



**SAMRAT ASHOK TECHNOLOGICAL INSTITUTE**  
(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

**-----AGRICULTURAL ENGINEERING-----**

Semester/Year		V/III		Program			B.Tech				
Subject Category	DC	Subject Code:	AE-501	Subject Name:		<b>Irrigation Engineering</b>					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-work	Quiz					
60	20	10	10	30	10	10	150	3	-	2	4
<b>Prerequisites:</b>											
<b>Course Objective:</b>											
At the completion of the course the students should be able to understand the necessity of planning an irrigation system to provide water at the right time and right place.											
<b>Course Outcomes:</b>											
After completion of the course, the student will be able to:											
<ol style="list-style-type: none"> <li>1. The student will gain knowledge on different methods of irrigation including canal irrigation</li> <li>2. Knowledge of different water lifting pumps and their operation</li> <li>3. Design of Drip &amp; Sprinkler irrigation system</li> </ol>											
<b>UNITs</b>	<b>Descriptions</b>								<b>Hrs.</b>	<b>CO's</b>	
I	<b>Introduction</b> -Irrigation; impact of irrigation on human environment; purpose of irrigation; source of irrigation water; India water budget; river system of India; advantage and disadvantage of irrigation. <b>Soil plant water relationship</b> Saturation point; field capacity; moisture equivalent; wilting point; permanent wilting point; Evaporation; transpiration ; evapotranspiration ; evaporation measurement;								7	CO1	
II	<b>Irrigation Methods</b> surface irrigation method and design; wind speed; crop growth stage and crop coefficient ; modified penman equation; crop water requirement; net irrigation requirement ; gross irrigation requirement; irrigation frequency; irrigation period; irrigation management; irrigation efficiency and based numerical problem.								8	CO1	
III	<b>Water Lift and Pumps</b> - classification of pumps; performance and adaptability of common type indigenous water lift; application of non-conventional energy in pumping; positive displacement pumps; variable displacement pumps; specific speed of pumps; pump characteristics; terminology; effective speed and impeller diameter on pump performance; centrifugal pump- principle of operation, classification ; type of impeller; operation, maintenance and troubleshooting; submersible pump; selection of pump; power								9	CO2	

	requirement; efficiency and economy of pumping plant.		
IV	<b>Canal irrigation and command area development</b> Classification of canals- Alignment of canals – Design of irrigation canals– Regime theories - Canal Head works – Canal regulators - Canal drops – Cross drainage works – Canal Outlet, Escapes –Lining and maintenance of canals - Excess irrigation and waterlogging problem - Command area - Concept, Components of CADP - On Farm Development works, Farmer’s committee - its role for water distribution and system operation - rotational irrigation system.	8	CO1
V	<b>Micro Irrigation</b> <b>Sprinkler irrigation</b> -adaptability; types; component; uniformity coefficient; design of sprinkler irrigation system; cost estimation; operation and maintenance of sprinkler system; <b>Drip irrigation</b> -component; installation; emitter selection; emission uniformity; design and layout of drip irrigation.	8	CO3
Guest Lectures (if any)			
<b>Total Hours</b>		40	
<b>Suggestive list of experiments:</b>			
<ol style="list-style-type: none"> <li>1. Measurement of soil moisture by different soil moisture measuring instruments.</li> <li>2. Measurement of irrigation water.</li> <li>3. Measurement of infiltration rate.</li> <li>4. Computation of evaporation and transpiration.</li> <li>5. Measurement of uniformity coefficient of sprinkler irrigation method.</li> <li>6. Measurement of uniformity coefficient of drip irrigation method.</li> </ol>			
<b>Skill based mini project</b>			
<ol style="list-style-type: none"> <li>1. Sensor based automatic irrigation system.</li> <li>2. Determination of uniformity coefficient of drip &amp; sprinkler irrigation system.</li> <li>3. Calculation of distribution uniformity of different surface irrigation method.</li> </ol>			
Text Book-			
<ol style="list-style-type: none"> <li>1. Irrigation Theory and practice by A.M. Michael, new Delhi vikas publication</li> <li>2. Principles of Agril. Engg. Vol-II by A.M. Michale and T.P. Ojha, Jain brother, New Delhi</li> </ol>			
Reference Books-			
<ol style="list-style-type: none"> <li>1. Soil and water conservation by Schwob, G.O. frevert, R.K. Edminister, T.W. barnes, K.K., John wiley and Sons Inc. New York</li> <li>2. Sprinkler and trickle irrigation by Keller Jack 1990, Van Nastrund Reinhold 115 fifth avenue new York</li> </ol>			
<b>Modes of Evaluation and Rubric</b>			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
<b>List/Links of e-learning resource</b>			

Recommendation by Board of studies on	14-12-2023
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	Civil Engineering Department



**SAMRAT ASHOK TECHNOLOGICAL INSTITUTE**  
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**-----AGRICULTUAL ENGINEERING-----**

Semester/Year		V/III	Program			B.Tech					
Subject Category	DC	Subject Code:	AE-502	Subject Name:		<b>Farm Machinery &amp; Equipment</b>					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work	Quiz					
60	20	10	10	30	10	10	150	3	-	2	4
<b>Prerequisites:</b>											
<b>Course Objective:</b>											
The students will be able to understand the mechanization and various equipment used in the farm for different field operations.											
<b>Course Outcomes:</b>											
After completion of the course, the student will be able to:											
<ol style="list-style-type: none"> <li>1. To introduce the students to the working principles of farm &amp; tillage implements.</li> <li>2. To expose the students to farm mechanization benefits and constraints, identification of components of primary and secondary tillage implements□</li> <li>3. Types, components &amp; working principle of different farm machinery</li> </ol>											
UNITS	Descriptions								Hrs.	CO's	
I	<b>FARM MECHANIZATION</b> Farm mechanization & its objectives. Tillage, objectives, methods, primary tillage implements, secondary tillage implements, animal drawn ploughs, construction. Types of farm implements – trailed, mounted, Field capacity , forces acting on tillage tool.								9	CO1	
II	<b>PRIMARY AND SECONDARY TILLAGE IMPLEMENTS</b> Mould board plough & attachments, mould board shapes and types. Disc plough, force representation on disc, Types of disc ploughs, Subsoiler plough - Rotary plough. Cultivators - types - construction. Disc harrows, Bund former, ridger, leveller. Basin lister, Wetland preparation implements..								8	CO2	
III	<b>SOWING AND FERTILIZING EQUIPMENT</b> Crop planting methods, row crop planting systems, Devices for metering seeds, furrow openers, furrow closers, types , Types of seed drills and planters, calibration-fertilizer metering devices, seed cum fertilizer drills, paddy transplanters, nursery tray machines..								7	CO3	
IV	<b>WEEDING AND PLANT PROTECTION EQUIPMENT</b> Weeding equipment, hand hoe , long handled weeding tools, dryland star weeder, wetland conoweeder and rotary weeder Engine operated and tractor weeders Sprayers, types, classification, methods of atomization, spray application rate, droplet size determination,								8	CO3	

	volume median diameter, numerical median diameter, drift control		
V	<b>HARVESTING MACHINERY</b> Principles of cutting crop, types of harvesting machinery, vertical conveyor reaper and binder combine harvesters, balers, threshers, tractor on top combine harvester, combine losses	8	CO3
Guest Lectures (if any)			
<b>Total Hours</b>		40	
<b>Suggestive list of experiments:</b>			
<ol style="list-style-type: none"> <li>1. Introduction to various farm machines.</li> <li>2. Field capacity and field efficiency measurement for any two machines/implements.</li> <li>3. Draft &amp; fuel consumption measurement for different implements under different soil conditions.</li> <li>4. Construction details, adjustments and working of M.B. plow, disc plow and disc harrow and secondary tillage tools.</li> <li>5. Construction and working of rotavators and other rotary tillers, measurement of speed &amp; working width.</li> <li>6. Working of seed-cum-fertilizer drills, planters and their calibration in field.</li> <li>7. Working of trans-planters and operation; Weeding equipments and their use.</li> <li>8. Study of sprayers, dusters, measurement of nozzle discharge, field capacity etc.</li> </ol>			
<b>Skill based mini project</b>			
<ol style="list-style-type: none"> <li>1. Design &amp; Development of precision seed dibbler &amp; seed dropper for nursery tray.</li> <li>2. Design &amp; development of seed metering mechanism of seed drill/planter for different spacing of crops.</li> </ol>			
Text Book-			
<ol style="list-style-type: none"> <li>1. Jagdishwar Sahay. Elements of Agricultural Engineering. Standard Publishers Distributors, Delhi 6.2010.</li> <li>2. Michael and Ohja. Principles of Agricultural Engineering. Jain brothers, New Delhi., 2005</li> </ol>			
Reference Books-			
<ol style="list-style-type: none"> <li>1. Kepner, R.A., et al. Principles of farm machinery. CBS Publishers and Distributors, Delhi. 99, 1997.</li> <li>2. Harris Pearson Smith et al. Farm machinery and equipment. Tata McGraw-Hill pub., New Delhi.,1996.</li> <li>3. Srivastava, A.C. Elements of Farm Machinery. Oxford and IBH Pub. Co., New Delhi, 1990.</li> </ol>			
<b>Modes of Evaluation and Rubric</b>			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
<b>List/Links of e-learning resource</b>			
Recommendation by Board of studies on		14-12-2023	
Approval by Academic council on			

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**-----AGRICULTURAL ENGINEERING-----**

Semester/Year		V/III		Program			B.Tech				
Subject Category		DC	Subject Code:	AE-503	Subject Name:		<b>Soil and Water Conservation Engineering</b>				
Maximum Marks Allotted											
Theory				Practical			Total Marks	Contact Hours			Total Credits
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3		2	4
<b>Prerequisites:</b>											
<b>Course Objective:</b>											
<ol style="list-style-type: none"> <li>To present the concepts of erosion so that students get a sound knowledge about the problems associated with it.</li> <li>To enable the students to make use of the principles and concepts to solve issues related to soil and water management.</li> </ol>											
<b>Course Outcomes:</b>											
After completion of the course, the student will be able to:											
<ol style="list-style-type: none"> <li>The students will be able to gain fundamental knowledge on the concepts of erosion.</li> <li>Calculation of soil loss</li> <li>They will have sufficient knowledge on soil and water conservation measures</li> </ol>											
UNITs	Descriptions							Hrs.	CO's		
I	<b>SOIL EROSION PRINCIPLES</b> Approaches to soil conservation, Soil conservation in India, Erosion – Agents, Causes, Mechanics of water erosion, Soil erosion problems, Types of water erosion: Raindrop erosion, Sheet erosion, Rill erosion, Gully erosion, Stream bank erosion – Classification of Gully, wind erosion							8	CO1		
II	<b>ESTIMATION OF SOIL EROSION</b> Runoff computation for soil conservation: SCS-CN method, Evolution of Universal Soil Loss Equation: Applications and Limitations, Modified Universal Soil Loss Equation, Revised Universal Soil Loss Equation-Permissible erosion, Land use capability classification, Classification of eroded soils.							8	CO2		
III	<b>EROSION CONTROL MEASURES</b> Agronomic practices: contour cultivation, strip cropping, tillage practices, Soil management practices, Bunding: Types and design specifications, Mechanical measures for hill slopes, Terracing: Classification and design specification of bench terrace, Grassed waterways: Location, construction and maintenance –							9	CO3		
IV	<b>WATER CONSERVATION MEASURES</b> In-situ soil moisture conservation – Water harvesting principles and techniques: Micro catchments, catchment yield using morphometric analysis, Farm ponds: Components, Design, Construction and Protection, Check dams, Earthen dam, Retaining wall.							9	CO3		
V	<b>Gully Control Structures:</b> Drop Spillway, Drop Inlet, and Chute Spillways							6	CO3		

	- Prerequisites for soil and water conservation measures. Types of temporary and permanent gully control structures. Wind brakes, shelter belts		
Guest Lectures (if any)			
<b>Total Hours</b>		40	
<b>Suggestive list of experiments:</b>			
<ol style="list-style-type: none"> <li>1. Study of soil loss measurement techniques,</li> <li>2. Problems on Universal Soil Loss Equation;</li> <li>3. Preparation of contour map of an area and its analysis;</li> <li>4. Design of vegetative waterways;</li> <li>5. Design of contour bunding system and graded bunding system;</li> <li>6. Design of various types of bench terracing systems;</li> <li>7. Determination of rate of sedimentation and storage loss in reservoir;</li> <li>8. Design of Shelter belts and wind breaks</li> </ol>			
<b>Skill based mini project</b>			
<ol style="list-style-type: none"> <li>1. Analysis of impact of different agronomic practices for soil erosion control measures.</li> </ol>			
Text Book-			
<ol style="list-style-type: none"> <li>1. Suresh, R., "Soil and Water Conservation Engineering", Standard Publication, New Delhi, 2007.</li> <li>2. Ghanshyam Das, "Hydrology and Soil Conservation Engineering", Prentice Hall of India Private Limited, New Delhi, 2000.</li> </ol>			
Reference Books-			
<ol style="list-style-type: none"> <li>1. Murthy, V.V.N., "Land and Water Management Engineering", Kalyani Publishers, Ludhiana, 1998.</li> <li>2. Gurmail Singh, "A Manual on Soil and Water Conservation", ICAR Publication, New Delhi, 1982.</li> <li>3. Mal, B.C., "Introduction to Soil and Water Conservation Engineering", Kalyani Publishers, New Delhi, 2002</li> </ol>			
<b>Modes of Evaluation and Rubric</b>			
Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.			
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
<b>List/Links of e-learning resource</b>			
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**-----AGRICULTURE ENGINEERING-----**

Semester/Year		V/III		Program			B.Tech				
Subject Category		DE	Subject Code:		AE-504 (A)		Subject Name:		Crop Production		
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work	Quiz					
60	20	10	10				100	3	1	-	4
Prerequisites:											
Course Objective:											
<p>To introduce the students to principles of agricultural and horticultural crop production and to introduce the production practices of crops.</p> <p>To delineate the role of agricultural and irrigation engineers in relation to various crop production practices.</p>											
Course Outcomes:											
<p>After completion of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Students completing this course would have acquired knowledge on crop selection, crop production crop management.</li> <li>2. The students will have the required knowledge in the area of production of agricultural and horticultural crops.</li> </ol>											
UNITs		Descriptions							Hrs.		CO's
I		<p><b>AGRICULTURE AND CROP PRODUCTION</b></p> <p>Introduction to agriculture and its crop production sub-sectors - field crop production and horticulture; Factors affecting crop growth and production: genetic (internal) and environmental (external) factors; Crop management through environmental modification and adaptation of crops to the existing environment through crop cultural practices</p>							9		CO1
II		<p><b>CROP SELECTION AND ESTABLISHMENT</b></p> <p>Regional and seasonal selection of crops; Systems of crop production; Competition among crop plants; Spacing and arrangement of crop plants; Field preparation for crops including systems of tillage; Establishment of an adequate crop stand and ground cover, including selection and treatment of seed, and nursery growing.</p>							8		CO1
III		<p><b>CROP MANAGEMENT</b></p> <p>Crop water Management; Crop nutrition management - need for supplementation to soil supplied nutrients, sources, generalized recommendations, methods and timing of application of</p>							8		CO1

	supplemental nutrients including fertigation scheduling; Crop protection including management of weeds, pests and pathogens; Integrated methods of managing water, nutrients and plant protection; Types and methods of harvest.		
IV	<b>PRODUCTION PRACTICES OF AGRICULTURAL CROPS</b> Generalized management and cultivation practices for important groups of field crops in Madhya Pradesh: cereal crops, grain legumes, oil seed crops, sugarcane, and fiber crops, and special purpose crops such as those grown for green manure and fodder.	8	CO2
V	<b>PRODUCTION PRACTICES OF HORTICULTURAL CROPS</b> Important groups of horticultural crops in Madhya Pradesh such as vegetable crops, fruit crops, flower crops; Cultivation practices of representatives of each group; Special features of production of horticultural crops - green house cultivation.	7	CO2
Guest Lectures (if any)			
<b>Total Hours</b>		40	
<b>Suggestive list of experiments:</b>			
1.			
<b>Text Book-</b>			
1. Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2015.			
2. Reddy T. Sankara G.H. Yellamanda Reddi, Principles of Agronomy, Kalyani Publishers, New Delhi, 2005.			
3. Handbook of Agriculture. ICAR Publications, New Delhi, 2011.			
<b>Reference Books-</b>			
1. Bose T. K. and L.P.Yadav. Commercial Flowers, Naya Prakash, Calcutta.1989.			
1. Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005			
2. Kumar, N., Abdul Khader, M. Rangaswami, P. and Irulappan, I. Introduction to spices, plantation crops, medicinal and aromatic plants. Rajalakshmi Publications, Nagercoil. 1993.			
3. Kumar, N.,”Introduction to Horticulture”, Rajalakshmi Publications. Nagercoil, 7th edition, 2015.			
4. Shanmugavel, K.G. Production Technology of Vegetable Crops. Oxford India Publications, New Delhi. 1989			
<b>Modes of Evaluation and Rubric</b>			
Quiz, Assignment, Mid term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
<b>List/Links of e-learning resource</b>			

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### -----AGRICULTURE ENGINEERING-----

Semester/Year		IV/II	Program				B.Tech				
Subject Category	DE-I	Subject Code:	AE-504(B)	Subject Name:		Soil Science					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks	L	T	P	
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work	Quiz					
60	20	10	10	-	-	-	100	3	1	-	4
Prerequisites:											
Course Objective:											
To expose the students to the fundamental knowledge on Soil formation, physical parameters, Permeability fertility & productivity.											
Course Outcomes:											
After completion of the course, the student will be able to:											
<ol style="list-style-type: none"> <li>1. Understand the concept of soil profile &amp; soil formation process</li> <li>2. Understand the basic soil physical property.</li> <li>3. Understand the soil chemical property.</li> </ol>											
UNITs	Descriptions							Hrs.	CO's		
I	Soil – Pedological and edaphological concepts – Origin of the Earth – Composition of Earth's crust - Rocks and minerals – primary and secondary minerals. Weathering of rocks & minerals - Physical, chemical and biological weathering – Soil formation - factors-active & passive. Soil forming processes - fundamental and specific soil forming processes- Soil profile.							9	CO1		
II	Phases of soil. Soil physical properties and their significance – Soil texture and textural classes - Soil structure and classification – Soil consistency							8	CO2		
III	Bulk density, particle density and porosity - Soil colour – significance - causes and measurement. Soil temperature – Soil air – Soil water- Soil water potentials – Soil moisture constants – Movement of soil water – saturated and unsaturated flow – Infiltration, hydraulic conductivity, percolation, permeability and drainage							8	CO2		
IV	Soil colloids – Properties, types and significance – Layer silicate clays – their genesis and sources of charges – Ion exchange – CEC, AEC and Base saturation – Factors influencing Ion exchange -significance. Soil reaction, Buffering capacity and EC							8	CO3		
V	Soil organic matter – Composition – decomposition and mineralization, C : N ratio, Carbon cycle –Fractions of soil organic							7	CO3		

	matter – Humus formation. Soil organisms - Beneficial and harmful effects.		
Guest Lectures (if any)			
<b>Total Hours</b>		40	
Suggestive list of experiments:			
<b>Text Book-</b>			
<b>Reference Books-</b>			
<ol style="list-style-type: none"> <li>1. Brady, N.C., 2002 The Nature and Properties of Soils (13th Edition) McMillan Co., New York. Indian Publisher – Eurasia Publishing House (P) Ltd., Ramnagar, New Delhi – 55</li> <li>2. Dilip Kumar Das. 2004. Introductory Soil Science, Kalyani Publishers, New Delhi</li> <li>3. Fundamentals of Soil Science. 2009. ISSS Publication, New Delhi.</li> <li>4. Daji A.J., (1970) A Text Book of Soil Science - Asia Publishing House, Madras.</li> <li>5. Biswas T.D. and Mukherjee S.K., 1987. Text Book of Soil Science–Tata McGraw Hill Publishing Co. Ltd., New Delhi.</li> <li>6. Jenny, H. 1941. Factors of Soil Formation - A System of Quantitative Pedology. McGraw-Hill Book Company INC. New York.</li> <li>7. Joffe, J.S. 1936. The ABC of Soils. Pedology Publication, New Jersey.</li> </ol>			
<b>Modes of Evaluation and Rubric</b>			
Quiz, Assignment, Mid term exam, End term exam and Practical Viva. Rubric: End term exam. Practical: 50% Quiz and 50% Viva.			
<b>List/Links of e-learning resource</b>			
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### Agricultural Engineering

Semester/Year		Program				B.Tech.						
Subject Category	DE	Subject Code:	<b>AE-504 (C)</b>		Subject Name:	<b>Theory of Machine</b>						
Maximum Marks Allotted							Contact Hours			Total Credits		
Theory				Practical		Total Marks	L	T	P			
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work							
60	20	10	10	-	-	100	3	1	4			
<b>Prerequisites:</b>												
<b>Course Objective:</b>												
This course is focused on the study of different mechanisms and relative motion between numerous machine components.												
<b>Course Outcomes:</b>												
After completion of the course, students would be able to -												
<ol style="list-style-type: none"> <li>1. Interpret concepts of link, mechanisms,</li> <li>2. Compute velocity and acceleration of a point or a link in Mechanism</li> <li>3. Analyse Gear Mechanism</li> <li>4. Illustrate Cam &amp; follower mechanisms</li> <li>5. Analyse stability of four wheelers, Two wheelers, ships and plane under the action of gyroscopic effect</li> </ol>												
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	2	2	2								
<b>CO2</b>	3	3	2	3								

<b>CO3</b>	3	2	3	3								
<b>CO4</b>	2	3	3	3								
<b>CO5</b>	2	3	3	2								
<b>Contents:</b>												
UNITs	Descriptions										Hrs.	CO's
I	<p><b>BASICS OF MECHANISMS:</b> Classification of mechanisms — Basic kinematic concepts and definitions - Degree of freedom, Mobility — Kutzbach criterion, Gruebler's criterion — Grashof's Law — Kinematic inversions of four-bar chain and slider crank chains — Limit positions — Mechanical advantage — Transmission Angle — Description of some common mechanisms — Quick return mechanisms, Straight line generators, Universal Joint — rocker mechanisms.</p>										8	CO1
II	<p><b>KINEMATICS OF LINKAGE MECHANISMS:</b> Displacement, velocity and acceleration analysis of simple mechanisms — Graphical method— Velocity and acceleration polygons — Velocity analysis using instantaneous centers — kinematic analysis of simple mechanisms — Coincident points — Coriolis component of Acceleration.</p>										8	CO2
III	<p><b>GEARS:</b> Law of toothed gearing — Involute and cycloidal tooth profiles — Spur Gear terminology and definitions—Gear tooth action — contact ratio — Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears</p>										8	CO3
IV	<p><b>GEAR TRAINS</b> — Speed ratio, train value — Parallel axis gear trains – Epicyclic Gear Trains.</p> <p><b>GYROSCOPE:</b> Gyroscopic Action in Machines: angular velocity and acceleration, gyroscopic torque/ couple; gyroscopic effect on naval ships; stability of two and four wheel vehicles, rigid disc at an angle fixed to a rotating shaft.</p>										8	CO4
V	<p><b>KINEMATICS OF CAM MECHANISMS:</b></p> <p>Cams - Classification of followers and cams, radial cam nomenclature, analysis of follower motion (uniform, modified uniform, simple</p>										8	CO5

	harmonic, parabolic, cycloidal), pressure angle, radius of curvature, synthesis of cam profile by graphical approach, cams with specified contours.		
Guest Lectures (if any)			
<b>Total Hours</b>		40	
<b>Suggestive list of experiments: (if any)</b>			
Text Books-			
<ol style="list-style-type: none"> <li>1. Rattan SS; Theory of machines; TMH</li> <li>2. Ambekar AG; Mechanism and Machine Theory; PHI.</li> <li>3. Sharma CS; Purohit K; Theory of Mechanism and Machines; PHI.</li> <li>4. Thomas Bevan; Theory of Machines; Pearson/ CBS PUB Delhi.</li> </ol>			
Reference Books-			
<ol style="list-style-type: none"> <li>1. Ghosh, A., Mallik, A K; Theory of Mechanisms &amp; Machines.</li> <li>2. Rao J S and Dukkupati; Mechanism and Machine Theory; New Age Delhi</li> </ol>			
<b>Modes of Evaluation and Rubric</b>			
There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. The practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.			
Recommendation by Board of studies on		Date:	
Approval by Academic council on		Date:	
Compiled and designed by		Name 1. Dr. Chandra Pal Singh Name 2:	
Checked and approved by		Name 1.	





**SAMRAT ASHOK TECHNOLOGICAL INSTITUTE**  
(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

**-----AGRICULTURAL ENGINEERING-----**

Semester/Year		V/III	Program			B.Tech				
Subject Category	DLC	Subject Code:	AE-506	Subject Name:		Tractor and Farm Machinery Operation and Maintenance				
Maximum Marks Allotted										
Theory			Practical			Total Marks	Contact Hours			Total Credits
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
			30	10	10	50			4	2
<b>Prerequisites:</b>										
<b>Course Objective:</b>										
The students will be introduced to the practice of different farm machinery in the field on tillage, sowing, plant protection, harvesting and threshing; care and maintenance; lubrication; fits and tolerances and replacements; adjustments of farm machines; dismantling and reassembling of a disc harrow, seed-cum fertilizer drill and sprayer, engine pumps										
<b>Course Outcomes:</b>										
After completion of the course, the student will be able to:										
Practice of different farm machinery in the field & their adjustment & maintenance										
<b>Suggestive list of experiments:</b>										
<ol style="list-style-type: none"> <li>1. Introduction to various systems of tractor viz. Fuel system, Lubrication system, cooling system, Electrical system, Transmission system, Steering system, Hydraulic system, Final drive system.</li> <li>2. Field operation and adjustments of ploughs, harrows, cultivators, plant protection equipment, mowers and reapers.</li> <li>3. Calibration of seed drill.</li> <li>4. Various losses in combine &amp; performance evaluation of thresher.</li> <li>5. Maintenance after 10, 50, 100, 250, 500 and 1000 hours of operation.</li> <li>6. Studies on methods of repair, maintenance and off-season storage of farm equipment</li> <li>7. Opening and reassembly of disc harrows, determination and adjustment of tilt and disc angles</li> <li>8. Hitching of agricultural implements and trailers</li> <li>9. Economic analysis Cost of operation and Depreciation value.</li> </ol>										
<b>Text Book-</b>										
<ol style="list-style-type: none"> <li>1. Jain, S.C. and C.R. Rai. Farm Tractor Maintenance and Repair. Standard publishers and Distributors, New Delhi, 1999.</li> <li>2. Herbert L.Nichols Sr., Moving the Earth, D. Van Nostrand company Inc. Princeton, 1959.</li> </ol>										
<b>Reference Books-</b>										
<ol style="list-style-type: none"> <li>1. John A Havers and Frank W Stubbs, Hand book of Heavy Construction, McGraw – Hill book Company, New York, 1971.</li> <li>2. Barger, E.L., J.B. Liljedahl and E.C. McKibben, Tractors and their Power Units. Wiley Eastern Pvt. Ltd., New Delhi, 1997.</li> </ol>										
<b>Modes of Evaluation and Rubric</b>										

Quiz, Assignment, Mid-term exam, End term exam and Practical Viva.  
Rubric: End term exam. Practical: 50% Quiz and 50% Viva.

List/Links of e-learning resource

Recommendation by Board of studies on

14.12.2023

Approval by Academic council on

Compiled and designed by

Subject handled by department

Civil Engineering Department