

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



Department Of Agricultural Engineering

Evaluation Scheme & Syllabus for

Diploma- Agriculture Engg.

(VI Semester)

(Effective from session 2025-26)

EVALUATION SCHEME
DIPLOMA - AGRICULTURE ENGINEERING (6th Sem)

Study And Evaluation Scheme For
Diploma in Agriculture Engg.-6 SEM

SEMESTER-6

SUBJECTCODE	SUBJECTSNAME	STUDY SCHEME Periods/Week			Credits	Marks In Evaluation Scheme						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DENVIAE601	Environmental Education & Disaster Management	4	-	-	4	30	-	30	70	-	70	100
DIRRIAE602	Irrigation & Drainage Engineering	4	-	-	4	30	-	30	70	-	70	100
DSOILAE603	Soil-Water Conservation & Land Reclamation Engineering	4	-	-	4	30	-	30	70	-	70	100
DRCCSAE604	R.C.C. & Steel Structure	4	-	-	4	30	-	30	70	-	70	100
DFARMAE605	Farm & Land Development Machinery	4	-	-	4	30	-	30	70	-	70	100
DRCCSAE606	R.C.C. & Steel Structure Lab	-	-	2	1	-	25	25	-	25	25	50
DFARMAE607	Farm & Land Development Machinery Lab	-	-	2	1	-	25	25	-	25	25	50
DPROJAE608	PROJECT	-	-	12	6	-	100			100	100	200
Total		20	0	16	28	150	150	300	350	150	500	800

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DENVIAE601: ENVIRONMENTAL EDUCATION & DISASTER
MANAGEMENT

1. INTRODUCTION:

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects. - Lowering of water level , Urbanization.
- Biodegradation and Bio-degradability, composting, bio remediation, Microbes
- Use of bio pesticides and bio fungicides.
- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain ,etc.

2. POLLUTION: Sources of pollution, natural and man made, their effects on living environments and related legislation.

2.1 WATER POLLUTION: Flow Measurement: Hot Wire Anemometry, Laser Doppler Velocity meter, Rota meter Temperature Measurement: Thermometers, bimetallic thermocouples, thermostats and pyrometers. Measurements of Force, Torque: Different types of load cells, elastic transducers, pneumatic & hydraulic systems. Seismic instruments Measurements of Acceleration, and Vibration: Accelerometers vibration pickups and decibel meters, vibro-meters.

- Factors contributing water pollution and their effect.
- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal. - Physical, Chemical and Biological Characteristics of waste water.
- Indian Standards for quality of drinking water.
- Indian Standards for quality of treated waste water.
- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION: Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, CO, CO₂, NH₃, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers

B. Cyclones

C. Scrubbers (Dry and Wet)

D. Multi Clones

E. Electro Static Precipitations

F. Bag Filters. - Ambient air quality measurement and their standards.

- Process and domestic emission control
- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III & Euro IV.

2.3 NOISE POLLUTION: Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION: Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT: Municipal solid waste, biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION:

Preliminary knowledge of the following Acts and rules made there under-

- The Water (Prevention and Control of Pollution) Act
- 1974. - The Air (Prevention and Control of Pollution) Act - 1981.
- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.
- # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000
- # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.
- # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.
- # The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.
- # Municipal Solid Wastes (Management and Handling) Rules, 2000.
- # The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

- Basic concepts, objective and methodology of EIA.
- Objectives and requirement of Environmental Management System (ISO-14000)

5. DISASTER MANAGEMENT: Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy

- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority
- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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DIRRIAE602:IRRIGATION AND DRAINAGE ENGINEERING.

DETAILED CONTENTS:

1. Introduction:

Definition of Irrigation, History of Irrigation, Necessity & scope of Irrigation, Types of irrigation.

2. Sources of Irrigation Water

Wells, rivers, ponds, canals, tube wells. Investigation and survey, selection of site and determination of capacity of storage reservoirs and tanks.

3. Ground Water:

Water bearing formation, confined and unconfined aquifers, static water level, piezometric surface, pumping water level, drawdown, area of influence, prediction of yield in confined and unconfined aquifer, well development.

4. Water requirement of plants:

Types of soils, soil properties in relation of irrigation and drainage, classes and availability of soil water, preparation of land for irrigation and drainage, quality of irrigation water, evaporation, transpiration, evapotranspiration, consumptive use, estimating crop water requirements, duty of water, delta, factors affecting duty methods of improving duty. Assessment irrigation water requirements of different crops, estimation of depth and time of irrigation, different criteria for irrigation scheduling depending upon soil-plant-atmospheric factors.

5. Irrigation Methods & Design of Drip Irrigation System :

Surface and subsurface methods, sprinkler and drip system of irrigation. Design of drip irrigation system : Laterals and Submain.

6. Storage Structures, Rain Water Harvesting Structures & Methods:

Introduction of different types of dams e.g. earthen dams, rockfilled, hydraulic filled etc.. Different types of spillways and outlets, cross sections of earthen dams, causes of failures of earthen dams.

7. Evaluation of Farm Irrigation Systems:

Measurement of irrigation efficiencies, water conveyance, storage, application, distribution and water use efficiency.

8. Soil Moisture Movement:

Soil moisture measurements, soil moisture tension, soil moisture characteristics curve, saturation and field capacity, wilting point, moisture equivalent, percolation, seepage, infiltration, hydraulic conductivity, permeability.

10. Design of Irrigation Channels:

Non-erodible channels, design of open channels, maximum permissible velocity, channel slopes, free board, hydraulic sections, most economical section.

(B) DRAINAGE ENGINEERING:

1. Introduction:

Definition necessity water logging salinity, its control interrelationship of irrigation drainage, drainage coefficient, water table fluctuations.

2. Drainage Investigation & Requirements:

Estimation of drainage requirements, required water table depths, lowering of water table, ground water contours, drainage depths for different crops.

3. Drainage Systems:

Different types of surface and subsurface drainage systems, land smoothing, leveling and grading, design of surface drainage systems, different types of subsurface drainage systems and their design, tile drainage depth and spacing of tile drains, field survey, installation and layout of drains, installation of tile outlets.

4. Special Methods of Drainage:

Vertical drainage, mole drains, drainage of irrigated lands in arid and semi arid areas. Drainage for leaching.

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DSOILAE603: SOIL-WATER CONSERVATION & LAND RECLAMATION ENGINEERING

1. WATER SHED MANAGEMENT :

Concept, objectives, use of remote sensing in water shed management, Planning, Ground water recharging, Water harvesting.

2. RUN OFF & Hydrology :

Definition, phenomenon and forms of run off characteristics of run off, factors affecting run off, measurement of run off by float, current meter and weirs, time of concentration and its impact on run off, estimation of peak run off rate by rational equation. Hydrology : Hydrologic cycle, importance, its components, occurrence and forms of precipitation; Characteristics of rainfall in India, rain fall intensity, measurement of rain fall by non-recording and recording type of raingauges, method of computing average rainfall, recurrence interval.

3. SOIL EROSION

Mechanics, types and causes of erosion, factors affecting erosion, damages caused by soil erosion.

4. SOIL AND WATER CONSERVATION

Definition and aims of soil and water conservation in agriculture, soil conservation survey and land use capability classification, conservation farming.

5. AGRONOMIC MEASURES FOR SOIL & WATER CONSERVATION

Crop classification on the basis of soil conservation value, contour forming, mulching, strip cropping, cover cropping, mixed cropping, conservation crop rotation, ley forming, monoculture, role of grasses in soil conservation.

6. MECHANICAL METHODS OF EROSION CONTROL

Elementary idea of basin listing, sub-soiling, field bunding, contour bunding, graded bunding, ridge and channel terraces. Cost of narrow base broad base bund as earthwork and sadding cost.

7. CONSERVATION MEASURES FOR HILL SLOPES:

Contour trenching, specification of trenching, alignment and construction of trenches, , bench terracing- types, construction and maintenance, elementary idea of stone terracing and its specification.

8. GULLY EROSION CONTROL & RECLAMATION:

Classification of gullies, principles of prevention and control of gullies by vegetative and mechanical measures, contour and peripheral bunding, ditches, gully plugging. Temporary and permanent structures: Earthen check dams, woven wire check dams, Brush dams, loose rock dams, log and plank dams, straight drop spillway. Reclamation of gullies for cultivation.

9. FORESTRY MANAGEMENT IN SOIL CONSERVATION:

Effects of forests on soil and water conservation and climate, classification of forests, elementary idea of farm and social forestry, Taungya system and forest protection, selection, development, tillage, irrigation protection and management of nurseries, Bamboo Production Methods.

10. GRASSED WATERWAYS:

Use, design of waterways, grasses for waterways, construction of water ways, establishment of grasses on waterways, maintenance of waterways.

11. DRY FARMING:

Definition, climatic classification, elementary idea of various crop management & tillage practices. Land management practices in dry farming eg. sub-soiling and tied ridging. Water shed based soil and water conservation.

12 WATER CONSERVATION RESERVOIRS:

Types and uses of water conservation reservoirs, site selection & storage capacity of farm ponds, design principles of water harvesting bunds and structures, digging of ponds, construction and maintenance of water conservation structures.

13. FLOOD CONTROL:

Types of flood, damages caused by floods, elementary idea of head water flood control methods.

14. LAND GRADING & LAND LEVELLING:

Water harvesting, Scope, need types, long term and short term water harvesting techniques, design of ponds.

15. WIND EROSION CONTROL: Principles, vegetative and mechanical practices.

16. LAND RECLAMATION

Classification of usar soils, salt resistant crops, reclamation of usar soils. Reclamation of waste lands forest lands and sandy soils, sand dunes stabilization.

17. RAVINE RECLAMATION:

Classification of ravines and various measures for ravine reclamation.

18. COMMAND AREA DEVELOPMENT :

Advantage and disadvantages, Command area development, Component of C.A.D.A., Various C.A.D.A. programmes in India.

19. VERMI COMPOST FROM COWDUNG & AGRICULTURAL WASTE

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DRCCSAE604: R.C.C. & STEEL STRUCTURE

DETAILED CONTENTS:

(A) STEEL STRUCTURES

1. Introduction:

Importance, types of loads, structural steel, properties of structural steel, structural steel section, permissible stresses.

2. Structural Connections:

Types of structural connection, strength and design of rivetted and welded joints for axially loaded members.

3. Tension member

Common section used as tension member, strength of tension members.

4. Compression member:

Common section used as compression member, strength of compression members (axially loaded columns & struts). Concept of lacing & battens.

5. Beams:

Design criteria, allowable stresses.

6. Roof Truss:

Types of trusses for different spans, roof coverings, supports, spacing, loads on trusses.

7. Bamboo Trusses

(B) REINFORCED CONCRETE:

1. Introduction:

Behaviour and principles, assumptions in R.C. design, designation of concrete mixes, types and need of reinforcement, permissible stresses in concrete and steel, modular ratio, shear & bond stresses. Provision of shear and bond reinforcement. Concept of LIMIT DESIGN.

2. Singly Reinforced Concrete Beam & slab:

Stress distribution, neutral axis, depth of neutral axis, tensile force, compressive force, lever arm, moment of resistance, actual & critical neutral axis. Types of singly reinforced beam, under, over and balanced sections, analysis of a given section, permissible stresses, design of a singly reinforced beam and slab.

3. Doubly Reinforced Beam:

Importance of doubly reinforced beam, advantages and disadvantages of use of doubly reinforced beams.

4. T Beam

Concept, advantages, calculation of neutral axis, moment of resistance of T beam, reinforcement (no design).

5. Column and Column footing:

Types of column, effective length, different theories of design, lateral & transverse reinforcement, lateral ties, spiral/helical or hoop reinforcement, effective area of column, strength of short column, strength of column wound by spirals, reduction factor. Concept of placement of steel in column footing.

6. Prestressing:

Definition, basic principle, advantages and disadvantages, method of prestressing, systems of prestressing (Methods only).

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DFARMAE605: FARM & LAND DEVELOPMENT MACHINERY

DETAIL CONTENTS:

1. Farm Mechanization

Definition, status of farm mechanization in India, scope, limitations, advantages.

2. Primary Tillage Equipment:

i) Definition & Functions of tillage, tillage systems, types of tillage, Tillage implements.

ii) a. Mould Board Plough: Types of mould board plough, construction. Types of share, and Mould board and their material of construction, Concept of sunction, plough size,

hitching of plough, point of bearing, Draft, side draft, unit draft, factors affecting draft, forces acting on plough. (Introduction only) Horse power requirements, and related numerical problems.

b. Disc Plough: Purpose, principles, types, construction and adjustment.

c. Other Plough: Chisel, subsurface, Rotary plough.

d. Ploughing: Concept of terms related with ploughing, Methods of Ploughing.

3. Secondary Tillage equipments:

a. Harrow: Types, construction and Adjustment repair and maintenance of Animal & tractor driven harrow.

b. Land Rollers Hackers & Pulveriser: Types construction and operation.

c. Rotavator and Puddlers

4. Sowing & Planting Equipment:

a. Pre germinated paddy seeder

b. Seed Drill/Seed cum Fertilizer Drill: Functions, Types, Construction, detail, size Metering devices, Furrow openers, seed covering devices Calibration of seed drill, and related numerical problems. Field adjustment, repair and

maintenance & construction details. Zero fill ferti drill, Fill plant machine, Strip fill drill Raised bed Planting Machine

c. Planters: Function, Types, Metering devices, Method of planting. Field advertisement,

repair and maintenance. Potato Planter, Sugar Cane Planter, Cotton, Misc. etc. Planter.

d. Trans-Planter : Paddy transplanter (Manual & self propelled), Vegetable transplanter.

5. Inter culture and Weed Control Equipment:

- a. Cultivator: Types, Construction, Attachments.
- b. Rotary Hoe: Construction and working.
- c. Flame Weed Control: Construction and working.

6. Fertilizing Equipments:

- a. Manure Spreaders: Construction and working.
- b. Fertilizer Distributor: Construction and working.

7. Plant Protection Equipment:

Types, principles of working, parts and material of construction, function and adjustment of sprayer and duster, selection of plant protection equipment, field adjustment, repair and maintenance, safety precaution.

8. Harvesting Equipments:

- a. Mower, Windrower and Reaper Principle of cutting, types, construction working, adjustments, trouble shooting.
- b. Combined Harvester : Types, Construction, Working, Material
- c. Field Forage Harvesters: Types, working adjustment & flow path adjustment, maintenance.
- d. Potato & Groundnut Digger: Construction and working.
- e. Sugarcane Harvester: Construction and working.

9. Threshing Equipments:

Types of threshers: Olpad thresher, Power wheat and paddy thresher, working principle, material, flow path, adjustment, repair and maintenance, trouble shooting and precaution.

10. Processing Equipments:

Types, Construction and working of the following equipments: Chaff cutter, Sugarcane crusher, Corn sheller, Potato grader and Winnowing.

11. Land development Equipments:

Construction, operation/working and output of the following: Dozer, Scraper, Power shovel, Drag hoe and Drag Line, scoop, Land Leveller, Land Plane, Laser Land Plane.

12. Field Capacity & Efficiency:

Introduction, Concept about Field capacity & Efficiency.

13. Economics, Management and testing of farm equipments

a. Selection of farm machines and matching equipment of farm needs, break even point,

Pay Back Period.

b. Calculation of cost of operation of farm-machines.

c. Field capacity & field efficiency.

d. Farm machinery testing in India. Details of category and field testing of few machines e.g. seed drill, thresher and plant protection equipment.

14. Garden Equipment :

Details of Garden & Horticultural equipment.

15. Raised Bed Preparation Equipment :

Use and utility of raised bed preparation equipment.

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DRCCSAE606: R.C.C. & STEEL STRUCTURE LAB

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LIST OF EXPERIMENT:

1. To determine soundness of aggregates.
2. To determine specific gravity and water absorption of aggregates.
3. Comparative study of compressive strength of concrete for at least 3 different mix under various curing periods.
4. Setting out of a building with two rooms and a verandah.
5. To determine cube strength of concrete.
6. To find slump of a given mix of concrete.

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DFARMAE607: FARM & LAND DEVELOPMENT MACHINERY
LAB

LIST OF EXPERIMENTS:

1. Identifying mould board and disc plough and their parts, assembling & dismantling, measurement of size, sections, angles, setting adjustment.
2. Hitching, field operation, adjustment and measurement of draft, line of pull etc. of a mould board plough.
3. Hitching, field operation and adjustment, measurement of depth and width of ploughing with a disc plough.
4. Identifying harrow and cultivator and their parts, assembling and dismantling, angle setting, hitching, field operation and adjustments.
5. Identifying seed drills, seed cum fertilizer drill and planters and their parts, assembling and dismantling, setting and adjustments.
6. Calibration, field operation and adjustment of seed cum fertilizer drill.
7. Setting, field operation and adjustment of planter and transplanter.
8. Study of power sprayers and dusters different types of nozzles and calibration.
9. Field, operation, setting alignment, registration and other adjustments of a reaper and windrover.
10. Study of chaff cutter and sugarcane crusher.
11. Repair of farm equipment : Ploughs, harrows, Seed drills and weeding tools.
12. Visit of a mechanized farm for study of combine harvester.(Visit Only)
13. Operation of power thresher and safety aspects.
14. Study, sketch and operation of one of the following land development equipment through field visit: Dozer, Scraper, Shovel, Drag hoe and Drag line.

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DPROJAE608: PROJECT

The project should be taken in close collaboration with the employing agencies. The project shall evolve selection, analysis and solution of special problems related to farm implement, machinery and power/soil and water engineering/ agricultural process engineering applicable to Indian conditions.

The project will be assigned to individual student or to a group of students not exceeding 5 as per problem.

Project will consist of:

(a) Rural Development

(b) Demonstration of new techniques for the cultivation of crops, operation of agricultural machinery power tiller and tractors.

(c) Problem concerning to any one of the following:

To run his own workshop for repair and maintenance of agricultural implements. Leveling and Irrigation-Drainage and soil-water conservation needs of farms. To establish an agro based small scale rural industry. Any other problem concerning agriculture. At the end of the project student will submit a written report of his/ their accomplishment and face a viva voce examination individually.

NOTE: (1) Project periods allotted in study scheme per week shall be provided in a stretch at the end of the session.

(2) Two different problems shall be framed by the head of department based on local needs and application in rural areas for technological advancement

(3) Devices for eliminating pollution and control must be included in the project.