOR HITCH SYSTEM (4 Credits)

OBJECTIVE:

To teach the different hitching methods and control system of Tractors

UNIT–1: Hitching of tillage implements – Advantages of hitching– Terminology related to hitching

UNIT–2: Way of hitching – Draw bar hitch, Three point linkage – Advantages of three point linkage – Weight transfer and its calculation

UNIT–3: Three point hitch – Categories – Freelink operation, Restrained link operation

UNIT–4: Hitching of semi-mounted implements and hitching of trailed implements – Trailer hitches – military hitch and automatic hitch.

UNIT–5: Functions and use of draft control and depth control – Operation of control levers

PRACTICAL SCHEDULE

No. of week (4 hrs. per week)	Topic covered
1st to 3rd Week	• Hitching of tillage implements-necessity and advantages; Terminology related to hitching
4th to 6th Week	• Way of hitching-drawbar hitch and three point linkage-practice of tractor hitching with different farm implements.
7th to 10th Week	• Practice hitching of semi mounted implements in field conditions. • **8th Week : Mid-Semester Examinations**
11th to 13th Week	• Practice hitching of trailed implements in field conditions.
14th to 16th Week	• Identify the faults and remedies of three point hitch system • Practice on depth control and draft control under field conditions.

REFERENCE BOOKS

1. Sanjay Kumar, 2007, A Text Book of Tractor at a Glance, International book distributing company, Lucknow
2. Tractor Mechanic 2015, published by National Instructional Media Institute, Chennai

LEARNING OUTCOME:

- Students able to learn the different hitching methods and control system of Tractors

FOURTH SEMESTER

18CSAU04A1 – COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION (4 Credits)

OBJECTIVES

- To understand the basic concepts of computers
- To develop applications using MS word, MS excel and MS PowerPoint.

UNIT–1: Definition of a computer – computer terminologies – anatomy of a computer – generations of computers- types of computers – types of operating system- types of programming languages – assembler- translator – compiler – cross complier

UNIT–2: Input devices – output devices – storage devices – source data entry devices.

UNIT–3: MS–Word: Introduction – features – document creation – document editing: cursor movements – selecting text – copying text – moving text – finding and replacing text – spelling and Grammar – page setup – mail merge – table creation.

UNIT–4: MS – Excel: Introduction – advantages and application – organization of workbook – editing a worksheet – range – formatting worksheet – chart: creation – changing type – print options – built-in functions.

UNIT–5: Power point: introduction – features – creating presentation – viewing – saving and close presentation – changing layout – changing designs – slide transition – adding animation effects – inserting table, charts, pictures, clipart in presentation.

LECTURE / PRACTICAL SCHEDULE

No. of week (4 hrs. per week)	Topics covered
1st to 3rd Week Computer concepts	Students able to know about • Definition of a computer – Origin of Computer- Characteristics • Computer terminologies • Anatomy of a computer - generations of computers • Types of computers- types of operating system • Types of programming languages • Assembler - translator • Compiler – cross compiler • Discussion on recent trends and technology
4th to 6th Week Hardware devices	• Input devices –Keyboard-mouse-pointing devices • Output devices - printers- plotters- monitors • Storage devices - Floppy – Compact disk – external Hard disk – Pen drives – Flash Drive • Source data entry devices – Digital camera – Scanners – Voice Recognition System – fax machine - microphone • Surprise test/ slip test

7th to 10th Week MS-Word	• MS-Word: Introduction - features • Document creation - Document editing: cursor movements • **8th Week : Mid-Semester Examinations** • Selecting text - copying text - moving text • Finding and replacing text - Spelling and Grammar • Page setup - Table creation. • Mail Merge • Test on MS word shortcut keys
1th to 13th Week MS-Excel	• MS-Excel : Introduction - Advantages & applications - • Organization of workbook - Editing a worksheet - • Range - Formatting worksheet - • Chart: creation - changing type - Print options • Built-in functions. • Test on Excel Functions
13th to 16th Week MS-Power Point	• MS-Power Point: Introduction - features – • Creating presentation - viewing - saving and close presentation • Changing Layout - Changing Designs - Slide transition • Adding animation effects • Inserting table, charts, pictures, clipart in presentation. • Checking the creativity of Students

REFERENCES:

1. S.K.Bansal, 2002, Fundaments of Information Technology, A.P.H. Publishing company, New Delhi.
2. Joyce Cox, Joan Preppernau, Steve Lambert and Curtis Fyre, 2007, Microsoft Office System.

LEARNING OUTCOME

- Students understand the basic concepts of computers
- Students using MS word, MS excel and MS PowerPoint.

18SPOU0001- Sports and Games (0 + 2 Credits)

Course Objective:

To gain knowledge about the Sports and Games

Course Outcomes:

Students should be able to

- Explain the basic concepts of physical education
- Demonstrate skills in major games.
- Assess the fitness level
- Analyze basic skills involved in track and field events
- Outline the modern trends and development in Physical Education.

UNIT–I: Concept, meaning and Definition of Physical Education – Aims and Objectives of Physical Education - Scope of Physical Education.

UNIT–II: Concept of Fitness, aerobic and anaerobic exercises - practice of high and low intensity of aerobic and anaerobic exercises - procedure for Yo Yo fitness test.

UNIT–III: Basic skills of Indigenous games (Kabaddi and Kho-Kho) - Basic skills of any Two of the major games (Basketball, Football, Hockey and Volleyball) – any two events in Track and Field Events.

UNIT–IV: Concept and meaning of Intramural and Extramural tournaments – Types of Tournaments - Methods to draw the fixture for knockout and league tournaments – Recreational activities (Minor games).

UNIT–V: Personal Hygiene – Safety education with special reference to playfield – Modern trends in Physical Education - Nutrition and Sports diet - Common athletic injuries and first-aid. Preparation of Physical Education record / album in the area of specialization of one of the major game and two track and field events is a must for each student.

Text Books:

1. Anderson “School Health Practice”.
2. Ashwani Bhardwaj, A Complete Guide to Family Safety and First-aid, Goodwill Publisher.
3. Bucher Charles A., (1983), Foundationas of Physical Education, St. Louis the C.V. Mosby Company.
4. Conling David,(1980), Atheletics, London, Robert Hale.
5. Elizabeth Anders, (July,2008), Field Hockey (Steps to Success)
6. Goswami Shashikant,(1996), Nutrition for sports, SAINSNIS, Patiala.
7. Hoeger W.K. Werner and Sharon A. (1990), Hoeger, Fitness and Welness : Mortor Publishing Company, Englewood.
8. Jan Galen Bishop, (2013), Fitness through Aerobics(9ED), Pearson Publishers, ISBN10:0321884523, ISBN 13:9780321884527
9. Kamalesh M.L., (1988), Physical Education: Facts and Foundation, New Delhi, P.B. Publication.
10. Ken O. Bosen Track & Field Fundamental Techniques NIS Publications, Patiala.
11. Kenneth H.Cooper, (1978), Aerobics, M Evans & Co Publishers.

12. Kenneth H.Cooper, (1982), Aerobics programme for total Wellbeing, NY, Bantam Books Publishers, ISBN 0-553-34677-6, ISB?N:978-0-307-77725-6.
13. National Club Games Rule Book Kho-Kho - Indian Olympic Association.
14. Park and Park "Preventive and social medicine"
15. Rule Book, (2014), 9 Provinces battling for the Indigenous Games champs trophy
16. Sanju Sira, (2016), First Aid Manual for Nurses.
17. The Step-by-Step Training Manual of Soccer Skills & Techniques: Hundreds of Training Tips and Techniques, with Easy-to-Follow Instructions in Over 750 Photographs and Diagrams, (Mar 2011), Anness Publishing Ltd (Creator).
18. Thiru. Narayanan C and & Harihara Sharma (1989), "Methods in Physical Education " Karaikudi CJ and S.H.
19. Thirunarayanan, C. and Hariharan, S., (1990), Analytical History of Physical Education, Karaikudi, C.T. & S.H., Publications.

References Books:

1. Joseph. P.M. "Organization of Physical Education".
2. Kamlesh, M.L., Management concepts physical education and sport Metropolitan Book Co., Pvt., Ltd., Nethaji Subhash Marg, New Delhi.
3. Singh M.K. Teaching Methods in Physical Education.

Web Resources:

1. https://www.iaaf.org/home
2. http://www.indiankabaddi.org/
3. http://khokhofederation.in/
4. https://www.olympic.org/the-ioc

18SPOV0001	SPORTS AND GAMES

Credits : 0+2	Lecture Hours/Week : 4	CFA (T&P) : 50	ESE (T) : NA

Course Objective:

To gain knowledge about the Sports and games

UNIT	CONTENTS	Lecture Schedule
I	Concept, meaning and Definition of Physical Education – Aims and Objectives of Physical Education - Scope of Physical Education	**4**
II	Concept of Fitness, aerobic and anaerobic exercises - practice of high and low intensity of aerobic and anaerobic exercises - procedure for Yo Yo fitness test	**16**
III	Basic skills of Indigenous games (Kabaddi and Kho-Kho) - Basic skills of any Two of the major games (Basketball, Football, Hockey and Volleyball) – any two events in Track and Field Events	**24**
IV	Concept and meaning of Intramural and Extramural tournaments – Types of Tournaments - Methods to draw the fixture for knockout and league tournaments – Recreational activities (Minor games)	**12**
V	Personal Hygiene – Safety education with special reference to playfield – Modern trends in Physical Education - Nutrition and Sports diet - Common athletic injuries and first-aid	**8**
Total Contact Hours		**64**

Course Outcomes

Students should be able to

- Explain the basic concepts of physical education
- Demonstrate skills in major games.
- Assess the fitness level
- Analyze basic skills involved in track and field events
- Outline the modern trends and development in Physical Education.

18YOGV0001 - YOGA EDUCATION (0+2 credits)

Course Objective: To gain knowledge about the Yogic Practices

Course Outcomes:

Students should be able to

- Evaluate the importance of preparatory exercise.
- Demonstrate the suryanamaskar and various asanas.
- Utilize the meditation techniques.
- Compare mudras and bandhas
- Assess the difference between the asanas and physical exercises.

UNIT–I: History of Yoga - Definition of the term Yoga - Comprehensive Nature and Scope of Yoga- Aims and Objectives of Yoga - Various schools of Yoga - Yoga as an ideal system of physical culture.

UNIT–II: Schools of Yoga: Patanjaliyoga – Astangayoga – Tantrayoga – Mantrayoga – Hathayoga – Layayoga - Rajayoga – Jnanayoga – Bhaktiyoga – Karmayoga - Difference between practice of Asanas and Physical Exercise.

UNIT–III: Asanas Practice: Meditative Asanas: Sukhasana – Ardha Padmasana – Padmasana – Samasana - Vajrasana – Standing Asanas: Tadasana – Padahasthasana – Ardha cakrasana- Trikonasana- Parivrtta Trikonasana – Vrikshasana – Virabhadrasana- Utkatasana; Sitting Asanas: Baddha konasana – Janusirasana – Paschimottanasana – Ustrasana – Vakrasana - Gomukhasana – Akarna Dhanurasana – Utthita Padmasana - Upavistakonasana - Suryanamaskar.

UNIT–IV: Asanas Practice: Prone Asanas: Makarasana – Bhujangasana – Shalabhasana – Dhanurasana – Naukasana – Niralambhasana – Supine Asanas: Pavanamuktasana – Sethubandhasana – Navasana – Sarvangasana – Halasana – Matsyasana – Savasana.

UNIT–V: Pranayama Practice: Sectional Breathing - Nadisuddhi – Bhramari – Bhastrika - Kapalabhati – Introduction to Bandhas – Mudras – Dharana (Trataka) – Dhyana.

REFERENCE BOOKS:

1. Asanas, Swami Kuvalayananda, Kaivalayadhama, Lonavla, 1993.
2. Light on Yoga, B.K.S Iyengar Harpine Collins Publication, New Delhi, 2000.
3. Sound Health Through Yoga, K.Chandrasekaran, Prem Kalyan Publications, Sedapatti, 1999.
4. Yoga For All, Maharishi Patanjali, Sahni Publications, 2003.
5. Yoga For Health, Institute of Naturopathy & Yogic Sciences, Bangalore, 2003.
6. Yoga for Health, K.Chandara Shekar, Khel Sahitya Kendra, Theni, 2003.
7. Yoga For the Morden Man, M.P.Pandit, Sterling Publishers Private Limited, New Delhi, 1987.
8. Yoga For You, Indira Devi, Jaico Publishing House, Chennai, 2002.

Web Resources

1. https://kdham.com/
2. http://www.biharyoga.net/

YOGA EDUCATION (Two Credits)

18YOGV0001	YOGA EDUCATION	
Credits : 0+2 Practical Hours/Week : 4 CFA (T&P) : 50 ESE (T) : NA		
Course Objective: To gain the practical knowledge about the Yogic Practices		
UNIT	**CONTENTS**	**Lecture Schedule**
I	**History of Yoga** - Definition of the term Yoga - Comprehensive Nature and Scope of Yoga-Aims and Objectives of Yoga - Various schools of Yoga - Yoga as an ideal system of physical culture	**8**
II	**Schools of Yoga:** Patanjaliyoga – Astangayoga – Tantrayoga – Mantrayoga – Hathayoga – Layayoga - Rajayoga – Jnanayoga – Bhaktiyoga – Karmayoga - Difference between practice of Asanas and Physical Exercise	**8**
III	**Asanas Practice:** Meditative Asanas: Sukhasana – Ardha Padmasana – Padmasana – Samasana - Vajrasana – Standing Asanas: Tadasana – Padahasthasana – Ardha cakrasana- Trikonasana- Parivrtta Trikonasana – Vrikshasana – Virabhadrasana- Utkatasana; Sitting Asanas: Baddha konasana – Janusirasana – Paschimottanasana – Ustrasana – Vakrasana - Gomukhasana – Akarna Dhanurasana – Utthita Padmasana - Upavistakonasana - Suryanamaskar	**20**
IV	**Asanas Practice:** Prone Asanas: Makarasana – Bhujangasana – Shalabhasana – Dhanurasana – Naukasana – Niralambhasana - Supine Asanas: Pavanamuktasana – Sethubandhasana – Navasana – Sarvangasana – Halasana – Matsyasana - Savasana	**16**
V	**Pranayama Practice:** Sectional Breathing - Nadisuddhi – Bhramari – Bhastrika - Kapalabhati – Introduction to Bandhas – Mudras – Dharana (Trataka) – Dhyana	**12**
Total Contact Hours		**64**
Course Outcomes		
Students should be able to • Evaluate the importance of preparatory exercise. • Demonstrate the suryanamaskar and various asanas. • Utilize the meditation techniques. • Compare mudras and bandhas • Assess the difference between the asanas and physical exercises.		

18FEMV0422 – EMPLOYABILITY SKILLS – (4 Credits)

OBJECTIVE:

- To teach verbal communication, non-verbal communication, listening, self awareness and behaviorial skill.
- To teach productivity about how well student combine resources to produce goods and series.
- To teach environmental education, labour welfare legislation and quality tools.

UNIT–1: English literacy – Practice on greetings and introduction; Practice on office hospitality; Practice on telephone skills; Practice on role playing and group discussion; practice on job description; practice on job application and resume writing

UNIT–2: Productivity – Definition-productivity of land, materials, machine and men; necessity of productivity; benefits of productivity- categories of productivity benefits; productivity affecting factors- skills, working aids, automation, environment and motivation; personal finance management- Banking process, categories of consumer accounts, safe cash handling procedures, KYC registration, personal risk and insurance.

UNIT–3: Environment education- Global warming- effect of global warming; effects of greenhouse and change in climate; methods to control of greenhouse effect; causes of the depletion of ozone layer; prevention measures for ozone layer depletion; process for drinking water treatment, sewage treatment, industrial water treatment and disinfectants of water treatment.

UNIT–4: Labour welfare legislation- Benefits guaranteed under various Acts – Factories Act 1948; Apprentices Act; Employees state insurance (ESI) Act; Payment of Wage Act 1936; Minimum Wages Act & Rules, Employees provident fund Act (EPF) and Works men Compensation Act.

UNIT–5: Quality tools- Quality consciousness, quality concept; ISO standards; quality tools; analyse the problems using quality tools; quality parameters and quality management.

LECTURE SCHEDULE

No. of week (4 hrs. per week)	Topic covered
1st to 3rd Week	• English Literacy **:** Practice on Office Hospitality; Telephone skills; Role Playing and Group Discussion; Practice on Role Playing and Group Discussion; Practice on Job Description and Practice on Job Application and Resume Writing
4th to 7th Week	• Productivity – Definition-productivity of land, materials, machine and men; necessity of productivity; benefits of productivity- categories of productivity benefits; productivity affecting factors- skills, working aids, automation, environment and motivation; personal finance management- Banking process, categories of consumer accounts, safe cash handling procedures, KYC registration, personal risk and insurance. • **8th Week : Mid-Semester Examinations**

9th to 11th Week	• Environment education- Global warming- effect of global warming; effects of greenhouse and change in climate; methods to control of greenhouse effect; causes of the depletion of ozone layer; prevention measures for ozone layer depletion; process for drinking water treatment, sewage treatment, industrial water treatment and disinfectants of water treatment.
12th to 14th Week	• Labour welfare legislation- Benefits guaranteed under various Acts – Factories Act 1948; Apprentices Act; Employees state insurance (ESI) Act; Payment of Wage Act 1936; Minimum Wages Act & Rules, Employees provident fund Act (EPF) and Works men Compensation Act.
15th to 16th Week	• Quality tools- Quality consciousness, quality concept; ISO standards; quality tools; analyse the problems using quality tools; quality parameters and quality management.

REFERENCES:

1. Employability skills – Sep. 2016, Common for all trades, I Semester, Published by published by National Instructional Media Institute, Chennai
2. Employability skills – June 2016, Common for All Trades, II Semester, Published by published by National Instructional Media Institute, Chennai

LEARNING OUTCOME

- Students learn employability skills in the field of English literacy, productivity, environment education, labour welfare legislation and quality tools.

18FEMV0423 – REPAIR AND OVERHAULING OF TRACTOR ENGINE (3 Credits)

OBJECTIVES:

- To teach the procedure involved in servicing and overhauling of tractor engine.
- To teach common engine troubles, reasons and its remedies.

Identify, use, maintain and store tools required for overhauling of different components of the engine system

UNIT–1: Servicing of tractor engine

UNIT–2: Dismantling and assembling of engine components

UNIT–3: Radiator

UNIT–4: Air cleaner and fuel feed pump

UNIT–5: Fuel injection pump

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topic covered
1st to 3rd Week	
Demonstrate major assemblies of tractor.	• Ascertain and select tools and materials for the job and make this available for use in a timely manner. • Identify different gauges fitted on the dashboard and check for proper functioning. • Perform daily checks before starting the engine. • Start the engine and allow it warm up. • Identify the problem in functionality of particular Gauge fitted on dashboard and record the reading and compare it with standard reading. • Repair / Replace the defective gauges as per standard operating practice. • Check for proper functionality • Stop the engine.
4th to 6th Week	
Overhauling of Diesel engine of tractor	• Ascertain and select tools and materials for the job and make this available for use in a timely manner. • Plan work in compliance with standard safety norms. • Demonstrate possible solutions and agree tasks within the team. • Drain coolant and lubricants from the engine and Remove Accessories of engine. • Service cylinder head assembly • Service oil sump and oil pump • Service piston and connecting rod assembly • Service flywheel, crank shaft, camshaft and its bearings and gear • Service cylinder block • Check and adjust valve clearances as per procedure and recommended specification • Refit all the accessories • Refill all the required coolant and lubricants as per standard specification • Start the engine and observe reading of dashboard gauges and record Engine Performance

7th to 10th Week	
Servicing of radiator	• Check engine coolant and reverse flush the cooling system using flushing solution. • Service radiator and radiator cap • **8th Week : Mid-Semester Examinations** • Check radiator hoses for crack and replace it necessary • Test thermostat valve for proper functioning as per manufacturer specification and replace if necessary. • Check water pump for serviceability and replace if faulty. • Check fan / alternator belt for proper tension.
11th to 13th Week	
Servicing air cleaner and fuel pump	• Service / replace air cleaner • Check the oil level in the air cleaner • Check and replace air filter if necessary • Tune up diesel engine as per manufacturer specification. • Check leakages in diesel fuel line. • Service fuel tank and fuel filter. • Service fuel feed pump. • Set diesel fuel injection pump timing as per manufacturer specification. • Bleed the fuel system to vent out any air dropped. • Start the engine and check for proper functioning as per standard guidelines specified by manufacturer.
14th to 16th Week	
Service fuel injection pump	• Tune up diesel engine as per manufacturer specification. • Check leakages in diesel fuel line. • Service fuel tank and fuel filter. • Service fuel injection pump. • Set diesel fuel injection pump timing as per manufacturer specification. • Bleed the fuel system to vent out any air dropped. • Start the engine and check for proper functioning as per standard guidelines specified by manufacturer.

REFERENCES:

1. Mechanic Tractor, February 2016 Sector : Automobile, Common for Mechanic Tractor / Mechanic Agriculture Machinery, Trade: Practical, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
2. Repair & Maintenance of Radiator, March 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
3. Repair & Overhauling of Tractor, October 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
4. Basic Tractor Servicing, March 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
5. A.K.Jain, 2006, Automobile Engineering, Vol.2; Published by Standard Publishers Distributors, 1705-B, Nai Sarak, Delhi – 110 006, ISBN: 81-86308-01-6
6. Er. Sanjay Kumar, 2007, A Text Book of Tractor at a glance (A unique book of farm power), Published by International Book Distributing Co., Lucknow 226 001 UP, ISBN: 81-8185-185-6

LEARNING OUTCOME

- Student learn servicing and engine overhauling of tractor
- Student able to identify the faults in engine and its remedies

18FEMV0424 - TRACTOR TRANSMISSION AND HYDRAULIC SYSTEM (3 Credits)

OBJECTIVES:

- To teach construction of tractor transmission systems.
- To teach the common defects in transmission system and its remedies
- To teach construction of hydraulic control system

UNIT–1: Power transmission system of tractor – Functions; clutch and fluid coupling – necessity of a clutch in a tractor; essential features of a good clutch; types of clutch – Friction of clutch – single plate, multiple plate clutch; dog clutch and fluid coupling.

UNIT–2: Transmission gears and torque converter gear – selective sliding type and constant mesh type gear; components of drive train; torque converter.

UNIT–3: Differential unit and final drive – components of differential unit – Functions of crown when – differential lock, final drive and power take off shaft.

UNIT–4: Steering system and brake steering system – power steering; brake – principle of operation, classification of brake – mechanical brake and hydraulic brake; types of mechanical brake – internal expending type, external contracting shoe type and disc type.

UNIT–5: Hydraulic control system – Working principle; Basic components of hydraulic system – Position control system, draft control system, mixed control; Repairs and maintenance of hydraulic system.

LECTURE SCHEDULE

No. of week (3 hrs. per week)	Topic covered
1st to 3rd Week	• Power transmission system of tractor – Functions: Clutch – importance and types of clutch and its construction details.
4th to 7th Week	• Gears – Functions; Types of gear – selective sliding type and constant mesh type gear; components of drive train; Torque converter
8th Week	• **Mid-Semester Examination**
9th to 10th Week	• Differential unit and final drive – components; functions; differential lock; final drive and power take off shaft – construction details and its functions
11th to 14th Week	• Steering system – Power steering; Brake system – Principle of operation; classification of brake; types of mechanical brake.
15th to 16th Week	• Hydraulic system – basic components – function; types of hydraulic control system – Repair & Maintenance of hydraulic system.

REFERENCES

1. Basic of Transmission, Suspension, Steering System & Brakes, January 2014, Sector : Automobile for Centres of Excellence, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
2. Repair & Overhauling of Chassis System (Heavy Vehicle), March 2010, Sector : Automotive Repair for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.
3. A Text Book of Farm Machinery, April 2015, Dr. T. Senthilkumar, Dr. R. Kavitha Dr.V.M. Duraisamy, Published by Thannambikkai publication, Coimbatore, ISBN: 978-93-81102-30-5
4. A Text Book of Tractor at a glance (A unique book of farm power), 2007, Er. Sanjay Kumar, Published by International Book Distributing Co., Lucknow 226 001 UP, ISBN: 81-8185-185-6

LEARNING OUTCOME

- Student learn components and function of tractor transmission system
- Students able to identify the defects in the tractor transmission system and also its remedies.
- Students learn hydraulics control system and its working principles

18FEMV0425 – SERVICE AND MAINTENANCE OF ELECTRICAL AND CONTROL BOARD SYSTEM
(3 Credits)

OBJECTIVES:

- To teach electrical and electronic systems used in tractor.
- To teach how to service the electrical system in tractor

Identify, use, maintain and store tools required for overhauling of different components of the tractor hydraulic and electrical system

UNIT–1: Locating electrical parts, system and controls of the tractor- Making different joints on simple strapped conductors- Sieving, insulating the conductors- Measuring the gauge of the conductors- Soldering the wire joints; Making serious and parallel connections and circuits- Connecting the voltmeter and ammeter- Checking the fuse box, wires short circuited and identification of starting system wiring and marking on terminal joints- Study of circuit breakers, relays and construction of simple circuit using relay

UNIT–2: Testing of alternator output voltage, circuit voltage drop and trouble shooting in charging system- Dismantling and assembling of alternator and trouble shooting of alternator; Dismantling and assembling of starter motor- Replacement of brushes and commutator – Checking up of spark plug, head light, ignition coil and condenser

UNIT–3: Identify and measure voltage of Dry cells/ Battery; Identify the parts of a battery charger and test for its operation; Charge a Secondary Battery; Maintain service and trouble shoot a battery charger; Form a DC source 12V/ 500mA using 2 V cells; Maintenance of Lead- Acid Batteries; Battery Servicing and Testing.

UNIT–4: Various meters and components available in control board of a tractor – its functions and recommended specifications for indicators / gauges for good maintenance of a tractor.

UNIT–5: Identification of faults using the indicators of the control board and its rectifications.

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topic covered
1st to 4th Week	• Perform basic electrical testing in a tractor • Identify different types of basic electronic components and measuring instruments • Tracing the auto electrical components in a tractor • Test continuity and voltage drop in electrical circuit.
5th to 7th Week	• Construct electrical circuits and test its parameters by using electrical measuring instruments • Select the tools, instruments and materials required to do the job. • Comply with safety rules when performing the basic electrical operation
8th Week :	**Mid-Semester Examinations**
9th to 12th Week	• Overhauling alternator and starting system of a tractor • Check charging system for proper functioning as per manufacturer guidelines.

13th to 14th Week	• Identify and measure the voltage of battery • Service the battery as per the specification. • Identify the tools for maintenance of battery • Charging of battery
15th to 16th Week	• Ascertain and select tools and materials for the job • Comply with safety rules when performing the operations • Check the meters for proper functioning as per manufacturing guidelines.

REFERENCES

1. Repair & Overhauling of Auto Electrical & Electronic System, March 2010, Published by National Instructional Media Institute, Chennai.
2. Mechanical Technology in Agriculture, 2005, Donald M. Johnson, Joe Harper, David E. Lawver, Philip, Buriak, Published by International Book Distributing Co., Lucknow 226 001 UP, ISBN: 81-8189-081-7
3. Mechanic Tractor, February 2016, Published by National Instructional Media Institute, , Chennai.
4. Repair & Overhauling of Hydraulic System, October 2011, Published by National Instructional Media Institute, Chennai.

LEARNING OUTCOME

- The students learn to identify the repairs in electrical and electronics system used in the tractor
- Students learn servicing and testing of battery
- Students learn to service the alternator and starting motor of tractor
- Student learn to identify repair and maintenance meters available in control board

18FEMV0426 – REPAIR AND MAINTENANCE OF TRACTOR TYRE, FRONT AXLE AND FOUR WHEEL DRIVE (3 Credits)

OBJECTIVES:

- To teach the specification of tractor type, front axle and batteries.
- To teach care and maintenance of tyres and tubes.
- To teach four wheel drive

UNIT–1: Identify the tools needed for maintenance of tyres and tubes; Identify the types and components of wheels and tyres; Remove wheel from tractor, dismantle and assemble tyre from wheel; Refit the wheel on the tractor

UNIT–2: Maintain the tyres and tubes; Maintain the tyres by vulcanizing method; Maintain the tyre by cold patch and hot patch; Practice on the tyre rotation, check and inflate correct tyre pressure; Tighten the wheel nut in a sequence, Ballasting of Wheels

UNIT–3: Adjust wheel track; Identify the various tyre defects- wear on edges, wear at centre, wear on spots, uniform wear all around, wear on inner edge, wear on outer edge; Practice on the maintenance of tyres, Trailer wheel with power assisted brake

UNIT–4: Dismantling & assembling of Front Axle of the Tractor : Functions of front axle; classification of front axle, kinematics of front axle; Adjustments of front wheel and dismantling & assembling of front axle of a tractor

UNIT–5: Four wheel drive: Merits in four wheel drive; major components involved in four wheel drive tractors – its functions and maintenance; safety precautions followed in four wheel drive on and off the field.

PRACTICAL SCHEDULE (3 hrs. per week)

No. of week (3 hrs. per week)	Topic covered
1st to 3rd Week	• Dismantle the tyres and tubes from the wheels • Check the measurement of tyre and tube sizes. • Check and service rim, tyres and tube and perform repair / replace if necessary.
4th to 7th Week	• Dismantle the tyres and tubes from the wheels • Check the measurement of tyre and tube sizes. • Check and service rim, tyres and tube and perform repair / replace if necessary.
8th Week :	**Mid-Semester Examinations**
9th to 11th Week	• Check the wheel alignment • Check the tyre defects at on-edges and centre, • Practice on assembling and dismantling of tyres

12th to 14th Week	• Perform battery testing as per the operating procedure. • Identify the reasons for troubles and its remedies for effective functioning of a battery. • Service the battery as per the specification mentioned by the manufacturer.
15th to 16th Week	• Practice on assembling and dismantling of front axle of a tractor • Comply with safety rules when performing the operations.

REFERENCES:

1. Repair and Maintenance of Tyres and Tubes, March 2011, Sector: Agriculture. For Modular Employable Skills, NIMI Publications, Chennai
2. Maintenance of Batteries, May 2013, Sector: Electrical. For Modular Employable Skills, NIMI Publications, Chennai
3. Dr. Kirpal Singh, 2006, Automobile Engineering,Vol.2; Published by A.K.Jain, Standard Publishers Distributors, 1705-B, Nai Sarak, Delhi, ISBN: 81-86308-01-6
4. Er. Sanjay Kumar, 2007, A Text Book of Tractor at a glance (A unique book of farm power), Published by International Book Distributing Co., Lucknow 226 001 UP, ISBN: 81-8185-185-6

LEARNING OUTCOME

- Students learn the specification of tractor tyre, front axle and tyres
- Students learn care and maintain of front axle.
- Students learn four wheel drive of tractor

18FEMV0427 - INPLANT TRAINING–II (6 Credits)

OBJECTIVE:

To learn skills for specific job role from relevant Industry / Institution.

Students have to undergo four weeks training in any Agricultural Machinery Manufacturing Industry / Training Institutes to acquire relevant skills. The in-plant training may be organized continuously for four weeks or more than one spell within a semester as per the convenience of the Industry/Institutes. During their stay in the industry, they have to maintain a diary on daily basis to record the work assigned, outcome of the work and it has to be countersigned by the student's in-charge. In addition, he/she has to submit weekly report to the department. During the in-plant training period, the Industry / Institute partner will evaluate their performance for 60 marks and the concerned course teacher for 40 marks as given below

INDUSTRY/ INSTITUTE

1	Attitude	10 marks
2	Punctuality	
3	Behavior	
4	Involvement	10 marks
5	Performance (completion of assigned work)	20 marks
6	Contribution to the industry	20 marks
	Total	**60 marks**

COURSE TEACHER

1	Diary /Record	10 marks
2	Weekly report	10 marks
3	Viva –voce	20 marks
	Total	**40 marks**

LEARNING OUTCOME

- Students able to learn the work culture from the concerned industry
- Students learn to handle special tools used in assembling and dismantling of machinery components.

FIFTH SEMESTER

18FEMV0528 - POST HARVESTING EQUIPMENTS (4 Credits)

OBJECTIVES:

- To teach the operation and maintenance of selected post harvesting equipments
- To teach the adjustments needed for effective functioning of the equipments

UNIT–1: Function, suitability of crop, power requirement, labour requirement, components and capacity of Paddy thresher, Paddy winnower, Multicrop thresher

UNIT–2: Function, suitability of crop, power requirement, labour requirement, components and capacity of Groundnut thresher, Pulse thresher, Mini dhal mill

UNIT–3: Function, suitability of crop, power requirement, labour requirement, components and capacity of Arecanut dehusker, Castor sheller, maize sheller, Sunflower seed sheller

UNIT–4: Function, suitability of crop, power requirement, labour requirement, components and capacity of Seed cleaner cum grader, Groundnut grader, Potato grader

UNIT–5: Function, suitability of crop, power requirement, labour requirement, components and capacity of Rectangular metal bin drier, Solar Tunnel Drier, Solar cabinet drier, Agricultural waste fired furnace drier

LECTURE SCHEDULE

No. of week (3 hrs. per week)	Topic covered
1st to 5th Week	• Identify and check functionality of major components and assemblies and servicing of the following equipments i. Paddy thresher ii. Paddy winnower iii. Multicrop thresher iv. Groundnut thresher v. Pulse thresher vi. Mini dhal mill
6th to 10th Week	• Identify and check functionality of major components and assemblies and servicing of the following sheller, cleaner and grader equipments i. Arecanut dehusker ii. Castor sheller iii. Maize sheller iv. Sunflower seed sheller v. Seed cleaner cum grader vi. Groundnut grader **8th Week : Mid-Semester Examinations**
11th to 16th Week	• Identify and check functionality of major components and assemblies and servicing of the following drying equipments i. Rectangular metal bin drier ii. Solar Tunnel Drier iii. Solar cabinet drier iv. Agricultural waste fired furnace drier

REFERENCES

1. Repair, Maintenance & Operation of Post harvesting Equipments, March 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.

2. Directory of Rural Technologies, Vol.1, Farm & Post-harvest Equipment, 1986, Published by Council for Advancement of Rural Technology, New Delhi

3. Principles of Agricultural Processing, 1994, P.H.Pandey, Published by Kalyani Publishers, New Delhi

4. Bankable Post Harvest Equipment developed in India, 1986, R P Kachru, P K Srivastava, B S Bisht & T P Ojha, Published by CIAE, ICAR-Bhopal

LEARNING OUTCOME

- Student will able to learn the operation and maintenance of selected post harvesting machineries.
- To learn the adjustments needed for effective functioning of the machineries

18FEMV0529 - SAFETY TESTING OF AGRICULTURAL MACHINERY (4 Credits)

OBJECTIVES:

- Students will be taught the safety aspects of testing of Agricultural Machinery
- Students will be taught test procedures for ascertaining the performance of the machinery

UNIT–1: Introduction – types of agricultural machinery accidents – status of accidents.

UNIT–2: Technical requirements for ensuring machinery safety, safety guards, safe distance, safety devices, safety signs and operational case; testing of agricultural machinery for safety; maximum actuating force required to operate control as per ISO recommendation.

UNIT–3: Checking of tools and devices method of safety testing, Guards for moving parts, Guards for PTO shafts, safety devices, breaking device, operator's work place, operating controls and roll over protective structures (ROPs); definition of terms.

UNIT–4: Test procedure; criterion for acceptance of ROPS. And Safety precautions – General, Tractor starting, Tractor operations, Towing, using agricultural implements and machinery, stopping and maintenance.

UNIT–5: Safety aspects of workers – Machines – Tools – Workshed – Environment – Pollution control – Wastage of materials – Labour welfare legislation.

LECTURE SCHEDULE

No. of week (4 hrs. per week)	Topic covered
1st to 2nd Week	• Introduction of safety from agricultural machinery • types of agricultural machinery accidents • Status of accidents.
3rd to 7th Week	• Technical requirements for ensuring machinery safety, safety guards, safe distance, safety devices, safety signs • Operational case; testing of agricultural machinery for safety • Maximum actuating force required to operate control as per ISO recommendation.
8th Week	**Mid-Semester Examinations**
9th to 11th Week	• Checking of tools and devices method of safety testing, • Guards for moving parts, Guards for PTO shafts, • safety devices, breaking device, operator's work place, • operating controls and roll over protective structures (ROPs); • definition of terms
12th to 14th Week	• Test procedure; Criterion for acceptance of ROPS. • And Safety precautions; General, Tractor starting • Tractor operations, Towing, using agricultural implements and machinery, Stopping and maintenance.
15th to 16th Week	• Safety aspects of workers – Machines – Tools – Workshed – Environment – • Pollution control – Wastage of materials – Labour welfare legislation.

REFERENCES:

1. Mehta, M.L., S.R.Verma, S.K.Misra and V.K.Sharma, 1995, "Testing and Evaluation of Agricultural Machinery", Published by Dhaya Publishing House, New Delhi,
2. Sanjay Kumar, 2007, A Text Book of Tractor at a Glance, International book distributing company, Lucknow

LEARNING OUTCOME:

- Students learn the safety aspects of testing of Agricultural Machinery
- Students learn the precautions to prevent the accidents occurring during handling of agricultural machineries.

18FEMV0530 – RENEWABLE ENERGY APPLIANCES (4 Credits)

OBJECTIVES:

- To teach the various sources of renewable energy and their applications
- To attend minor repair & maintenance of solar gadgets and biogas plant

UNIT–1: Renewable energy – definition; comparison between conventional and renewable energy; solar energy, wind energy and biomass energy – merits and demerits.

UNIT–2: Solar applications – Solar cooker, solar water heater, solar dryer, solar distillation, solar lantern and solar water pumps – components and working principles; Repair & Maintenance of solar gadgets.

UNIT–3: Bio gas plants – Fixed dome type and Floating gas holder type – Construction details, operational parameters of a biogas plant; Repair and Maintenance of bio gas plants.

UNIT–4: Wind mill applications – pumping water, grinding grain and generation of electricity – classification of wind mill - horizontal axis rotor and vertical axis rotor.

UNIT–5: Gasifier – Classification of gasifier – up-draft, down-draft, cross – draft and fluidized bed gasifer; Components and functions; cooling and cleaning of producer gas; Recommended fuel size for different types of gasifiers.

LECTURE SCHEDULE (4 hrs. per week)

No. of week (4 hrs. per week)	Topic covered
1st to 3rd Week	• Renewable energy – definition; • Comparison between conventional and renewable energy; • Solar energy, wind energy and biomass energy • Merits and demerits.
4th to 7th Week	• Solar applications – Solar cooker, solar water heater, solar dryer, solar distillation, solar lantern and solar water pumps – • Components and working principles; • Repair & Maintenance of solar gadgets.
8th Week	**Mid-Semester Examinations**
9th to 11th Week	• Bio gas plants – Fixed dome type and Floating gas holder type • Construction details, operational parameters of a biogas plant; • Repair and Maintenance of bio gas plants.
12th to 14th Week	• Wind mill applications – pumping water, grinding grain and generation of electricity – • Classification of wind mill – • Horizontal axis rotor and vertical axis rotor
15th to 16th Week	• Gasifier – Classification of gasifier – • Up-draft, down-draft, cross – draft and fluidized bed gasifer; • Components and functions; • Cooling and cleaning of producer gas; • Recommended fuel size for different types of gasifiers.

REFERENCES:

1. Repair, Maintenance and operation of energy sources equipments, 2011, NIMI Publications, Chennai.
2. Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8

LEARNING OUTCOME:

- Students learn the various sources of renewable energy and their application and limitations
- Students learn to handle the renewable energy gadgets

18FEMV0531 - OPERATION AND MAINTENANCE OF VERTICAL CONVEYOR REAPER
(6 Credits)

OBJECTIVES:

- To give driving practice of operating Vertical Conveyer Reaper (VCR)
- To identify the faults and remedies of VCR
- To adjust the components of VCR based on field conditions.

UNIT–1: Identify the components of VCR and select the tools for maintenance of VCR (tractor mounted and power tiller operated).

UNIT–2: Identify the faults and remedies of VCR and set the precaution while handling in field.

UNIT–3: Adjust cutter bar, star wheel, conveyer belt, depend on field conditions

UNIT–4: Practice on checking the drive mechanism of VCR.

UNIT–5: Practice on the operation, adjustments and maintenance of reaper binder.

PRACTICAL SCHEDULE (6 hrs. per week)

No. of week (4 hrs. per week)	Topic covered
1st to 3rd Week	• Identify the components of VCR and select the tools for maintenance of VCR (tractor mounted and power tiller operated).
4th to 7th Week	• Identify the faults and remedies of VCR and set the precaution while handling in field.
8th Week	**Mid-Semester Examinations**
9th to 11th Week	• Adjust cutter bar, star wheel, conveyer belt, depend on field conditions
12th to 14th Week	• Practice on checking the drive mechanism of VCR
15th to 16th Week	• Practice on the operation, adjustments and maintenance of reaper binder.

REFERENCES

1. Repair, Maintenance & Field Operation of Combine Harvester, March 2011, Published by NIMI Chennai.

2. R K Ghosh & S Swain, 1993, Practical Agricultural Engineering, Naya Prokash Publications, Kolkata, ISBN: 81-85421-15-3

3. Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8

LEARNING OUTCOME

- Student learn to operate and maintain the VCR in the field condition
- Student learn to operate and maintain the reaper binder in the field condition

18FEMV0532 - OPERATION AND MAINTENANCE OF CROP HARVESTERS (6 Credits)

OBJECTIVES:

- To learn the operation and maintenance of different crop harvesting machineries

UNIT–1: Identification fo components, functions, suitability, power requirement, labour requirement and capacity of Potato Digger

UNIT–2: Identification fo components, functions, suitability, power requirement, labour requirement and capacity of Groundnut Digger

UNIT–3: Identification fo components, functions, suitability, power requirement, labour requirement and capacity of Turmeric Digger

UNIT–4: Identification fo components, functions, suitability, power requirement, labour requirement and capacity of Sugarcane Harvester

UNIT–5: Identification fo components, functions, suitability, power requirement, labour requirement and capacity of Maize harvester

PRACTICAL SCHEDULE

No. of week (6 hrs. per week)	Topic covered
1st to 5th week	Identify and check functionality of major components, practice on driving and servicing of Potato Digger and Groundnut Digger
6th to 10th Week	Identify and check functionality of major components, practice on driving and servicing of Turmeric Digger and Maize Harvester **8th Week : Mid-Semester Examinations**
11th to 16th Week	Identify and check functionality of major components, practice on driving and servicing of Sugarcane Harvester

REFERENCES

1. Repair, Maintenance & Field Operation of Root Harvesting Equipments, March 2011, Sector : Agriculture for Modular Employable Skills, Developed by National Instructional Media Institute, Directorate General of Employment & Training, Ministry of Labour & Employment, Government of India, Chennai.

2. Farm Machinery and Equipment, Smith, Wilkes, Tata McGraw Hill.

3. Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu, 2012, Fundamentals of Agricultural Engineering, Published by Kalyani Publishers, Chennai, ISBN: 978-93-272-2168-8

4. Performance Evaluation of Sugarcane Harvesters, 2002, Technical Report No. CIAE/AMD/NATP/2002/272, CIAE, ICAR-Bhopal

LEARNING OUTCOME

- Students able to operate and maintain the different types of crop harvesting machineries

18FEMV0533 - OPERATION AND MAINTENANCE OF COMBINE HARVESTER (6 Credits)

OBJECTIVES:

- To practice on driving combine harvester
- To learn repairs and maintenance of combine harvester

UNIT–1: Combine harvester – introduction – prime operational functions in combine; classification of combine harvester – pull type harvesting machine, pull type with auxiliary engine and self propelled harvesting combine.

UNIT–2: Constructional details of combine harvester – components of combine and their functions.

UNIT–3: Practice on field operative of combine harvester for paddy harvesting

UNIT–4: Calculation of grain losses and other parameters – collectable and non-collectable losses due to combine.

UNIT–5: Estimate the cost of operation of combine, power requirement and field capacity

PRACTICAL SCHEDULE

No. of week (4 hrs. per week)	Topic covered
1st to 5th week	Identify and check functionality of major components and servicing of cutter bar, feeder and threshing assembly
6th to 11th Week	Driving practice in fields conditions and learn the adjustments based on field and crop conditions. **8th Week : Mid-Semester Examinations**
12th to 16th Week	Identify and check functionality of drive mechanism of combine harvester suitable for paddy and maize crop; calculation of grain losses, capacity and cost of operation.

REFERENCES:

Repair, Maintenance & Field Operation of Combine Harvester, March 2011, Published by NIMI Chennai.

LEARNING OUTCOME

- Students learn to identify tools for maintenance of combine harvester.
- Students learn to adjust cutter bar, feeder, thresher, straw walker blower and augers depend on field conditions
- Students learn to drive combine harvester

SIXTH SEMESTER

18CSAU0634 – COMPUTER TALLY (3 Credits)

OBJECTIVE:

- To teach basic principle of Accounts, Trail balance, Ledger opening and posting of Vouchers
- To introduce Tally software, ERP 9 for elementary book keeping.

UNIT–1: Introduction to Accounts – Features, Types, Rules, Account Transactions, Transaction Entry, Balance Sheet, Trial Balance, Profit & Loss accounts, manual Exercise with Accounts

UNIT–2: Tally – fundamentals, Features, Startup, Screen Components, Mouse/ Keyboard functions, Screen Areas, Company Data, Creation / Altering Company in Tally, Base of Currency information, Working with Multiple company – Practical Exercise – Banking Deposits & advance, lending schemes / Government Schemes – Maintenance of records & book keeping - Methodology

UNIT–3: Tally Accounting, Ledger Creation, Single & Multiple ledger creation, Director income / Expenses, Indirect income / Expenses, Opening Balance, payment Vouchers and Receipt Vouchers – Accounts only Voucher Entry (individual company creation & Voucher Entry) – Practical.

UNIT–4: Charts of accounts, Pre-defined Groups, Manual Group Creation, Multiple Ledger creation, Multiple Ledger creation, Practical and Multiple Groups / Ledger – Tally Vouchers, Credit / Cash Purchase and Sales Vouchers, Payment / Receipt Vouchers for Inventory, Journal Vouchers, Stock Journal, Stock Journal, Sales returns and Purchase returns, Delivery Note, Receipt Note, Memo Vouchers, Post Dated Vouchers, Display and Alter Option for voucher types, Voucher creation.

UNIT–5: Working with Tally Inventory, Configuration / Features Settings with Tally, Inventory Masters, Stock Categories, Location / Godowns, Creating Sing & Multiple Stocks, Single / Multiple stock items, Displaying and altering stocks groups / items – Practical Exercise

PRACTICAL SCHEDULE

No. of week (3 hrs. per week)	Topics covered
1st to 3rd Week	
Learn the basic features of accounts, types, rules and transaction; Preparing Balance Sheet, Trial Balance, Profit & Loss accounts	• Identify different types of accounts and its transactions methods. • Understand the basic account rules, exercise on entry of accounts • Method of preparing a model trial balance sheet • Method of entering profit and loss accounts verifying balance sheet

4th to 6th Week	
Learning the fundamentals of tally and its applications; Maintenance of records and book keeping	• Identify Tally software and matching computer operation of system • Practice the basic function of tally • Practice in creation of company and feeding date. • Practice in private lending schemes • Exercise on using tally in Government schemes. • Methodology to maintain records and book keeping
7th to 10th Week	
Method of Ledger creation, entering of income and expenses; check the statement of accounts.	• Creating of day book, ledger, etc. • Entering of income and expenditure vouchers • Differentiating direct and indirect income / expenses • Posting / preparing statement of accounts • **8th Week : Mid-Semester Examinations**
11th to 13th Week	
Identify and learn the purpose of creation of different types of vouchers	• Preparation of credit / cash purchase vouchers • Preparation of purchase and sales vouchers • Preparation of payment and receipt vouchers • Preparation of journal vouchers • Preparation of delivery / receipt / memo / post dated vouchers
14th to 16th Week	
Working with tally inventory and its applications	• Preparing inventory masters • Preparing stock categories • Creating single and multiple stocks • Displaying and altering stock groups • Select configuration / feature settings with tally.

REFERENCES

1. Tally (Vet, 9) by Nellai Kannan.
2. Tally ERP 9 BPB Publications, Author : K.K.Nathani

LEARNING OUTCOME

- Student can write their own accounts and able to record it using Tally system.

18FEMV0635 – ENTREPRENEURSHIP DEVELOPMENT (3 Credits)

OBJECTIVE

- To develop and strengthen entrepreneurial quality and motivation among students.
- To impart basic entrepreneurial skills and understandings to run a business efficiently and effectively.

UNIT–1: Entrepreneurial Competence : Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

UNIT–2: Entrepreneurial Environment: Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services - Central and State Government Industrial Policies and Regulations - International Business.

UNIT–3: Business Plan Preparation: Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT–4: Launching of Small Business: Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT startups.

UNIT–5: Management of Small Business: Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units – Effective Management of small Business.

LECTURE SCHEDULE

No. of week (3 hrs. per week)	**Topics covered**
1st to 3rd Week	
	• Introduction to Entrepreneurship • Definition – concept • Industrial small entrepreneurship • Meaning – Important – Significance and Scope • Characteristics of entrepreneur • Factors influence rural entrepreneurial development
4th to 6th Week	
	• Industries for Small Entrepreneurs : General study of cottage • Small Scale Industries – Enterprise Management – Need and Important • Women Entrepreneurship development through SHG – Entrepreneurial Competencies
7th to 10th Week	• Registration & Financing • Identification of opportunities – choice of product • Preparation of feasibility – Report – Registration and License • Financial assistance Nationalized banks – State financial corporation – DIC – KVIB – KVIC – NSIC, SIDBI and NABARD – Incentives and Government support. • **8th Week : Mid-Semester Examinations**

11th to 13th Week	
	• Entrepreneurial Development: Approaches to Entrepreneurship Development • EDP – Issues – Entrepreneurial Training
14th to 16th Week	
	• Methods and Institutions offers Entrepreneurial Training • Market Survey – Model Project Report • Regularity Laws : Central Excise – Income Tax – Sales tax – Licensing Authority – Export and Import Regulatory Acts

TEXTBOOKS

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.
2. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001.

REFERENCES

1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra, 2nd Edition ,2005
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996.
3. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai -1997.
4. Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning. 2012

LEARNING OUTCOME

- Students will gain knowledge and skills needed to run a business.

18FEMV0636 – BOOK KEEPING (3 Credits)

OBJECTIVES:

- To teach basic concepts of Accounting for Business
- To teach the accounting practices and its techniques with special reference to Sole-Proprietorship, Trading and Non-Trading Concerns.

UNIT–1: Fundamentals of Accountancy, Meaning, Scope and Utility of Accounts, Methods of keeping Books of Accounts, Difference between Book Keeping and Accountancy, Users of Accounts, Fundamental Accounting Equation, Types of Accounts, Rules of Debit and Credit, Types of Transactions, Types of Assets and Liabilities

UNIT–2: Capital, Revenue, Deferred Revenue Expenses, Reserves, Provisions And Contingent Liability, Meaning and difference between Capital and Revenue Incomes and Expenses, Identification of Capital and Revenue Expenses and Incomes, Meaning of Deferred Revenue Expense, Difference between Reserves and Provisions, meaning of Contingent Liability

UNIT–3: Accounting Concepts, Conventions & Principles Accounting, Principles, Policies, Concepts and Conventions. Generally Accepted Accounting Principles, Identification of different Accounting concept applied in various transactions, its accounting entries and its presentation in Annual Financial Statement

UNIT–4: Accounting For Non Trading Concerns, Meaning of Non Trading Concern, Annual Financial Statements of Non Trading Concerns (NTC), and How NTC differs from Trading Concern, Identification of Capital and Revenue Items for non trading organizations, Receipts and Payments Account, Income and Expenditure Account, Balance Sheet, Concept of different funds and their accounting treatment.

UNIT–5: Final Accounts of Sole Proprietary Concern 25% 14 Preparation of Final account of sole Trading.

LECTURE SCHEDULE (3 hrs. per week)

No. of week (3 hrs. per week)	Topic covered
1st to 5th week	• History and basics of accountancy; Methods of keeping accounts, difference between book keeping and accountancy • Various users of accounts and different types of accounts • Rules for debit and credit. • Various types of transactions, types of assets and liabilities • Lecture on capital and revenue, basics income and expenses.
6th to 11th Week	• Deferred revenue expenses and accrued incomes • Revenue provisions and contingency • Mid-semester Examination. • Principles and concepts of accounting • Identification of various concepts applied in different transaction • Presentation of various entries in Annual Financial Statements. • **8th Week : Mid-Semester Examinations**

12th to 16th Week	• Accounting in Non trading concerns • Difference between trading and Non- trading concerns- regarding accounts. • Receipts, payments, income and expenditure of non-trading organizations. • Preparing of trial balance from different ledgers. • Preparing of trading account, profit and loss account. • Preparation of balance sheet.

REFERENCES:

1. Accounting for Managers – J. Made Gowda – Himalaya Publishing House, 2015
2. Financial Management, I.M.Pandey,
3. Financial Management, Texts and cases, 2014.
4. Financial Accounting by Dr. Malleswari, 7th Edition, 2016. Himalaya Publishing House

LEARNING OUTCOME

- The student will gain knowledge about the basics of book keeping,
- The students able to prepare balance sheets and analysis of financial statements

18FEMV0637 – AGRI BUSINESS AND PROJECT MANAGEMENT (3 Credits)

OBJECTIVE:

- To teach special features of agri business and its importance in Indian economy

UNIT–1: Agribusiness : Agribusiness – Definition – Structure of Agribusiness (input, farm and product sectors), Agribusiness Management - Special features of Agribusiness - Importance of Agribusiness in Indian Economy.

UNIT–2: Introduction to Principles of Management : Management functions — planning, organizing — departmentation, forms of agri business organization - staffing, directing, supervision and motivation, controlling — types, performance. evaluation and control techniques. Strength Weakness Opportunities and Threats (SWOT) analysis.

UNIT–4: Production and Personal Management : Functional areas of agri business — production and operations management — functions, planning, physical facilities and managing quality. Inventory management— raw material procurement, inventory types, costs. Personnel management — recruitment, selection and training.

UNIT–4: Marketing Management : Marketing management — marketing environment, marketing mix.

UNIT–5: Input Marketing, Distribution: Input marketing firms-types and distribution channels. Processing firms-types, size and managerial problems. Management Information System (MIS) — concept and applications. Business standards business - Intellectual property rights and patenting – Government policies for agri business.

LECTURE SCHEDULE

No. of week (3 hrs. per week)	Topic covered
1st to 5th week	• Raw material procurement in Agro-industries — visit to firm. • Business plan preparation — identification and business opportunities. • Market potential assessment for agro-inputs and agro products. • Agricultural inputs - marketing promotional activities.
6th to 11th Week	• Food products - marketing promotional activities. • Product pricing methods. • Visit to District industries Centre. • Presentation and discussion on consumer survey reports. • Management of agricultural inputs marketing firm- visit to firms. • **8th Week : Mid-Semester Examinations**
12th to 16th Week	• Management of small agro-processing firm — visit to firms. • Discussion with lead bank on agribusiness finance. • Documents preparation to obtain Agriculture loan from banks • Discussion with successful farmers about economics of crop cultivation

REFERENCES

1. Prasad, L.M, 2005, 'Principles and Practices of Management', Sultan Chand and Sons Educational Publishers, New Delhi.
2. Richard, B Chase, Nicholas J., Acquilano and F.Robert Jacobs, 2007, `Production and Operations Management - Manufacturing and service, Tata McGraw Hill Publishing Company Limited, New Delhi.
3. Aswathappa, K, Human Resource Management: Text and Cases, Tata McGraw-Hill Pub. Co. Ltd. New Delhi, 5th Edition, 2008.
4. Philip Kotler, Marketing Management, Pearson Education, India, 2003.
5. Chandra Prasanna. 2000. Financial Management - Theory and Practice. Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
6. R.K.Sapru, Project Management, Excel Books, New Delhi, 1997.
7. Broadway, A.C. (2003). Text Book of Agri Business Management, Atlas Books and Periodicals, New Delhi.
8. Kapur, S.K. (1994). Principles and Practice of Management, S.K. Publishers, New Delhi.
9. Prasad, L.M. (1993). Principles and Practice of Management, Sultan Chand & Sons, New Delhi.

LEARNING OUTCOME

- The students able to start a suitable agri business enterprises

18FEMV0638 – AGRO BASED ENTREPRENEURSHIP ACTIVITIES (6 Credits)

OBJECTIVE:

- Students will be trained under different agro based entrepreneurship activities.

  Introduction of different agro based entrepreneurship activities; conduct market survey and analyse market demand based on market trend, existing competition, current requirement, market status, etc. Identify possible source of finance / loan; Identify potential farmers; identify suitable location for case of conducting business.

UNIT–1: Case study on vermi compost

UNIT–2: Case study on poly house cultivation

UNIT–3: Case study on value addition of milk and milk products

UNIT–4: Case study on value addition of fruits and vegetables

UNIT–5: Case study on cold storage unit

PRACTICAL SCHEDULE

No. of week (6 hrs. per week)	Topic covered
1st to 3th week	• Visit to Vermi compost unit and prepare a case study report
4th to 7th Week	• Visit to poly house cultivation unit and prepare a case study report
8th Week	• **8th Week : Mid-Semester Examinations**
9th to 11th Week	• Visit to dairy unit and prepare a case study report on value added of milk and milk products
12h to 14th Week	• Visit to Food processing unit and prepare a case study report on value addition of fruits and vegetables
15h to 16th Week	• Visit to a cold storage unit and prepare a case study report.

REFERENCES

Er. Sanjoy Kumar, Er. Vishal Kumar, Ram Kumar, 2012, "Fundamentals of Agricultural Engineering", Kalyani Publishers, Ludhiana

LEARNING OUTCOME

- Students learn to identify suitable agro based entrepreneurship activity based on location, market demand, possible source of finance and opportunity for scaling up the business.

18FEMV0639 – FUNCTION AND MANAGEMENT OF AGRO SERVICE CENTRE (4 Credits)

OBJECTIVE:

- Students will be trained in Agro Service Centre and make them to understand the functions and management of the centre

Students will undergo one month training in any established tractor / any agricultural machinery/ Irrigation machinery dealer and prepare a case study report which will cover the following items.

UNIT–1: Select and order right machinery and equipments by prior consultation

UNIT–2: Identify and select vendors for purchase of farm machineries & equipments

UNIT–3: Monitor the operations on a daily basis and evaluate success or failure of business

UNIT–4: Stock spare parts for different machinery parts and prime movers

UNIT–5: Supervise minor repair and maintenance of farm machineries and implements

LEARNING OUTCOME

- Students learn to develop a sustainable model of Agro Service Centre

EVALUATION METHOD:

Dealer / Service Centre

1	Attitude	10 marks
2	Punctuality	
3	Behavior	
4	Involvement	10 marks
5	Performance (completion of assigned work)	20 marks
6	Contribution to the industry	20 marks
	Total	**60 marks**

Course Teacher

1	Diary /Record	10 marks
2	Weekly report	10 marks
3	Viva –voce	20 marks
	Total	**40 marks**

18FEMV0640 – FUNCTIONS AND MANAGEMENT OF CUSTOM HIRING CENTRE (4 Credits)

OBJECTIVE:

- Students will be trained in Custom Hiring Centre and make them to understand the functions and management of the centre

Students will undergo one month training in any established custom hiring centre and prepare a case study report which will cover the following items.

UNIT–1: To conduct local survey to understand the current trend and needs of machineries in the area.

UNIT–2: To evaluate and identify machineries for hire based on farmer demand competition and availability

UNIT–3: To identify sources of procurement for machinery and mode of purchase.

UNIT–4: To prepare application form for obtaining financial loan.

UNIT–5: To fix a suitable hiring price for the machinery based on procurement cost, competitor cost and profitability

EVALUATION METHOD:

Government / Private concern

1	Attitude	10 marks
2	Punctuality	
3	Behavior	
4	Involvement	10 marks
5	Performance (completion of assigned work)	20 marks
6	Contribution to the industry	20 marks
	Total	**60 marks**

Course Teacher

1	Diary /Record	10 marks
2	Weekly report	10 marks
3	Viva –voce	20 marks
	Total	**40 marks**

18FEMV0641 – PROJECT WORK (4 Credits)

The project work will be in one of the following themes:

i. A new innovation or critical study related to the technology or development dimensions envisaged by the course

ii. Preparation of an innovative enterprise for one's future career

iii. Carrying out a regional development/employment development project planning exercise within the spirit of the course

iv. Finding out a innovative project with analysis suitable for the specific area.

Project work will be carried out by a group of students, minimum 2 and maximum 5 out of 100 marks, the evaluation of 60 marks will be awarded by project guide based on students performance during project period and 40 marks will be awarded jointly by project guide and course coordinator based on final viva and students project presentation.