



# Shri Vaishnav Vidyapeeth Vishwavidyalaya

## Shri Vaishnav Institute of Technology and Science

### B.Tech in Agricultural Engineering

#### SEMESTER VIII

(2019-2023)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTAE801 (1)	DCS (Elective -I)	Mechanics of Tillage and Traction	2	0	2	3	50	30	0	15	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/Project/Participation in Class.

#### Course Objectives:

1. To learn the function of tractor systems and controls system.
2. To apply the principles of design of tractor systems and controls system.
3. To learn the fundamental concepts of tractor mechanics.

#### Course Outcomes:

1. Students will be able to understand the function to mechanics of tillage tools.
2. Students will be able to have knowledge and skill on tractor tyre system.
3. Students will be able to understand off road traction and mobility.
4. Students will be able to understand various tractor static equilibrium.
5. Students will be able to understand tractor stability especially at turns.

#### Syllabus:

##### UNIT I

Introduction to mechanics of tillage tools, engineering properties of soil, principles and concepts.

10HRS

##### UNIT 2


Stress strain relationship, design of tillage tools principles of soil cutting, design equation, force analysis, Application of dimensional analysis in soil dynamics and traction prediction equation.

9HRS


##### UNIT 3

Introduction to traction and mechanics, off road traction and mobility, traction model, traction improvement,

8HRS

  
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BTAE801 (1)	DCS (Elective -I)	Mechanics of Tillage and Traction	2	0	2	3	50	30	0	15	5

#### UNIT 4

Tyre size, tyre lug geometry and their effects, tyre testing.

7HRS

#### UNIT 5

Soil compaction and plant growth, variability and application of GIS in soil dynamics.


8HRS

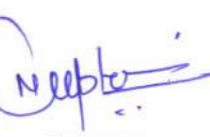
#### Practical

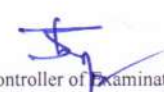
Measurement of static and dynamic soil parameters related to tillage, soil parameters related to puddling and floatation, draft for passive rotary and oscillating tools, slip and sinkage under dry and wet soil conditions and load and fuel consumption for different farm operations; Weight transfer and tractor loading including placement and traction aids; Studies on tyres, tracks and treads under different conditions, and soil compaction and number of operations.

#### Text and Reference Books:

1. Vandenberg and Gill. Tillage and Traction.
2. Liljedahl JB and others. Tractor and Power Units.
3. Daniel Hill. Fundamentals of Soil Physics.
4. Terzaghi K & Peck Ralph B. Soil Mechanics in Engineering Practices.

  
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<b>BTAE801(2)</b>	<b>DCS (Elective -I)</b>	<b>Farm Machinery Design and Production</b>	2	0	2	3	50	30	0	15	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class.

#### Course Objectives:

1. To provide a sound knowledge in the study of agricultural power and machinery in order to facilitates student's interest in agricultural engineering.
2. Discuss various power sources available for agricultural work.
3. Be able to select, and use appropriate agricultural machinery.

#### Course Outcomes:

1. Student will able to understand with farm mechanization, and identify the major functional components of farm machinery and forces acting on various tillage implements.
2. Student will able to understand significance of power to operate farm machinery.

#### Syllabus:

##### UNIT I

Theory Introduction to design parameters of agricultural machines & design procedure. Characteristics of farm machinery design. Research and development aspects of farm machinery.


10HRS


##### UNIT 2

Design of standard power transmission components used in agricultural machines: mechanical & hydraulic units.

9HRS

  
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BTAE801(2)	DCS (Elective -I)	Farm Machinery Design and Production	2	0	2	3	50	30	0	15	5

#### UNIT 3

Introduction to safety in power transmission. Application of design principles to the systems of selected farm machines. Critical appraisal in production of Agricultural Machinery; Advances in material used for agricultural machinery. Cutting tools including CNC tools and finishing tools.

8HRS

#### UNIT 4

Advanced manufacturing techniques including powder metallurgy, EDM (Electro- Discharge Machining), Heat Treatment of steels including pack carburizing, shot pining process, etc. Limits, Fits & Tolerances,

7HRS

#### UNIT 5

Jigs & Fixtures. Industrial lay-out planning, Quality production management. Reliability. Economics of process selection. Familiarization with Project Report.


8HRS

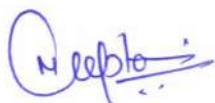
#### Practical


Familiarization with different design aspects of farm machinery and selected components. Solving design problems on farm machines & equipment Visit to Agricultural machinery manufacturing industry, Tractor manufacturing industry Jigs and Fixtures study in relation to agricultural machinery. Fits, tolerances and limits; Layout planning of a small scale industry; Problems on Economics of process selection; Preparation of a project report; Case study for manufacturing of simple agricultural machinery.


#### Text and Reference Books:

1. Richey, C.B. Agricultural Engineering Handbook.
2. Adinath M and AB Gupta. Manufacturing Technology.
3. Sharma PC and DK Aggarwal. Machine Design.
4. Narula V. Manufacturing process.
5. Singh S. Mechanical Engineer's Handbook.
6. Chakrabarti NR. Data book for Machine Design.

  
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<b>BTAE802 (1)</b>	<b>DCS (Elective -II)</b>	<b>Human Engineering and Safety</b>	2	0	2	3	50	30	0	15	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;  
\*Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class.

#### Course Objectives:

- 1 To provide a sound knowledge in the study of Human Engineering and Safety in order to facilitates student's interest in safety.
- 2 Discuss various arrangement and utilization of work space.
- 3 Be able to select, and use appropriate Safety gadgets for spraying, threshing, Chaff cutting and tractor & trailer operation etc.

#### Course Outcomes:

1. Students will be able to understand the human Engineering and Safety.
2. Students will be able to have knowledge and skill on safety.
3. Students will be able to understand anthropometry.
4. Students will be able to understand dangerous machine (Regulation) act.

#### Syllabus:

##### Unit 1

Human factors in system development – concept of systems; basic processes in system development, performance reliability, human performance. Information input process, visual displays, major types and use of displays, auditory and factual displays.

10HRS

##### Unit 2


Speech communications. Biomechanics of motion, types of movements, Range of movements, strength and endurance, speed and accuracy,.


9HRS


##### Unit 3


Human control of systems, Human motor activities, controls, tools and related devices.

7HRS

  
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#### Unit 4

Anthropometry: arrangement and utilization of work space, atmospheric conditions, heat exchange process and performance, air pollution.

8HRS

#### Unit 5

Dangerous machine (Regulation) act, Rehabilitation and compensation to accident victims, Safety gadgets for spraying, threshing, Chaff cutting and tractor & trailer operation etc.


7HRS


#### Practical

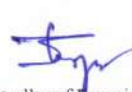
Calibration of the subject in the laboratory using bi-cycle ergo-meter. Study and calibration of the subject in the laboratory using mechanical treadmill; Use of respiration gas meter from human energy point of view. Use of Heart Rate Monitor. Study of general fatigue of the subject using Blink ratio method, Familiarization with electro-myograph equipment, anthropometric measurements of a selected subjects. Optimum work space layout and locations of controls for different tractors. Familiarization with the noise and vibration equipment. Familiarization with safety gadgets for various farm machines.


#### Text and Reference Books:

1. Chapanis A. 1996. Human Factors in System Engineering. John Wiley & Sons, New York.
2. Dul J. and Weerdmeester B. 1993. Ergonomics for Beginners. A Quick Reference Guide. Taylor and Francis, London.
3. Mathews J. and Knight A. A. 1971. Ergonomics in Agricultural Equipment Design. National Institute of Agricultural Engineering.
4. Astrand P. And and Rodahl K. 1977. Textbook of Work Physiology. Mc Hill Corporation, New York.
5. Mark S. Sanders and Ernest James McCormick. 1993. Human Factors in Engineering and Design. Mc Hill Corporation, New York.
6. Keegan J J, Radke AO. 1964. Designing vehicle seats for greater comfort. SAE Journal;72:50~5.

  
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BTAE802 (2)	DCS (Elective -II)	Hydraulic Drives and Controls	2	0	2	3	50	30	0	15	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;  
\***Teacher Assessment** shall be based following components: Quiz/Assignment/Project/Participation in Class.

#### Course Objectives:

- 1 To provide a sound knowledge in the study of Hydraulic Drives and Controls in order to facilitates student's interest in hydraulic.
- 2 Discuss various arrangement and utilization of work space.
- 3 Be able to select, and use appropriate hydraulic drives for controlling the system.

#### Course Outcomes:

1. Students will be able to understand the hydraulic drives and controls.
2. Students will be able to have knowledge and skill on control devices.
3. Students will be able to understand safety systems robotics.
4. Students will be able to understand United States of American Standards Institute USASI Graphical Symbols Tractor hydraulics.

#### Syllabus:

##### UNIT-1

Hydraulic Basics: Pascal's Law, Flow, Energy, Work, and Power. Hydraulic Systems, Color Coding, Reservoirs, Strainers and Filters, Filtering Material and Elements. Accumulators,

10HRS

##### UNIT-2

Pressure Gauges and Volume Meters, Hydraulic Circuit, Fittings and Connectors. Pumps, Pump Classifications, operation, performance, Displacement, Design of Gear Pumps, Vane Pumps, Piston Pumps.

9HRS

##### UNIT-3

Hydraulic Actuators, Cylinders, Construction and Applications, Maintenance, Hydraulic Motors. Valves, Pressure-Control Valves, Directional- Control Valves, Flow-Control Valves, Valve. Installation, Valve Failures and Remedies, Valve Assembly, Troubleshooting of Valves Hydraulic Circuit Diagrams and Troubleshooting,

7HRS

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<b>BTAE802 (2)</b>	<b>DCS (Elective -II)</b>	<b>Hydraulic Drives and Controls</b>	2	0	2	3	50	30	0	15	5

#### UNIT-4

United States of American Standards Institute USASI Graphical Symbols Tractor hydraulics, nudging system, ADDC. Pneumatics:

8HRS

#### UNIT-5

Air services, logic units, Fail safe and safety systems Robotics: Application of Hydraulics and Pneumatics drives in agricultural systems, Programmable Logic Controls (PLCs).


7HRS


#### Practical


Introduction to hydraulic systems. Study of hydraulic pumps, hydraulic actuators. Study of hydraulic motors, hydraulic valves, colour codes and circuits. Building simple hydraulic circuits, hydraulics in tractors. Introduction to pneumatics, pneumatics devices, pneumatics in agriculture; Use of hydraulics and pneumatics for robotics.

#### Text and Reference Books:

1. Kepner RA, Roy Barger & EL Barger. Principles of Farm Machinery.
2. Anthony E. Fluid Power and Applications.
3. Majumdar. Oil Hydraulic System.
4. Merit. Hydraulic Control Systems.
5. John Deere. Fundamentals of Service Hydraulics.

  
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BTAE803(1)	DCS (Elective - III)	Precision Agriculture and System Management	2	0	2	3	50	30	0	15	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class.

#### Course Objectives:

- 1 To provide a sound knowledge in the study of precision agriculture and system management in order to facilitate student's interest in precision engineering.
- 2 Discuss various arrangement and utilization for precision agriculture.
- 3 Familiarization with equipment for precision agriculture including sowing and planting machines.

#### Course Outcomes:

1. Students will be able to understand the precision agriculture need and functional requirements.
2. Students will be able to have knowledge and skill on precision agriculture.
3. Students will be able to understand sensors and application of sensors for data generation.
4. Students will be able to understand maintenance and scheduling of operations.

#### Syllabus:

##### UNIT-1

Precision Agriculture – need and functional requirements. Familiarization with issues relating to natural resources.

10HRS

##### UNIT-2


Familiarization with equipment for precision agriculture including sowing and planting machines, power sprayers, land clearing machines, laser guided land levellers, strawchopper, straw-balers, grain combines, etc.


9HRS

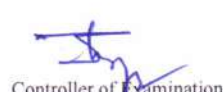
##### UNIT-3

Introduction to GIS based precision agriculture and its applications. Introduction to sensors and application of sensors for data generation.

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<b>BTAE803(1)</b>	<b>DCS (Elective - III)</b>	<b>Precision Agriculture and System Management</b>	2	0	2	3	50	30	0	15	5

#### UNIT-4

Database management. System concept. System approach in farm machinery management, problems on machinery selection, maintenance and scheduling of operations.

8HRS

#### UNIT-5

Application to PERT and CPM for machinery system management


7HRS


#### Practical


Familiarization with precision agriculture problems and issues. Familiarization with various machines for resource conservation. Solving problems related to various capacities, pattern efficiency, system limitation, etc. Problems related to cost analysis and inflation and problems related to selection of equipment, replacement, break-even analysis, time value of money etc.


#### Text and Reference Books:

1. Kuhar J E. The Precision Farming Guide for Agriculturist.
2. Dutta SK. Soil Conservation and land management.
3. Sigma and Jagmohan. Earth Moving Machinery.
4. Wood and Stuart. Earth Moving Machinery.
5. DeMess MN. Fundamentals of Geographic Information System.
6. Hunt Donnell. Farm Power and Machinery Management.
7. Sharma DN and S Mukesh. Farm Power and Machinery Management Vol I.

  
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BTAE803(2)	DCS (Elective - III)	Food Quality and Control	2	0	2	3	50	30	0	15	5

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class.

#### Course Objectives:

- 1 To provide a sound knowledge in the study of food quality and control.
- 2 Discuss various food quality parameters.
- 3 Familiarization with instrumental method for testing quality.

#### Course Outcomes:

1. Students will be able to understand the precision agriculture need and functional requirements.
2. Students will be able to have knowledge and skill on precision agriculture.
3. Students will be able to understand sensors and application of sensors for data generation.
4. Students will be able to understand maintenance and scheduling of operations.

#### Syllabus:

##### UNIT-1

Basics of Food Science and Food Analysis, Concept, objectives and need of food quality. Measurement of colour, flavour, consistency, viscosity, texture and their relationship with food quality and composition.

10HRS

##### UNIT-2


Sampling; purpose, sampling techniques, sampling procedures for liquid, powdered and granular materials, Quality control, Quality control tools, Statistical quality control, Sensory evaluation methods, panel selection methods, Interpretation of sensory results.

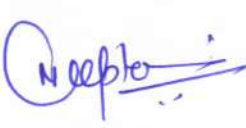
9HRS


##### UNIT-3

Instrumental method for testing quality. Food adulteration and food safety. TQM and TQC, consumer preferences and acceptance,

7HRS

  
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BTAE803(2)	DCS (Elective - III)	Food Quality and Control	2	0	2	3	50	30	0	15	5

#### UNIT-4

Food Safety Management Systems GAP, GHP, GMP, Hazards and HACCP (Hazard analysis and critical control point), Sanitation in food industry (SSOP), Food Laws and Regulations in India, FSSAI, Food grades and standards BIS, AGMARK, PFA, FPO, ISO 9000, 22000 Series.

8HRS

#### UNIT-5

CAC (Codex Alimentarius Commission), Traceability and Quality Assurance system in a process plant, Bio safety and Bioterrorism.


7HRS


#### Practical

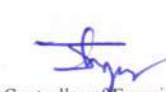
Examination of cereals & pulses from one of go-downs and market shops in relation to FPO and BIS specifications, Detection of adulteration and examination of ghee for various standards of AGMARK & BIS standards, Detection of adulteration and examination of spices for AGMARK and BIS standards, Detection of adulteration and examination of milk and milk products for BIS standards, Detection of adulteration and examination of fruit products such as jams, jellies, marmalades for FPO specification, Visit to quality control laboratory, Case study of statistical process control in food processing industry, Study of registration process and licensing procedure under FSSAI, Study of sampling techniques from food processing establishments, Visit to food processing laboratory and study of records and reports maintained by food processing laboratory.


#### Text and Reference Books:

1. Ranganna S. Hand book of Analysis and Quality Control for Fruit and Vegetable Products.
2. Srilakshmi B, Food Science.
3. Sharma Avanthi. A text book of Food Science and Technology.
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# Shri Vaishnav Vidyapeeth Vishwavidyalaya

## Shri Vaishnav Institute of Technology and Science

### B.Tech in Agricultural Engineering

#### SEMESTER VIII

(2019-2023)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
<b>BTAE804</b>	<b>DCS</b>	<b>Project Planning and Report Writing</b>	0	0	20	10	0	0	0	60	40

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.


\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class.

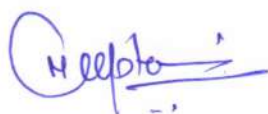
### Project Planning and Report Writing

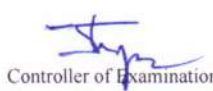
There are number of students interested for higher education and study abroad. Keeping in view their future requirement a component of Student Project is placed to understand and identify problems of his/ her interest and field, experimental set up, taking observation and writing and documentation in the form of thesis. Project work provides several opportunities to students to learn various aspects that cannot be taught in a class room or laboratory. In order to provide such opportunities to the graduates of agricultural science, Students Project is proposed as one of the components of the Student READY. It may be adopted based on the interest of student and expertise and facilities available with the College. The Students Project is proposed with the following objectives:


To impart analytical skills and capability to work independently.

- To conceptualize, design and implement the proposed work plan.
- Learn to work as a team- sharing work amongst a group, and learn leadership
- Learn to solve a problem through all its stages by understanding and applying project management skills.

  
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## Shri Vaishnav Institute of Technology and Science

### B.Tech in Agricultural Engineering


#### SEMESTER VIII

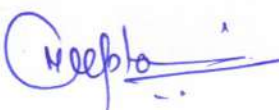
(2019-2023)

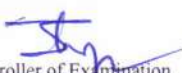
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<b>BTAE804</b>	<b>DCS</b>	<b>Project Planning and Report Writing</b>	0	0	20	10	0	0	0	60	40

- Learn to do various implementations, fabrication, testing and trouble shooting.
- Learn communication report writing skills.

All the above mentioned components are interactive and are conceptualized for building skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts, etc. with end to end approach. It is observed that this programme is quite useful and beneficial to the students/ graduates in gaining the competency for entrepreneurship, in building confidence, skill and acquire Indigenous Technical Knowledge (ITK) of the locality and thereby, preparing the pass-out graduates for self-employment. This programme will play the key role in overall personality development of our coming Agricultural Graduates. It is believed that ICAR efforts will help in improvement of Agriculture Education and sustainable development of the rural India.

  
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