Government of Karnataka

DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION

Program	Automobile Engineering	Semester	5
Course Code	20AT51I	Type of Course L:T:P	104:52:312
Specialization	Farm Machinery & Equipment	Credits	24
CIE Marks	240	SEE Marks	160

Introduction:

Welcome to the curriculum for the Specialisation Pathway – **Farm Machinery & Equipment**. This specialisation course is taught in Bootcamp mode. Bootcamps are 12 weeks, intense learning sessions designed to prepare you for the practical world – ready for either industry or becoming an entrepreneur.

Farm mechanization is playing a vital role in farm for raising crops. Farm tools, implements, and equipment play very important role in horticultural operations. Introduction of Equipment / Machinery in farming operations will not only increase production but also reduces labour requirement on farms. In order to do horticultural operations successfully, one must have a good working knowledge of the tools, implements and equipment before using them. The subject will enable the students to understand the basic principles, construction and working of farm machinery for different crops. This will also enable them to select appropriate machinery, use, repair and maintain the same. This knowledge will be highly useful in running an Agro Service Centre for Farm Machinery.

You will be assisted through the course, with development-based assessments to enable progressive learning. In this course, you'll learn how to select appropriate machinery, use, repair and maintain the farm tractor and its implements. This knowledge will be highly useful in running an Agro Service Centre for Farm Machinery.

Leading to the successful completion of this bootcamp, you shall be equipped to either do an **Internship** in an organisation working on **Farm Machinery & Equipment** or take up a **Project** in the related field. After the completion of your Diploma, you shall be ready to take up roles like Service Engineer, Shopfloor Manager, Production In-charge and also can become Entrepreneur in the related field and more.

Pre-requisite

Before the start of this specialisation course, you will have prerequisite knowledge gained in the first two years on the following subjects:
1st year -Engineering Mathematics, Communication Skills, Computer Aided Engineering Drawing, Statistics & Analysis, Basic IT Skills, Fundamentals of Electrical and Electronics Engineering, Project Management skills, Mechanical Science & Engineering and Automotive Engines.

2nd year-Automobile Chassis and Transmission System, Automotive Electrical System, Thermal Engineering and Engine Testing, Automotive Manufacturing Processes, Advanced Automotive Systems, Design and Drafting, Vehicle Body Engineering and Dynamics and Fuel and Pollution Control. In this year of study, you shall be applying your previous years learning along with specialised field of study into projects and real-world applications.

Course Cohort Owner

A Course Cohort Owner is a faculty from the core discipline, who is fully responsible for one specialised field of study and the cohort of students who have chosen to study that specialised field of study.

Instruction to course coordinator.

1. Each Specialized field of study is restricted to a Cohort of 20 students which could include students from other relevant programs.
2. One faculty from the Core Discipline shall be the Cohort Owner, who for teaching and learning in allied disciplines can work with faculty from other disciplines or industry experts.
3. The course shall be delivered in boot camp mode spanning over 12 weeks of study, weekly developmental assessments and culminating in a mini capstone.
4. The industry session shall be addressed by industry experts (in contact mode/online / recorded video mode) in the discipline only.
5. The cohort owner shall be responsible to identify experts from the relevant field and organize industry session as per schedule.
6. Cohort owner shall plan and accompany the cohort for industrial/mines/site/showroom/service Centre visits.
7. Cohort owner shall maintain and document the industrial assignments, weekly assessments, practices and mini project.
8. The cohort owner shall coordinate with faculties across programs needed for their course to ensure seamless delivery as per time table
9. The cohort owner along with classroom can augment or use for supplementally teaching on line courses available although reliable and good quality online platforms like Karnataka LMS, Infosys Springboard, NPTEL, Unacademy, SWAYAM etc.

10. Report should be maintained for industrial/field visit, such report shall be considered as industrial assignment.

Course outcome: A student should be able to

CO1	Apply farm mechanization techniques to increase productivity and profitability in agriculture and to implement erosion control measures to reduce soil erosion in farm land.
CO2	Determine the field capacity and field efficiency to evaluating the performance of a machine, Evaluating the performance of a tractor and implements.
CO3	Service and troubleshoot tractor system and power tillers.
CO4	Adjust and fix the implements to tractor and tiller.
CO5	Demonstrate and implement future enhancements on farm technologies, operate differential farm portal to claim the benefits from government by farmers, use drone in farming.

Detailed course plan

Learning outcomes (Week 1):

At the end of the week the students will be able to

1. Examine different types of soils and different agricultural practices and recommend the best way raising the crops.
2. Apply farm mechanization techniques to increase productivity and profitability in agriculture.
3. Identify and implement Erosion control measures in farms to reduce soil erosion.

Week	CO	PO	Days	1st session (9am to 1 pm)	L	T	P	2ND session (1.30pm to 4.30pm)	L	T	P
1	1	1	1	About Specialization – Future-Companies and Service sectors in India and outside India, Career opportunities. Importance and scope of agriculture, horticulture, sericulture, animal husbandry and forestry as farming enterprises and relation to industry.	2		2	About Farm tractors and Machinery- History- Importance- with an Example of a company (like M&M, TAFE, Escorts Tractors, VST tillers and tractors etc....) brief how the need for agricultural equipment evolved. Farm mechanization in India - Makes of tractors, power tillers, earth moving machinery - Classification of tractors	2		1
1	1	1	2	**Farm Mechanization:** 1.Introduction, Objectives of farm mechanization, Scope of farm mechanization, Benefits of farm mechanization.	2	2		**Introductory Agriculture, principles of Agronomy:** 1.Methods of crop production.	3		

				2. Limiting factors in farm mechanization. Bottlenecks in Indian farm mechanization system. 3. Classification of farm machines, Principles of selection of machines used to preparing land for production of crops.				2.Contribution of agriculture and horticulture crops to national economy.			
	1	1	3	**Agronomy:** 1.Definition and scope of agronomy. 2. Classification of crops, Effect of different weather parameters on crop growth and development.	2	2		1.Video demonstration on Inter-cultivation implements and practices 2. Importance of soil in crop production, Soil physical property, Effects of tillage on soil physical properties and root growth. 3. Soil color- factors, attributes and significance.	2	1	
	1	1	4	1. Green manuring, manure and fertilizer management for different cropping systems. 2. Methods of fertilizer application. 4. Video demonstration on Green manuring and fertilizer application	2		2	**SOIL CONSERVATION:** 1.Soil erosion - causes, types and agents of soil erosion. 2.Erosion control measures: agronomic measures - contour cropping, strip cropping, mulching; mechanical measures - terraces, bunds; 3.Landslides-factors causing it, land slips, Measures for control.	2	1	

	1		5	**Developmental Assessment**				Assessment Review and corrective action			3
	1		6	**Industry Class + Industrial Assignment** **Industry Class on:** Field visit to farm land to show the farm work/green manuring/ fertilizer application/ how the soil condition will affect the growth of the crops.	2		3				
Learning outcomes (Week 2): At the end of the week the student will be able to: 1. Determine the field capacity and field efficiency to evaluating the performance of a machine. 2. Determine the total cost of performing field operation and measure area in map using planimeter. 3. Test material used in tractors body.											
2	2	1	1	Tutorial (Peer discussion on Industrial assignment)	-	4	-	**Field capacities & economics:** 1.Terms related to Field performance of Machines-- Theoretical Field Capacity, Theoretical Time per hectare, Effective Field Capacity, Effective Operating Time, Field Efficiency, Performance Efficiency, Field Machine Index, Comparative Index, Time Efficiency, Material Capacity, Factors affecting field efficiency.	3		

	2	1, 2	2	Calculation of field capacity and field efficiency. (Simple Problems)			4	**Economics of machinery usage:** 1.Fixed cost, variable cost. Depreciation – Methods to calculate depreciation. 2. Operating cost, Estimation of cost of operation.	1	2	
	2	1, 4	3	Simple problems to show how to calculate the depression cost of the tractor, operating cost of the tractor			4	Simple problems to show how to calculate the depression cost of the tractor, operating cost of the tractor			3
	2	1, 4	4	Using planimeter/platometer measure given area of the land in map and calculate area of the land. Use Mobile app to plot, locate and measure the area of the land.	1		3	Using planimeter/platometer measure given area of the land in map and calculate area of the land. Use Mobile app to plot, locate and measure the area of the land.			3
	2		5	**Developmental Assessment**				Assessment Review and corrective action			3
	2	7	6	**Industry Class + Industrial Assignment** **Industry Class on:** Cost estimation and selection of tractor for different field work **or** Topic Related to material testing	2		3				
Learning outcomes (Week 3): At the end of the week the student will be able to: 1. Inspect tractor chassis for crack, bent or twist. 2. Service/ Troubleshoot of transmission systems in tractor.												
3	3	1, 3	1	Tutorial (Peer discussion on Industrial assignment)		4		**Tractors-**	1		2	

								1. Requirements of tractor, Classification/ Type of tractors and their applications, Wheeled type tractor parts & systems .2. *Walk around check and identification of wheel type tractor components & show the various systems in tractors.*			
	3	1, 3, 4	2	**Tractor Chassis:** 1. Tractor chassis, Functions of tractor chassis frame, Types of tractor chassis frame, 2.Chassisless Tractor, Tractor having Chassis Frame, Tractor chassis section **3.** *Familiarization / Video demonstration on Tractor chassis.*	2		2	*Practice on visual Inspection of chassis frame for crack, bent and twists.*			3
	3	1, 4	3	**Tractor Transmission system:** 1.Power Transmission system in Tractors-Functions. 2.Clutch in tractor –Requirement. 3. Gear box in tractor –Requirement- Types. *4. Familiarization of Tractor clutch assembly and its components and demonstration on clutch operation.*	3		1	*Compare/Observe Tractor transmission box with 4-wheeler gear box. (practice)*			3

	3	1, 3	4	*Service/Trouble shooting of clutch and gearbox*			4	*Servicing/ Overhaul Engine of Tractor*				3
	3		5	**CIE 1 – Written and Practice Test**				Assessment Review and corrective action				3
	3		6	**Visit to farm land or tractor showroom** Check & observe different types of tractors in the market and also different manufacturers manual, compare the differences in different make and models.			5					
Learning outcomes (Week 4): At the end of the week the student will be able to: 1. *Adjustment of track width and ground clearance in tractor.* 2. *Perform general maintenance.* 3. *Service/ Troubleshoot braking system.*												
4	3	4	1	Tutorial (Peer discussion on Showroom Visit), Report submission on visit.		4		Practice on *Adjustment of ground clearance in tractor (Video demonstration / Practice).*				3
	3	3	2	Practice on *Adjustment of track width and measure track width, wheel base (Video demonstration / Practice).*			4	*practice on tractor general maintenance*				3
	3	1, 3	3	**Tractor Braking system:** 1.Study of Braking system in tractors - types, Construction and working of Brake System – necessity of 2 brakes in tractor. 2. *Practice on checking & adjustment of tractor braking system.*	1		3	Troubleshooting the Tractor Brake, brake pedal.				3

	3	3	4	**Tractor Differential:** 1. Final drives - types of reductions - single reduction 2. *Familiarization with tractor differential-single reduction*	1		3	1.Double reduction final drives, Differential lock 2. *Practice on Double reduction final drive & checking back lash in the differential.*	1		2
	3		5	**Developmental Assessment**				Assessment Review and corrective action			3
	3		6	**Industry Class + Industrial Assignment** **Industry Class on** advancements in tractor transmission system	2		3				
Learning outcomes (Week 5): At the end of the week the student will be able to: 1. Fix the implements to PTO shaft and to troubleshoot PTO drive. 2. Service/ Troubleshoot the steering system.											
5	3	1	1	Tutorial (Peer discussion on Industrial assignment)		4		**Power take-off shaft:** 1. Power take off shaft – Necessity, Drive to PTO types –Transmission type, independent type & Continuous type PTO drive 2. *Familiarization with tractor PTO shaft operation with Two or more PTO drive applications (Video demonstration/live practice)*	1		2
	3	1, 3, 4	2	Practice on fixing of implements to the PTO shaft.			4	Troubleshooting the Tractor PTO drive			3

	3	1, 3	3	**Tractor Steering system:** 1. Study of Steering system in tractors Necessity, Types of steering systems in tractors-wheeled type tractor. 2. *Familiarization /Practice on wheeled type tractor steering system*	1		3	*Troubleshooting the Tractor Steering system*			3
	3	4	4	*Adjustment of split front axle.*			4	**Tractor Suspension system & Wheels:** 1. Tractor Suspension system: Objective, Various Types of suspension in tractors 2. Wheels and Tyres of Tractor, Specification of Wheels & Tyres, Cage wheel & its applications.	3		
	3		5	**CIE 2 – Written and Practice Test**				Assessment Review and corrective action			3
	3		6	**Industry Class + Industrial Assignment** **Industry Class on** Power take-off shaft.	2		3				
Learning outcomes (Week 6): At the end of the week the student will be able to: 1. Troubleshoot tractor electrical system. 2. Hitching the implements to the tractor.												
6	3	1, 2, 4	1	Tutorial (Peer discussion on Industrial assignment)		4		*Familiarization on wheeled type tractor suspension system.*	1		2
	3	1, 2	2	**Tractor Electrical system:**	1		3	*Troubleshooting the Tractor electrical system*			3

		, 4		1. Tractor electrical system- functions, components of tractor electrical system **2.** *Familiarization with tractor electrical system 3. practice on checking the faults in electrical system.*							
	3	1 , 2 , 4	3	**Hitch system in tractor:** 1.Hitch system in tractor- function, Types- Depth control, Draft control, position control. 2.Hitch and control board of tractor hitch: Drawbar hitch, three-point linkage. Implement control. *Video demonstration on hitching of implements to tractor*	2		2	Familiarization/ Practice on *Hitching of implements to the tractor.*			3
	3	1 , 2 , 4	4	**Tractor hydraulic systems** 1.Tractor hydraulic systems- Necessity- fundamental components of hydraulic system & its functions. 2. *Familiarization/Practice on Construction & working of Tractor hydraulic system*	1		3	1.Hydraulic systems applications in tractor, Lift mechanism – Depth wheel, Depth control- draft control- quick coupler 2. *Familiarization on Construction & working of Tractor depth control & draft control (Video demonstration/ practice)*	1		2
	3		5	**Developmental Assessment**				Assessment Review and corrective action			3
	3		6	**Industry Class + Industrial Assignment** **Industry Class on Tractor Hydraulic System**	2		3				
Learning outcomes (Week 7):												

At the end of the week the student will be able to:
1. Troubleshoot the tractor hydraulic system
2. Service the power tiller and to add implements to power tiller.

7	3	1, 2, 4	1	Tutorial (Peer discussion on Industrial assignment)		4		*Troubleshooting the Tractor Hydraulic system*				3
	3	1, 2, 4	2	**Power tiller:** 1.Introduction, role of Power Tiller in Agriculture, Types of Agriculture Tiller, Power Tiller Company in India. 2.Power Tiller Uses, Components, Operation, Power transmission in Power tiller. 3. *Video demonstration on Role of power tiller in Agriculture & other fields.*	2		2	**Power Tiller:** *1.Walk around check and identification of Power Tiller components & its systems.* 2. *Service or Troubleshooting of power tiller.*				3
	3	1, 3	3	**Power Tiller attachments:** 1. Attachments on a power tiller- Cage Wheel, Plough, Extension wheels 2. *Familiarization/ Video demonstration on working of cage wheel, Plough, Extension wheels used in power tiller* and to add the above attachments to the power tiller.	1		3	1.Water Pump, Potato Digger, Tyne Cultivator, Seed Cum Fertilizer Drill 2. *Familiarization/ Video demonstration on the working of Water Pump, Potato Digger, Tyne Cultivator, Seed Cum Fertilizer Drill used in power tiller* and to add the above attachments to the power tiller.	1		2
	3	1, 2	4	1. Sprayer Unit, Slasher, Shredder in agriculture, Ridger (Furrower).	1		3	1. Axial Flow Thresher, Reaper, Leveller, Cultivator 2. *Familiarization/ Video demonstration on Axial Flow Thresher, Reaper, Leveller, Cultivator used in*	1			2

		, 4		2. *Familiarization/ Video demonstration on Sprayer Unit, Slasher, Shredder in agriculture, Ridger (Furrower) used in power tiller and to add the above attachments to the power tiller.*				*power tiller and to add the above attachments to the power tiller.*			
	3		5	**CIE 3 – Written and Practice Test**				Assessment Review and corrective action			3
	3	1 , 2 , 4	6	**Visit** to **Tractor Service Centre and look into the power tillers and attachments**			5				
Learning outcomes (Week 8): At the end of the week the student will be able to: 1. Adjust the agricultural implements based on the need of the job. 2. Field testing of different agricultural implements.												
8	4	2 , 4	1	Tutorial (Peer discussion on Industrial assignment/ Industrial visit) & Report Submission on service center visit		4		1. Trailer, Power Tiller Operated Generator, Auger Digger 2. *Familiarization/ Video demonstration on working principle and application of Trailer, Power Tiller Operated Generator, Auger Digger used in power tiller*	1		2
	4	2 , 4	2	**Agricultural Implements:** 1. **Tillage:** Primary and secondary tillage equipment, Plough-purpose-chisel plough, Mould board Plough-Construction- types 2. *Practice on Plough mounting & basic adjustments-depth of cut, Cutting angle etc.*	1		3	1. Disc plough-specification, Uses, Main parts of Disc plough, Direct mounted disc plough, Disc scrapper, Furrow wheel 2. *Practice on Adjustment of cutting angle in disc plough to various soil conditions.*	1		2
	4	2 , 4	3	**Secondary Tillage:**	1		3	1. Levelling and puddling implements & its maintenance-Specification-use	1		2

				1. Secondary tillage implements- Purpose-types, Disc harrow-types-construction & operation-Uses 2. *Practice on Operating hints, Maintenance of Disc harrow*				2. Cultivators-types-uses-care & maintenance. 3. *Field testing/Video demonstration on levelling, puddling, cultivator plough*			
	4	2, 4	4	**Cage wheel:** 1. Necessity, Construction, application, specification of cage wheel 2. *Practice on mounting the cage wheel to tractor.*	1		3	**Sowing and Planting:** 1.Introduction, methods of sowing-Broadcasting-Dibbling -Drilling- Seed dropping behind the plough- 2. Transplanting- Hill dropping (manual, mechanical), precautions while sowing the seeds. 3. *Field testing/ Video Demonstration of sowing and planting equipment.*	1		2
	4		5	**Developmental Assessment**				Assessment Review and corrective action				3
	4	2, 4	6	**Industry Class + Industrial Assignment** **Industry Class on: Agricultural implements**	2		3					
Learning outcomes (Week 9): At the end of the week the student will be able to: 1. Field testing of different agricultural implements.												
9	4	2, 4	1	Tutorial (Peer discussion on Industrial assignment) & Report Submission on mines visit.		4		1. Seed drill-function-components of seed drill-Construction and working of seed drills, no-till drills and strip-till drills. 2.*Field-testing and adjustment / Video demonstration of seed drill*	1		2	

	4	2, 4	2	**Planter:** 1.Planter-Functions-Construction and working of planters, rice transplanters. 2.*Field-testing and adjustment / Video demonstration of rice transplanter*	1		3	**Threshers:** 1.Introduction, Functions of Power threshers, types of power threshers, Main components of threshers, Principle of threshing 2. Functions- Feeding Hopper, threshing unit, cleaning unit, power transmission unit, main frame and transport unit 3. *Field-testing / Video demonstration of Threshers.*	1		2
	4	2, 4	3	**Fertilizer Equipment:** 1.Importance of Fertilizer application, Fertilizer drill machine, fertilizer spreader-types-Constructions 2.Pesticide sprayer- Sprayer nozzle- types. Pumps for spraying etc 3. *Field-testing and adjustment / Video demonstration of fertilizer sprayer*	1		3	**Harvesting:** 1. Introduction- Types- Principle of cutting crop- 2. Harvesting machine- Reaper, Tea leaf harvesting machine, Maize/corn harvesting machine, Palm harvester. 3. *Field operation practice/video demonstration on reaper and & other harvesting machine*	1		2
	4	2, 4	4	**Rotavator:** 1. Features-Specifications –Types- Use 2.*Field operation practice/video demonstration on Rotavator.*	1		3	**Trailer:** 1.Features-Types-Uses 2.*Field operation practice/video demonstration on Trailer*	1		2
	4		5	**CIE 4 – Written and Practice Test**				Assessment Review and corrective action			3
	4	2, 4	6	**Industry Class + Industrial Assignment** **Industry Class on** Fertilizer equipment and advance techniques used.	2		3				

Learning outcomes (Week 10):
At the end of the week the student will be able to:

1. Demonstrate and implement future enhancements on farm technologies
2. Operate different government portals related to farming & to help claim benefits given to farmers.

10	5	2, 4	1	Tutorial (Peer discussion on Industrial assignment)		4		**Future of Farming Technology:** 1. Introduction, agriculture industry facing challenges - An elevated increase in Demographics will boost Demand for food	3		
	5	2, 4	2	1. current uses of Natural resources are Highly stressed 2. direct and indirect causes of degraded farmland 3. Climate change is Reducing productivity In agriculture	2		2	1. Food waste is a massive Market inefficiency and an Environmental threat 2. Outcome: poverty and hunger 3. Agriculture 4.0: disrupting the system is doable with new technologies	3		
	5	2, 4	3	1. Agriculture 4.0: Produce differently using new techniques 2. Use new technologies to bring food production to consumers, increasing efficiencies in the food chain- Vertical and urban farming. 3. Genetic modification and Cultured meats	2		2	• Applying 3d printing Technology to food • *Video demonstration of 3d printing Technology in food industry.*	1		2

	5	2, 4	4	**Farm Portal (Website)**: Demonstration and practice on how to operate/use the portal, their benefits to farmers. • Various schemes for farmers by state and Central government and how to claim that- Requirement, Documents to be produced etc. • **KKISAN, DEPARTMENT OFAGRICULTURE & FARMERS WELFARE** - Demonstration and practice on how to operate/use the portal, their benefits to farmers.			4	Farm Portal: Demonstration • Benefits and Subsidies provided by government for various agricultural implements purchase, pump set etc. • How to operate/browse into the farm portal.			3
	5		5	**Developmental Assessment**				Assessment Review and corrective action			3
	5	2, 4	6	**Industry Class + Industrial Assignment Industry Class on Government schemes like kisan Yojana etc.**	2		3				
Learning outcomes (Week 11): 1. Demonstrate and implement future enhancements on farm technologies												
11	5	2, 4	1	Tutorial (Peer discussion on Industrial assignment)		4		Incorporate cross industry technologies and applications- drone technology	3		

								Incorporate cross industry technologies and applications- Blockchain and securing the agriculture value chain Nanotechnology and precision agriculture			
	5	2, 4	2	Food sharing and crowd farming the role of government- Traditional industry promoter/facilitator	1		3	**1. Some Modern Agriculture Technology-Semi-automatic robots, Drones used in agriculture** 2. *Video demonstration on Semi-automatic robots used in agriculture.* 3. *Video demonstration on Drones used in agriculture.*			3
	5	2, 4	3	**Smart Farming:** 1. Introduction, Difference between Traditional & Smart farming, 2. Impact of new technology in Agriculture. 3. Video demonstration on smart farming	1		3	1. Role of SAAS-based cloud software in smart farming **2.** Benefits of smart farming using SaaS solutions 3.*Video demonstration on SAAS based cloud software in smart farming*	1		2
	5	2, 4	4	**1.IoT-based remote sensing equipment used agriculture, Advantages of IoT in Agriculture** 2. Computer imaging in smart agriculture	1		3	1.Applications of Cloud-based Software in Agriculture			3

				3. *Video demonstration on IoT based remote sensing & Computer imaging in agriculture.* 4. Role of Digital Farming Technology Preseason, in-season, Post-season intervention				**2.**Differences between IoT and SaaS solutions to consider before investing in one 3. *Video demonstration on Cloud based software in Agriculture*			
	5		5	**CIE 5 – Written and Practice Test**				Assessment Review and corrective action			3
	5	2, 4	6	**Industry Class + Industrial Assignment** Industry Class on IOT/ Computer imaging/ Cloud-based Software in smart agriculture			4				
Learning outcomes (Week 12): At the end of the week the student will be able to: 1. Apply drone in farming applications.												
12	5	2, 4	1	Tutorial (Peer discussion on Industrial Visit)		4		1.*Case study on Smart farming* 2.*Case study on Smart farming Technology involving in India.*	1		2
	5	2, 4	2	Agro- chemical spraying using Drone: 1. Introduction to agricultural drone, Drone and their uses. 2. Identify & select different types of Drones Identify basic concepts of Drones 3. Critical parameters considered while spraying in field using drone	4			Safe application standards: Use of PPE kit, Basis maintenance issues. Field practice on care and maintenance.	1		2
	5	2, 4	3	Practice on flying a drone using drone simulator/ Drone			4	Practice on flying a drone using drone simulator/Drone			3

	5	2, 4	4	Practice on flying a drone using drone simulator/ Drone			4	Practice on flying a drone using drone simulator/ Drone				3
	5		5	**Developmental Assessment**				Assessment Review and corrective action				3
	5	2, 4	6	**Field Visit where drone is used in spraying/ for any agricultural practices**			5					
Learning outcomes (Week 13): At the end of the week the student will be able to: 1. Demonstrate the mini project which he has worked on.												
13				**Internship** **a) Secondary research on various industries and their operations to identify at least 3 companies along with the areas of work interest and develop an internship plan that clearly highlights expectations from the industry during the internship.** **b) Design and develop a cover letter for an internship request to all 3 identified companies and the resume to be submitted to potential companies.** **c) Prepare for an internship interview to highlight your interests, areas of study, career aspirations and personnel competence – including the areas of learning you expect to learn during internship.**				**Project** a) **Identification of the problem statement (from at least 3 known problems) the students would like to work as part of the project – either as provided by faculty or as identified by the student. Document the impact the project will have from a technical, social and business perspective.** b) **Design and develop the project solution or methodology to be used to solve at least one of the problems identified.** c) **Prepare a project plan that will include a schedule, WBS, Budget and known risks along with strategies to mitigate them to ensure the project achieves the desired outcome.**			40 Hrs.

CIE and SEE Assessment Methodologies

CIE Assessment	Assessment Mode	Duration In hours	Max Marks
Week 3	CIE 1– Written and practice test	4	30
Week 5	CIE 2– Written and practice test	4	30
Week 7	CIE 3– Written and practice test	4	30
Week 9	CIE 4– Written and practice test	4	30
Week 11	CIE 5– Written and practice test	4	30
	On line Course work (Minimum 10 hours online course with certification from (SWAYAM/NPTEL/Infosys Springboard)		40
	Profile building for Internship / Submission of Synopsys for project work		20
Portfolio evaluation (Based on industrial assignments and weekly developmental assessment) *			30
TOTAL CIE MARKS (A)			**240**
SEE 1 - Theory exam (QP from BTE) Conducted for 100 marks 3 hrs duration reduced to 60 marks		**3**	**60**
SEE 2 – Practical		**3**	**100**
TOTAL SEE MARKS (B)			**160**
TOTAL MARKS (A+B)			**400**

* The industrial assignment shall be based on peer-to-peer assessment for a total of 10 marks (on a scale of 1 to 10) and in the event of a group assignment the marks awarded will be the same for the entire group, the developmental assessment will be for a total of 20 marks and based on MCQ/case study/demonstration and such other assignment methods

Assessment framework for CIE (1 to 5)

Note: Theory to be conducted for 1 hour and practice for 3 hours, total duration of exam – 4 hours

Model Questions CIE-1

Programme	**Automobile Engineering**	**Semester**	**V**
Course	**Farm Machinery and equipment**	**Max Marks**	**30**
Course Code	**20AT51I**	**Duration**	**4 hours**
Name of the course coordinator			

Note: Answer one full question from each section.

Qn. No	**Question**	**CL L3/L4**	**CO**	**PO**	**Marks**
	Section-1 (Theory) – 10 marks				
1.a)	Justify the statement "weather and climate affect the agriculture productivity".	L4	1	1,2	4
b)	A plot of 1000X800 m is to be drilled by a corn planter. The planter is having 6 rows with spacing of 120 cm. The speed of travel of planting is 5 kmph. Assume that the time lost in each turn is 10s and time lost in filling the seed hopper is 10 min per hectare. Take an overlap of 15 cm in each run. Find the field efficiency of the machine.	L3	2	1,4	6
2.a)	Erosion of soil can be controlled by various methods; how can erosion be controlled by contour cropping.	L3	1	1,2	5
b)	Farmer is planning for the compaction of soil for cultivation, how do you calculate the cost of operation of implement, Explain.	L4	2	1,4	5
	Section-2 (Practical) - 20 marks				
3)	A tractor has been towed to a garage with defect 'NOT STARTING". Check for the causes for this defect and give the remedial solution.	L3	3	1,3	20

4)	When clutch is pressed and released, the driver observes the poor release of the clutch. What might be the problem, identify and give the remedial solution	L3	3	1,3	20

Note : Theory questions shall be aligned to practical questions

Assessment framework for SEE 1 (Theory)

Programme :	**Automobile Engineering**		
Semester :	**V**		
Course :	**Farm Machinery and equipment**	**Max Marks :**	**100**
Course Code :	**20AT51I**	**Duration :**	**3 Hrs**

Instruction to the Candidate: Answer one full question from each section.

Q.No	Question	CL	CO	Marks
	Section-1			
1.a)	"Agricultural machinery helps to mechanize the work of agriculture", Justify the statement, Distinguish benefits and limitations of farm mechanization.	L4	1	10
b)	Erosion of soil can be controlled by various methods; how can erosion be controlled by contour cropping.	L3		10
2.a)	How the nitrogen in the soil can be increased and how does nitrogen help in productivity of the crop.	L3		10
b)	Justify the statement "weather and climate affect the agriculture productivity".	L4		10
	Section-2			
3.a)	Farmer is planning for the land preparation for rice plantation, how do you calculate the cost of operation of implement, Explain.	L4	2	10
b)	A plot of 1000X800 m is to be drilled by a corn planter. The planter is having 6 rows with spacing of 120 cm. The speed of travel of planting is 5 kmph. Assume that the time lost in each turn is 10s and time lost in filling the seed hopper is 10 min per hectare. Take an overlap of 15 cm in each run. Find the field efficiency of the machine.	L3		10

4.a)	For a farm machinery is there a need for depreciation calculation? Explain about different methods for estimation of depreciation of farm machinery	L4		10
b)	Determine Theoretical Field Capacity for a machine that travels at 5.0 kmph and has an operating width of 20m. Say loss time is 0.75 hrs in a10 hr day, what is the effective Field capacity?	L3		10
	Section- 3			
5.a)	The tractor front wheels are smaller in comparison to the rear wheels, what is need for this type of design? What are the technical advantages of this arrangement?	L4	3	10
b)	The tractor has some problem, the mechanic checks and states the fault is in the clutch. Illustrate the minimum 3 signs of bad clutch in farm tractor and how to overcome it.	L3		10
6.a)	If the performance of your tractor starts decreasing over time, most likely the fuel system is probably what's malfunctioning. How does this effect the performance of the tractor and what is its remedial solution	L4		10
b)	A tractor has been towed to a garage with defect 'NOT STARTING". What can be the likely causes for this defect and how will you trace the same.	L3		10
	Section-4			
7.a)	With a neat sketch Construction and working of seed drills	L3	4	10
b)	What are the adjustments needed from disc plough for better working condition under field condition.	L4		10
8.a)	Distinguish between mould board plough and disc plough with neat sketches	L4		10
b)	What are the procedures to be followed for the maintenance of the disc plough	L3		10
	Section-5			
9.a)	How using SaaS solutions can benefit of smart farming. Justify the statement "Remote management of the farm" in smart farming.	L4	5	10
b)	In farmer portal, NMSA- What are the objectives of soil health card scheme	L3		10
10.a)	What is the smart farming solution, its essential features and its contribution to crop health management?	L3		10

b)	"Drone in agriculture" Justify the statement - drone help in productivity of the farming.	L4		10

Sample Question & Scheme of Evaluation for SEE 2

Sl. No	Description	Marks
Problem statement	Estimate the time required to cultivate land by using disc plough, based on type of soil, type of tractor and implement.	
1	Collection of data	20
2	Analyze the given Problem	20
3	Preparation of specification table	20
4	Result/ Calculation	20
5	Viva voce	20
Total		**100**

Equipment:

Sl. No.	**Particulars**	**Quantity**
1.	Planimeter/Platometer	5
2.	Tractor	1
3.	Power Tiller	1
4.	Cage Wheel	1
5.	Disc plough	1
6.	Sowing and planting Equipment	1
7.	Threshers	1
8.	Pesticide sprayer	1
9.	Harvesting machine	1

10.	Drone	1

References

Sl. No	Description
1	Farm Mechanization for Production by Dhirendra Khare, S.B. Nahatkar, A.K. Shrivastava, A.K. Jha (Scientific Publishers, 2018)
2	Introductory Farm Machinery and Equipments Engineering by Amaresh Sarkar
3	Agronomy of Field Crops by SR Reddy **by Craig C & Kristine M Moncada Sheaffer**
4	Introduction To Agronomy Food, Crops, And Environment by Craig C & Kristine M Moncada Sheaffer
5	Fluid power Engineering by RK Hegde & Niranjan Murthy
6	Farm machines and Equipment by C.P. Nakra
7	Fluid power transmission and control system by P.G. Mundas
8	Farm Tractor Maintenance and Repairs" by S C Jain
9	Farm Tractors (Olyslager Auto Library)" by Olyslager Organization
10	Tractors and Agricultural Machinery by Srinivasan, VV Narayanan, Sanjeev kumar singh, Geetha Lakshmi (Publisher: New India Publishing Agency)
11	FARM TRACTOR, POWER TILLER MAINTENANCE & REPAIR by S.C. JAIN, C.R. RAI
12	Agricultural Drones by Krishna K. R.
13	Quadcopters and Drones: A Beginner's Guide to Successfully Flying and Choosing the Right Drone Publisher : Createspace Independent Pub (25 June 2015) by Mark Smith.