

Faculty of Engineering & Technology
P.K. University
Shivpuri (MP)



Department Of Agricultural Engineering

Evaluation Scheme & Syllabus for

Diploma- Agriculture Engg.

(III Semester)

(Effective from session 2025-26)

EVALUATION SCHEME
DIPLOMA - AGRICULTURE ENGINEERING(3rd Sem)

Study And Evaluation Scheme For Diploma Agriculture Engineering												
SEMESTER-III												
SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
		Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DHYDRAE301	Hydraulics	3	1	0	4	30	-	30	70	-	70	100
DSOILAE302	Soil Mechanics & Soil Sciences	3	1	0	4	30	-	30	70	-	70	100
DSURVAE303	Surveying & Leveling	3	0	0	3	30	-	30	70	-	70	100
DHYDRAE304	Hydraulics Lab	0	0	2	1	-	25	25	-	25	25	50
DSOILAE305	Soil Mechanics & Soil Sciences Lab	0	0	2	1	-	25	25	-	25	25	50
DSURVAE306	Surveying & Leveling Lab	0	0	2	1	-	25	25	-	25	25	50
DINTRAE307	Introduction to Computer Lab	0	0	2	1	-	25	25	-	25	25	50
DAGRIAE308	Agricultural Equipment Workshop Practice Lab	0	0	4	2	-	25	25	-	25	25	50
Total		9	2	12	17	90	125	215	210	125	335	550

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3	1	0

DHYDRAAE301: HYDRAULICS

1. Introduction:

- 1.1 Fluid; Real Fluid, Ideal Fluid,
- 1.2 Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics and Hydrodynamics .

2. Properties of Fluids:

- 2.1 Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility

3. Hydrostatic Pressure:

- 3.1 Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
- 3.2 Total pressure, resultant pressure, and centre of pressure
- 3.3 Total pressure and centre of pressure on vertical and inclined plane surfaces:
 - 3.3.1 Rectangular 3.3.2 Triangular
 - 3.3.3 Trapezoidal 3.3.4 Circular

4. Measurement of Pressure:

- 4.1 Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
- 4.2 Piezometers, simple manometer, differential manometer and mechanical gauges.
Measurement of pressure by manometers and pressure gauges.

5. Fundamental of Fluid Flow:

- 5.1 Types of Flow:
 - 5.1.1 Steady and unsteady flow 5.1.2 Laminar and turbulent flow
 - 5.1.3 Uniform and non-uniform flow.
- 5.2 Discharge and continuity equation (flow equation)
- 5.3 Types of hydraulic energy.
 - 5.3.1 Potential energy 5.3.2 Kinetic energy 5.3.3 Pressure energy
- 5.4 Bernoulli's theorem; statement and description (without proof of theorems).
- 5.5 Venturi meter (horizontal and inclined) and Orifice Plate meter.

6. Orifice:

- 6.1 Definition of Orifice, and types of Orifices,
- 6.2 Hydraulic
- 6.3 Large vertical orifices.
- 6.4 Free, drowned and partially drowned orifice.
- 6.5 Time of emptying a rectangular/circular tanks with flat bottom.

7. Flow through Pipes:

- 7.1 Definition, laminar and turbulent flow explained through Reynold's Experiment.
- 7.2 Reynolds Number, critical velocity and velocity distribution.
- 7.3 Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction & change of direction (No derivation of formula) .
- 7.4 Hydraulic gradient line and total energy line.
- 7.5 Flow from one reservoir to another through long pipe of uniform & composite section.
- 7.6 Water Hammer Phenomenon and its effects. (only elementary treatment)

8. Flow through open channels:

- 8.1 Definition of a channel, uniform flow and open channel flow .
- 8.2 Discharge through channels using
 - (i) Chezy's formula (no derivation)
 - (ii) Manning's formula
- 8.3 Most economical sections
 - (i) Rectangular
 - (ii) Trapezoidal

9. Flow Measurements:

- 9.1 Measurement of velocity by
 - (i) Pitot tube
 - (iii) Surface Float
 - (ii) Current-meter
 - (iv) Velocity rods.
- 9.2 Measurement of Discharge by a Notch
 - 9.2.1 Difference between notches and orifices.
 - 9.2.2 Types of Orifice, Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation)
- 9.3 Measurement of Discharge by weirs
 - 9.3.1 Difference between notch and weir.
 - 9.3.2 Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use.
 - 9.3.3 Venturi flumes to measure flow.
- 9.4 Measurement of Discharge by velocity area-method.

10. Hydraulic Machines:

- 10.1 Reciprocating pumps
- 10.2 Centrifugal Pumps
- 10.3 Submersible Pump Sketching and description of principles of working of above mentioned machines.

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DSOILAE302: SOIL MECHANICS & SOIL SCIENCES

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3	1	0

DETAILED CONTENTS :

A. SOIL SCIENCE

1 Origin and classification of soils : Origin of soils, weathering of rocks and formation of horizon, composition of soils, structure of soils, classification of soils (based on agricultural needs), IS classification of soil, triangular classification of soil. Distinction between clay, loam & silt

2. Physical proportion of soil: Texture, particle density, structure, bulk density, porosity, air & water in soil, temperature, consistency and organic matter.

3. Chemistry of soils: Soil-water plant relation, soil mineral and chemical classification. (Acid soil, calcareous soil and saline soil) elementary exposure. Method of reclamation of acid & alkaline soil.

4. Introduction to Bio-Fertilizers, its importance.

B. SOIL MECHANICS

5. Introduction : Natural, residual and transported soil. weight volume relationship, determination of soil unit weights, water content and void ratio. Structure of soil : granular and cohesive soil. Soil colloids and Brownian motion.

6. Grain Size distribution: Sieve analysis, Stokes' law, hydrometer analysis (basic concept only), grain size accumulation curves their plotting and interpretation, IS soil classification.

Engineering properties of soil:

a. Consistency of soil: Atterberg's limits, method of determination of liquid limit and plastic limit, plasticity index, plotting of flow curve on semilog graph.

b. Permeability of soil: Darcy's law, coefficient of permeability, parameters affecting permeability, determination of permeability by constant and variable head permeameters, quick sand condition, seepage through soils.

c. Compaction and consolidation of soil: Concept of compaction and consolidation, difference between them, optimum moisture content, dry density, Proctor compaction test, use of optimum moisture content in embankment,

- d. Shear strength of soil : Definition of shear strength, Coulomb's law, direct shear box test and shear vane test.
- e. Bearing capacity of soil : Definition, net, ultimate and safe bearing capacity, plate load test.
- f. Subsurface investigation : Preliminary exploration, test pit, different methods of boring, augers, methods of sampling, sealing of samples, disturbed, representative and undisturbed samples, split spoon sampler.

8. Earth Pressure and Retaining Structures

- 8.1 Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall.
- 8.2 Relation between movement of wall and earth pressure
- 8.3 K_a and K_b by Rankin's Method.

9. Shallow and Deep Foundations

- 9.1 Definitions of shallow and deep foundations
- 9.2 Types of shallow and deep foundations
- 9.3 Application of Terzaghi's bearing capacity formula for different types of foundations.

10. Stabilization of Soils by Lime & Cement

Concept of stabilization, materials used, advantages of lime & cement as stabilizing agents. Strength of stabilized soil.

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DSURVAE303: SURVEYING & LEVELING

L	T	P
3	0	0

DETAILED CONTENTS :

- 1. INTRODUCTION:** Definition of Surveying and levelling, purpose, linear and angular units of measurement, instruments used for taking these measurements. Basic principle of Surveying, classification of survey.
- 2. MEASUREMENT OF DISTANCES:** Instruments used, types of chain, chaining of a line, ranging, line ranger, reciprocal ranging, setting out a right angle, optical square, cross staff, offset- right and oblique, errors in chaining, types of errors, correction of length measured by a faulty chain, chaining on sloping ground.
- 3. CHAIN SURVEY:** Definition of terms -Survey station, base line, tie line, check line, running measurement, reference sketch etc. Triangulation of an area, well conditioned triangle, method of booking a survey line, plotting of a survey line, symbols and conventional sign, permissible errors. Obstacles in chain survey.
- 4. MEASUREMENT OF AREA:** Direct measurement of area on paper by planimeter, Simpson's rule, average ordinate rule, trapezoidal rule, enlargement and reduction of a plan, pentagraph and edigraph.
- 5. COMPASS SURVEY:** Purpose, concept of meridians- magnetic, true and arbitrary. Bearing of a line, types of bearing, systems of bearing, fore bearing and back bearing, dip and declination, conversion of bearing from one system to other, calculation of included angles from bearings, calculation of bearings when included angles and bearing of some line is given, local attraction, causes, detection and correction of local attraction, construction, principle and working of prismatic and surveyor's compass. Traversing by compass, closed and open traverse, plotting of a traverse- included angle method and deflection angle method.
- 6. LEVELLING:** Definition of terms, levelling, level and horizontal surfaces. Datum-standard and ordinary, reduced level, bench mark, types of bench marks. Methods of levelling, direct and indirect levelling, their scope and utility. Direct levelling -simple, compound and reciprocal levelling, Levelling instruments, hand level, clinometer, levelling staves, merit and demerits of different types of staves and their use. Levelling field book. Fly levelling and check levelling. Differential levelling and its precision. Profile levelling, longitudinal levelling, cross sectional levelling, plotting of profile. Method of drawing longitudinal and cross section of a channel, drainage and road.
- 7. PLANE TABLE SURVEY :** Plane table and its accessories, adjustments of a plane table, centering, levelling and orientation. Methods of plane tabling- radiation, intersection,

traversing and resection. Errors in plane table survey, advantages and disadvantages of plane table survey.

8. THEODOLITE : Types of theodolite, different parts of a transit theodolite, different axes of a theodolite, relation between them, temporary adjustment of a theodolite, elementary knowledge of reading bearing by a theodolite.

9. CONTOURING: Definition of contour line, grade contour, horizontal equivalent, vertical interval. Contours of a hill, pond, valley, ridge, vertical cliff, valley line, ridge or water shed line. Method of drawing contours- direct and indirect method of contouring. **10. MINOR INSTRUMENTS:** Abney's level, Cylone ghat tracer, Tangent Clinometer.

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DHYDRAE304: HYDRAULICS LAB

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- (i) To verify Bernoulli's Theorem.
- (ii) To find out venturimeter coefficient.
- (iii) To determine Darcy's coefficient of friction for flow through pipes.
- (iv) To determine velocity of flow of an open channel by using a current meter.
- (v) Study and sketch any one of the following.

Reciprocating Pump or Centrifugal pump or Pressure Gauge/water meter/
mechanical flow meter/ Pitot tube.

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DSOILAE305: SOIL MECHANICS & SOIL SCIENCES LAB

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LIST OF EXPERIMENTS:

A. SOIL SCIENCE :

1. Determination of moisture tension with Tension meter.
2. Determination of wilting point.
3. pH value determination.
4. Classification of soil and field identification test.

B. SOIL MECHANICS:

5. Determination of grain size distribution by sieve analysis.
6. Determination of liquid limit and plastic limit.
7. Determination of permeability by constant and variable head permameter.
8. Determination of shear strength by direct shear box test.
9. Determination of OMC by Procter compaction test.
10. Determination of field density by core cutter method and sand replacement method

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DSURVAE306: SURVEYING & LEVELING LAB

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List of survey practicals:

1. To find out distance between two unapproachable objects.
2. Plan of a small area by means of chain surveying.
3. Plan of a small area by means of compass surveying.
4. Plan of a small area by means of plane table survey.
5. Contour map of an area with atleast 3 meter up and down area.
6. Plan for land aquisition and checking it with sajra plan.
7. To plot the longitudinal section of a canal showing ground level for atleast 1 km length.
8. To determine the elevation difference between two points by levelling with atleast five shifting of instruments.
9. To find out bearing with the help of theodolite
10. Use of minor instruments.
11. Calculation of area of a map with the help of plan meter.

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L	T	P
0	0	2

DINTRAE307: INTRODUCTION TO COMPUTER LAB

List Of Practicals:

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/ Report) on Word Processing tool Word and taking its print out.
3. Creating, editing, modifying tables in Database tool.
4. Creating labels, report, generation of simple forms in Database tool.
5. Creating simple spread sheet, using in built functions in Worksheet tool..
6. Creating simple presentation.
7. Creating mail ID, Checking mail box, sending/replying e- mails.
8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

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L	T	P
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DAGR1AE308: AGRICULTURAL EQUIPMENT WORKSHOP

PRACTICE LAB:

(At least 9 jobs are to be made):

I. MACHINE SHOP:

1. Lathe Machine:

- | | |
|---|-------|
| (a) Step turning, Taper turning and knurling. | 1 job |
| (b) Drilling, boring, counter boring and internal turning | 1 job |
| (c) V thread cutting (internal and external) | 1 job |
| (d) Multi-thread cutting | 1 job |
| 2. Planer Shaper and Slotter | 1 job |

3. Group Work on Milling Machine involving down and climb milling:

- | | |
|-------------------|-------|
| (i) Slab milling | 1 job |
| (ii) Gear cutting | 1 job |

II. FITTING SHOP:

- | | |
|--------------------------------|--------|
| (i) To make different keys | 2 jobs |
| (ii) To make Limit gauge | 2 jobs |
| (iii) To make cup and cut tool | 1 job |
| (iv) To grind a drill | 1 job |

III. WELDING SHOP:

- | | |
|--|--------|
| (a) Welding practice on mild steel & Cast Iron | 2 jobs |
| (b) Practice of gas cutting | 1 job |
| (c) Practice on spot welding machine | 1 job |