

TRACTOR SYSTEMS AND CONTROLS		Semester	IV
Course Code	BAG405A	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
Course objectives: The course will enable the students to <ul style="list-style-type: none">Acquire a basic understanding the concepts of transmission system in a tractor, major functional systems, Gearing theory, principle of operation, gear box types, functional requirements.Understand the study of brake system, familiarization with the hydraulic system adjustments and Study of tractor mechanics.			
Teaching-Learning Process (General Instructions) These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none">Adopt different type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations.Chalk and Talk method for Problem Solving.Arrange visits to show the live working models other than laboratory topics.Adopt collaborative (Group Learning) Learning in the class.Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information.Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.			
Module-1			
Study of need for transmission system in a tractor. Transmission system – types, major functional systems. Study of clutch – need, types, functional requirements, construction and principle of operation. Familiarization with single plate, multi-plate, centrifugal and dual clutch systems.			
Module-2			
Study of Gear Box – Gearing theory, principle of operation, gear box types, functional requirements, and calculation for speed ratio. Study of differential system – need, functional components, construction, calculation for speed reduction. Study of need for a final drive.			
Module-3			
Study of Brake system – types, principle of operation, construction, calculation for braking torque. Study of steering system – requirements, steering geometry characteristics, functional components, calculation for turning radius. Familiarization with Ackerman steering. Steering systems in track type tractors. Study of Hydraulic system in a tractor – Principle of operation, types, main functional components, functional requirements.			
Module-4			
Familiarization with system the Hydraulic adjustments and ADDC. Study of tractor power outlets – PTO. PTO standards, types and functional requirements. Introduction to traction. Traction terminology. Theoretical calculation of shear force and rolling resistance on traction device. Study of wheels and tyres – Solid tyres and pneumatic tyres, tyre construction and tyre specifications. Study of traction aids.			
Module-5			
Study of tractor mechanics – forces acting on the tractor. Determination of CG of a tractor. Determination and importance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stability especially at turns. Determination of maximum drawbar pull. Familiarization with tractor as a spring-mass system. Ergonomic considerations and operational safety. Introduction to tractor testing. Deciphering the engine test codes			

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Analyze functions of power transmission system and clutch system.
2. Discuss Gear Box – Gearing theory, principle of operation, gear box types.
3. Apply principle of operation, construction, calculation for braking torque.
4. Familiarization with system the Hydraulic adjustments and ADDC
5. Analyze the importance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stability especially at turns.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 220B2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Text Books**


1. Liljedahl J B and Others. Tractors and Their Power Units.
2. Rodichev V and G Rodicheva. Tractors and Automobiles.

Reference Books:

1. C.B.Richey. Agricultural Engineering Handbook.
2. John Deere. Fundamentals of Service Hydraul
3. Singh Kirpal. Automobile Engineering – Vol I.
4. Heitner Joseph. Automotive Mechanics: Principles and Practices

Web links and Video Lectures (e-Resources):**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars


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