	Course Title: **Farm tractors and construction Equipments**	Course Code: **15AT54A**
	Credits (L:T:P) : 4**:0:0**	Core/ Elective: Elective
	Type of course: : **Lectures**	Total Contact Hours: **52**
	CIE 25 Marks	**SEE 100 Marks**

Prerequisites:

Knowledge of basic mechanical engineering, hydraulics, and Automobile engineering

Course Objectives:

Appraise the need and explain construction and working of tractors and construction equipments.

On successful completion of the course, the students will be able to attain CO'S:

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Explain the purpose, constructional features and operation of Agriculture tractors.	***A/U***	2,5	**12**
CO2	Explain construction and working of Farming implements and justify their use.	***R/U/A***	2,4,5	**08**
CO3	Explain the purpose, constructional features and operation of Construction equipment.	***U/A***	2,4,5	**10**
CO4	Explain the purpose and construction of under carriage and suspension of tracked vehicles.	***R/U/A***	2	**08**
C05	Appreciate the purpose and explain construction of power steering and brakes.	***R/U/A***	2,4	**10**
CO6	Describe the purpose, construction, features, operation and application of cranes.	R/U/A	2,4	**04**
		Total sessions		**52**

Legend: R: Remember, U: Understand A: Application

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Form tractors and construction equipments	**0**	**3**	**0**	**3**	**3**	**0**	**0**			

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENT AND BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Hour	Questions to be set For Sem End Exam			Marks weightage (%)
			R	U	A	
I	**Tractors**	**12**	**--**	**15**	**15**	**21**
II	**Agricultural implements for tractors**	**08**	**---**	**10**	**15**	**18**
III	**Construction equipment**	**10**	**--**	**10**	**15**	**18**
IV	**Under carriage and suspension**	**08**	**---**	**10**	**15**	**18**
V	**Power steering and brakes**	**10**	**---**	**10**	**15**	**18**
VI	**Cranes**	**04**	**---**	**05**	**05**	**07**
	Total	**52**	**145**			**100**

Legend: R; Remember, U: Understand A: Application

Course Delivery: The course will be delivered through lectures, presentations, classroom discussions, and videos.

Course Content:

UNIT I

Tractors : 12Hrs

Tractors - Classification - types of tractors with their application, Power take off shaft – purpose – application - types, Track width necessity - different methods, hydraulic system in tractors – necessity, depth & draft control –types. Final drives - types of reductions - single reduction - double reduction final drives

UNIT II

Agricultural implements for tractors 8Hrs

Farming equipments – types,- construction and working of Cultivator , Disc plough, Mould board plough, Harrow plough, rotary plough, thresher, sprayer.

UNIT III

Construction equipment 10-Hrs

Classification - types - applications. Construction and working of Dump trucks, Dozers, Loaders, Shovels, Excavators, Scrapers, Motor graders, Rollers, smooth wheeled, pneumatic, sheep foot , and tandem roller,

UNIT IV

Under carriage and suspension **08Hrs**

Tyre and tracked vehicles - advantages and disadvantages, under carriage components like tracks, roller frames, drive sprockets, track rollers, track chains and track shoes. Suspension - rubber spring suspension and air spring suspension

UNIT V

Power steering and brakes **10Hrs**

Power steering - linkage or semi integral type - integral power steering, Steering of tracked vehicles -Skid steering -clutch /brake steering system - planetary steering system – differential steering system - construction and working of each type, Articulated steering– construction & working, Brakes - Types - disc brake - spot type - clutch type – construction & working , Engine retarders brakes.

UNIT VI

Cranes **04Hrs**

Classification -Derrick crane, mobile cranes, traveller crane overhead cranes and Tower cranes - constructional features.

Resources:

Websites:

1) https://www.youtube.com/watch?v=eYQV5GOPQPw
2) https://www.youtube.com/watch?v=9cWdiNFEa7w
3) https://www.youtube.com/watch?v=pRIifT_h8yw

Reference books:

SlNO	Title of the book	Author	Publisher
1	Farm machines and equipments"	Nakra C.P	Dhanparai Publishing companyPvt
2	Construction equipment and its management.	S.C. Sharma	
3	On and with the earth	Jagman Singh	W.Newman and Co. culkatta
4	Farm machinery and mechanism	Donald R. hunt and L. W.garner	
5	Diesel equipment- volume I and II	Erich J.schulz	
6	On and with the earth	Jagman Singh,	W.Newman and Co. culkatta
7	Construction planning and equipment",	B Satyanarayana, Subhash Chandra Sexena	standard publishers and distributors, New Delhi, 1985.

SPECIAL INSTRUCTIONAL STRATEGIES

UNIT NO	UNIT NAME	STARATEGIES
1	**Tractors**	Showing actual working, presentations, Video movies
2	**Agricultural implements for tractors**	Presentations, charts, Video movies, field visits
3	**Construction equipment**	Presentations, charts. field visits, Video movies
4	**Under carriage and suspension**	Teaching, Presentations & Seminar
5	**Power steering and brakes**	Teaching, Presentations & Seminar
6	**Cranes**	Presentations, charts, Video movies

Student Activities/assignment to be performed to award five marks in continuous internal evaluation:

Student should prepare report or charts on locally available tractors, different systems observed on different tractors, different attachments used on tractor. Or earth moving equipment's locally available and operations performed by them or make a report on any one of the systems in tractors and earth moving equipment's.

Note:

1. **Student should prepare a hand written report on any one of the above/similar activity, which helps in achieving above course outcomes.**
2. **The report prepared should be approved by the concerned staff and HOD.**
3. **The activity group should consist of maximum of three students.**

MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY

RUBRICS MODEL

Student Name :				Reg No:		
RUBRICS FOR ACTIVITY(5 Marks)						
	Unsatisfactory	**Developing**	**Satisfactory**	**Good**	**Exemplary**	**Student Score**
	1 Mark	**2 Mark**	**3 Mark**	**4 Mark**	**5 Mark**	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	5

Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	2
Average / Total =marks=(4+5+3+2)/4=14/4=3.5=4						

Note: This is only an example for each student. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	CIE(Continuous Internal Evaluation)	IA	Students	Three IA Tests; (Average of three Tests)	20	Blue books	1,2,3,4,5,6
				Activities	05	Activity reports	1,2,3,4,5,6
	SEE (Semester End Examination)	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4,5,6
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2 & 3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3,4,5 & 6 Effectiveness of Delivery of instructions & Assessment Methods

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Note to IA verifier*: *The following documents to be verified by CIE verifier at the end of semester

1. Blue books (20 marks)
2. Student suggested activities report for 5 marks evaluated through appropriate rubrics.
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	VI SEM	**Farm tractors and construction equipments**	20
	Year:	Course Code:15AT54A	

Tractors and Agricultural implements for tractors

	Question	MARKS	CL	CO	PO
1	State various types' of tractors with their applications. OR State the purpose of power takes off. Mention their types	05	R R	01	2,5
2	Draw the sketch of tractor and label the parts. OR What are the different operations performed by using tractor.	05	U U	01	2,5
3	With a neat sketch explain construction of cultivator OR With a neat sketch explain construction and working of chopping knife type thresher	10	U/A	02	2,4, 5

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODELQUESTION PAPER (SEE)

VI Semester Diploma Examination

Farm tractors and construction equipments {Elective Theory}

[Time:**3 Hours**] [MaxMarks**:100]**

Note: Answer any **SIX** from Part A and any **SEVEN** from Part B

PartA 6x5=30marks

1. State detailed classification tractors.
2. Sketch and label continuous drive PTO.
3. What is different farming implements used in agricultural farming?
4. How earth moving equipment's are classified?
5. State application of dozers.
6. Explain operation of a loader(sketch not required)
7. State advantages and disadvantages of tyre vehicles over tracked vehicles.
8. State advantages of power steering.
9. Write a note on overhead cranes.

Part B 7X10=70 Marks

1. Explain construction of a tractor with a neat sketch.
2. State the purpose of power takes off. Explain with a Sketch continuous drive pto.
3. With a neat sketch explain construction and working of rotary plough.
4. With a neat sketch explain construction of a dozer.
5. Explain construction of track roller and sprocket with supporting sketches.
6. With a lay out explain working air spring suspension.

7. Explain construction and working of clutch /brake steering system with a neat sketch.
8. Explain construction and working of Tower cranes with a neat sketch.
9. State the purpose of power takes off. Explain with a Sketch independent drive pto
10. With a neat sketch explain construction and working of Sprayer.

MODEL QUESTION BANK

Tractors

FIVE MARKS QUESTIONS

1. State detailed classification tractors. A
2. State various types' of tractors with their applications. R/U
3. State the purpose of power take off. Mention different types R
4. What is the necessity of adjusting track width? State the methods of adjusting track width. R/U
5. State the necessity of hydraulic system in a tractor. What is different hydraulic system used. R/U
6. State the necessity final drives. What are the advantages of double reduction final drive? R/A
7. Draw the sketch of tractor and label the parts. U/A
8. What are the different operations performed by using tractor. U/A
9. Sketch and label continuous drive PTO shaft. A
10. Sketch and label transmission drive PTO shaft. A
11. Sketch and label independent drive PTO shaft. A

TEN MARKS QUESTIONS

1. Explain construction of a tractor with a neat sketch. A/U
2. State the purpose of power take off. Explain with a Sketch continuous drive PTO shaft. A/U
3. State the purpose of power take off. Explain with a Sketch transmission drive PTO shaft. A/U
4. State the purpose of power take off. Explain with a Sketch independent drive PTO shaft. A/U
5. With neat sketch explain construction and working of draft control mechanism. A/U
6. With neat sketch explain construction and working of depth control mechanism. A/U.
7. With neat sketch explain construction, working of double reduction final drive and state advantages. U/A

02 Agricultural implements for tractors

FIVE MARKS QUESTIONS	
1. State different farming implements.	R
2. Sketch and label the parts of cultivator	A/U
3. Sketch and label the parts of Disc plough,	A/U
4. Sketch and label the parts of Mould board plough.	A/U
5. Sketch and label the parts of rotary plough.	A/U
6. Sketch and label the parts of Harrow plough.	A/U
7. Sketch and label the parts of Sprayer.	A/U
8. Sketch and label the parts of thresher	A/U

TEN MARKS QUESTIONS	
1. With a neat sketch explain construction of cultivator	A/U
2. With a neat sketch explain construction of Disc plough.	A/U
3. With a neat sketch explain construction of Mould board plough	A/U
4. With a neat sketch explain construction and working of rotary plough.	A/U
5. With a neat sketch explain construction of Harrow plough.	A/U
6. With a neat sketch explain construction and working of Sprayer.	A/U
7. With a neat sketch explain construction and working of beater type thresher	A/U
8. With a neat sketch explain construction and working of chopping knife type thresher	R/U

Construction equipment

FIVE MARKS QUESTIONS	
1. How earth moving equipment's are classified?	A/U
2. State classification of dumpers.	R
3. State the different works performed by dozer.	R
4. State application of dozers.	A
5. Explain operation of a loader (sketch not required)	U
6. Explain operation of rope shovel.	U
7. Sketch and label the parts of Dump trucks	A
8. Sketch and label the parts of Dozers	A
9. Sketch and label the parts of rope Shovels	A
10. Sketch and label the parts of Scrapers	A
11. Sketch and label the parts of motor grader	A
12. Sketch and label the parts of three wheeled roller.	A
13. Sketch and label the parts of pneumatic roller.	A
14. Sketch and label the parts of sheep foot roller.	A
15. Sketch and label the parts of tandem roller.	A
16. Sketch and label the parts of wheel loader.	A
17. What are the applications of rollers?	A
18. State the factors on which output of dozer depends.	A
19. Which are the parameters that influence degree of compaction?	A
20. Explain the factors which decide the haulage equipment?	An

TEN MARKS QUESTIONS	
1. Classify the construction equipment based on application	U/A
2. With a neat sketch explain construction of a dozer.	A/U

3. With a neat sketch explain construction and working of hydraulic excavator.	A/U
4. Explain operation of motor grader with a neat sketch.	A/U
5. State applications of dozers, rollers, motor graders.	A
6. Explain operation of rope shovel with a sketch.	A/U
7. State applications of smooth wheeled, pneumatic, sheep foot, and tandem roller,	A
8. State the factors on which output of power shovel depends.	A
9. Describe the principle of operation and uses of Bull-dozer	A
10. Describe the principle of operation and uses of Scraper	A

Under carriage and suspension

FIVE MARKS QUESTIONS

1. List advantages and disadvantages of tyre vehicles over tracked vehicles.	A
2. What are the undercarriage components of crawler tractor?	R
3. Sketch and label parts of track roller.	A
4. Explain construction of track chain.	U
5. Explain construction of track shoe with help of clutch.	A/U
6. Explain working of rubber suspension.	A

TEN MARKS QUESTIONS

1. With a lay out explain working air spring suspension.	U/A
2. State under carriage components of crawler tractor and explain functions of components.	R/A
3. Explain construction of track roller and sprocket with supporting sketches	U/A

Power steering and brakes

FIVE MARKS QUESTIONS

1. State advantages of power steering.	A
2. Sketch and label the parts of linkage type power steering, or semi integral power steering.	A/U
3. Write a note on linkage type power steering, or semi integral power steering.	A
4. Write a note on integral power steering.	A
5. Sketch and label the parts of clutch /brake steering system	A
6. Sketch and label the parts of differential steering system	A
7. Sketch and label the parts of planetary steering system.	A
8. Write a note on articulated steering system.	A
9. Sketch and label the parts of spot type (calliper type) disc brake	A
10. Sketch and label the parts of clutch type disc brake.	A
11. Write a short note on engine retarder type brakes.	A

TEN MARKS QUESTIONS

1. Sketch and explain linkage type power steering or semi integral power steering	A
2. Sketch and explain integral power steering.	A
3. With a neat sketch explain construction and working of clutch /brake steering system	U/A
4. With a neat sketch explain construction and working of differential steering system	U /A
5. With a neat sketch explain construction and working of planetary steering system.	U/A
7. With a neat sketch explain construction and working of calliper type disc brakes	U/A
8. With a neat sketch explain construction and working of clutch type disc brakes.	U/A

Cranes:

FIVE MARKS QUESTIONS	
1. Write a note on cranes.	A
2. Sketch and label the parts of Derrick crane	A
3. Sketch and label the parts of Tower cranes	A
4. Write a note on mobile cranes.	A
5. Write a note on over head cranes.	A
6. Write a note on Tower cranes.	A

TEN MARKS QUESTIONS	
1. Explain construction and working of Tower cranes with a neat sketch.	U/A
2. Explain construction and working of mobile cranes with a neat sketch.	U/A