

Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)



**Evaluation Scheme & Syllabus
Department of Agricultural Engineering**

M. Tech (Farm Machinery & Power)

(I to IV Semester)

(Effective from session 2019-20)

EVALUATION SCHEME

M.Tech- Farm Machinery & Power Semester-I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(3)	EXT.(70)	SESS.(25)	EXT.(25)	
MT-AG-101	Tractor System Design-I	30	70	NA	NA	100
MT-AG-102	Farm Machinery Design and Testing	30	70	25	25	150
MT-AG-103	Solid Dynamics in Tillage and Traction	30	70	NA	NA	100
MT-AG-104	Land Grading and Earth Moving Machine.	30	70	NA	NA	100
MT-AG-105	Adv. in Tractor Hydraulics and Trans. Syst	30	70	NA	NA	100
MT-AG-106	Seminar-I	NA	NA	25	25	50

Semester-II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MT-AG-201	Alternative Energy Sources	30	70	NA	NA	100
MT-AG-202	Tractor Systems Design - II	30	70	NA	NA	100
MT-AG-203	Off-road Vehicle Engineering	30	70	NA	NA	100
MT-AG-204	Instrumentation and Research Techniques	30	70	25	25	150
MT-AG-205	Tractor Ergonomics	30	70	NA	NA	100
MT-AG-206	Farm Machinery Testing Laboratory	NA	NA	25	25	50

Semester-III

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MT-AG-301	Dissertation phase-I	NA	NA	300	300	600
MT-AG-302	Seminar-II	NA	NA	25	25	50

Semester-IV

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MT-AG-401	Dissertation Phase-I	NA	NA	300	300	600

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I Year I Semester
MT-AG-101 Tractor Systems Design I

Trends in tractor design. Engine performance. Selection of engine for tractors. Design of principal engine components. Design of engine systems. Tractor clutches and brakes. Design of power transmission systems. Design and selection of ground drive components. Design and performance evaluation of traction and transport devices.

I Year I Semester
MT-AG-102 Farm Machinery Design and Testing

Basic design principles of farm machines, implements and tools. Design and selection of power transmission elements. Design of primary and secondary tillage implements. Design of seeders, planters, transplanting machines, fertilizer distributors and plant protection equipments. Design of harvesting and threshing machines for cereals, pulses and root crops. Design of farm transport equipment.

Test codes. Performance indices. Selection of machine for various farming operations.

LIST OF EXPERIMNET

1. Design of agricultural implements.
2. Performance evaluation of tractor and power tiller .
3. To study about operation drawn tillage, seeding, weeding, plant protection, harvesting and threshing machines.
4. Testing of animal drawn and manually drawn operated implements.
5. Testing of crop processing equipments. Test codes of agricultural machines.

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I Year I Semester

MT-AG-103 Soil Dynamics in Tillage and Traction

Measurement of dynamic properties of soil in compression, tension, shear, impact, friction and adhesion. Soil strength. Mechanics of rigid, rotary and oscillating tillage tools. Design and performance of various tillage tools. Tyre size, load and pressure relationship. Mechanics and design of traction and transport devices. Theories for predicting thrust and rolling resistance. Measurement and characterization of terrain response. Methods for parametric analysis of wheeled vehicle performance. Analysis of tracked vehicle performance. Traction improvement. Handling characteristics of off-road vehicle

I Year I Semester

MT-AG-104 Land Grading and Earth Moving Machinery

Grading of sloppy lands. Principles of mechanisms used in crawler mounted tractors. Dump trucks and their mechanisms. Load hoisting equipment. Earth diggers and ditchers. Bull dozers and scrapers. Elevating and self powered graders. Automation of earth moving and grading machines. Boring machines. Different methods of boring.

I Year I Semester

MT-AG-105 Advances in Tractor Hydraulics and Transmission

Fluid Based System: Basic principles and elements of fluid power. Characteristics of fluids, pumps, valves and actuators. Types of fluid power systems. Pressure transients. Hydraulics systems design, system maintenance, servo control system.

Power Transmission: Basic principles of power transmission, manual shift transmission, constant and synchromesh transmission, powershift transmission, hydrostatic transmission. Differentials and final drives.

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I Year II Semester

MT-AG-201 Alternative Energy Sources

Solar system. Design of solar energy operated systems for heating, cooling, distillation, drying, dehydration, water pumping and power generation for application in agriculture. Photo voltaic devices. Utilization of wind energy for generation of electricity and mechanical power. Types of wind mills and their characteristics. Mechanics of wind mills. Design of wind mills. Recycling of agricultural waste. Microbial conversion of plant materials to fuel. Bio-chemistry of anaerobic fermentation of bio-mass. Design of biogas systems for heating, lighting and running IC engines. Economics of biogas utilization. Bio- fuels.

I Year II Semester

MT-AG-202 Tractor Systems Design II

Design of tractor chassis. Tractor stability analysis. Single and three point hitch systems. Drawbar performance. Quick attaching couplers. Hydraulic controls and systems. Design of mechanical and power steering. Human factors engineering in tractor design.

I Year II Semester

MT-AG-203 Off-Road Vehicle Engineering

Engine components and basic engine nomenclature, IC engine classification, Air standard cycle and fuel cycle analysis for diesel and dual combustion or limited pressure cycle, Difference between actual and fuel air cycles in diesel engines, Combustion in CI engines, Alternate fuels for CI engines, Engine friction and lubrication, Engine cooling, Supercharging, Dual fuel and multifuel engines, Exhaust emissions and its measurement, Testing of farm engines, Performance parameter and characteristics.

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I Year II Semester

MT-AG-204 Instrumentation and Research Techniques

Principle of measurements. Measurement of physical, rheological, mechanical, electrical properties of agricultural materials. Measurement of temperature, pressure, humidity, moisture content, velocity, discharge, force, torque, strain and displacement. Strain and stress relationship. Strain sensitive transducers. Principle and selection of transducers. Signal conditioning. Data acquisition systems. Data analysis and statistical interpretation.

I Year II Semester

MT-AG-205 Tractor Ergonomics

Ergonomic principles. Man-machine system, tractor reliability. Fatigue in tractor operation. Energy cost of tractor operation. Tractor operator's working environment. Thermal stresses in tractor operation. Operator workplace design. Vibrator and noise: evaluation, reduction, application in tractor seat design. Biomedical aspects of tractor operation; Visual perception in tractor control panel design. Principle and design of ROPS, International standards and testing of ROPS. Computer application and automation in tractor design.

I Year II Semester

MT-AG-206 Farm Machinery Testing Laboratory

LIST OF EXPERIMENTS

1. Testing of tractor hydraulic systems.
2. Testing of mechanical and power steering systems.
3. Testing of tractor from ergonomic considerations.
4. Design and drawing of tractor transmission systems.
Testing of clutches and brake

