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

Department Of Agricultural Engineering

Evaluation Scheme & Syllabus for

Diploma- Agriculture Engg.
(V Semester)
(Effective from session 2025-26)

EVALUATION SCHEME
DIPLOMA - AGRICULTURE ENGINEERING (5th Sem)

Study And Evaluation Scheme For Diploma Agricultural Engineering

SEMESTER-5

SUBJECT CODE	SUBJECTS NAME	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	
DMINOAE501	MINOR IRRIGATION & TUBE WELL ENGG.	4	-	-	4	30	-	30	70	-	70	100
DPOSTAE502	POST HARVEST TECH. & AGRO BASED INDUSTRIES	3	1	-	4	30	-	30	70	-	70	100
DESTIAE503	ESTIMATING & COSTING	3	1	-	4	30	-	30	70	-	70	100
DAGRIAE504	AGRICULTURAL INDUSTRIAL FINANCE & RURAL ENTREPRENEURSHIP	3	1	-	4	30	-	30	70	-	70	100
DGREEAE505	GREEN HOUSE TECHNOLOGY HYDROPONICS & AQUAPONICS ENGG.	3	1	-	4	30	-	30	70	-	70	100
DMINOAE506	MINOR IRRIGATION & TUBE WELL ENGG LAB	0	0	2	1	-	25	25	-	25	25	50
DPOSTAE507	POST HARVEST TECH. & AGRO BASED INDUSTRIES LAB	0	0	2	1	-	25	25	-	25	25	50
DAGRIAE508	AGRICULTURAL INDUSTRIAL FINANCE & RURAL ENTREPRENEURSHIP LAB	0	0	2	1	-	25	25	-	25	25	50
DGREEAE509	GREEN HOUSE TECH. HYDROPONIC & AQUAPONICS ENGG. LAB	0	0	2	1	-	25	25	-	25	25	50
DINDUAE510	INDUSTRIAL TRAINING	0	0	0	2	-	-	-	-	50	50	50
Total		16	4	8	24	150	100	250	350	150	500	750

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III Year V Semester

L	T	P
4	0	0

DMINOAE501: MINOR IRRIGATION & TUBE WELL ENGG.

A) MINOR IRRIGATION

1. Introduction

   Importance, necessity and advantages of minor irrigation.

2. Minor Irrigation & Tubewell Engineering:

   Concept, appliaction and scope of minor irrigation & Tubewell engineering.

3. Planning & Layout:

   Planning and layout of minor irrigation channel,

4. Minor Irrigation Equipments:

   Introduction of the following traditional water lifting devices: Swing basket, mhot, rahat, charas, dhenkuli, Egyptian screw, Propeller pump, Axial flow pump.

5. Water Pumping Equipments

   Wind mills, hydrams, solar water pumps, principles, constructional details & working.

6. Sources of minor irrigation:

   Shallow & deep wells, water tanks and ponds, Confined and unconfined aquifer, development of well.

(B) TUBE WELL ENGINEERING:

Introduction:

Definition of tube well, need, advantages & disadvantages.

2. Selection of Site:

   Characteristics of tube well site, factor affecting site selection.

3. Drilling Methods:

   Types of drilling methods, advantages of different methods. Types of rigs; Rotary & percussion rigs, their construction, installation and working.

4. Types of Tube well

   Types of tube well, advantages & disadvantages of each type, selection of tubewell for a given site.

5. Strainers: Types, method of design, comparison of different types of strainers.

6. Open Wells:

   Design and construction of open wells.

7. Pump and Pumping equipments

   Types, main features, working principle, selection of pumps and pumping equipment, centrifugal pump, Submersible and turbine pumps, performance, installation and Aligment of centrifugal pump. Submersible pumps, installation, operation and maintenance. State Tube wells: Importance in increasing agriculture prodcution, command area and government policy about tubewells.

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L	T	P
3	1	0

DPOSTAE502: POST HARVEST TECH. & AGRO BASED INDUSTRIES

DETAILED CONTENTS

1. Introduction:

Importance of grain and seed processing principles of agricultural processing, sequence of operations, flow diagram, services offered by processor to farmers and Under water grain storage

DIFFERENT STEPS INVOLVED IN SEED PROCESSINGS.

2. Drying

Importance of moisture in seed and grain representation. Determination of moisture, direct and indirect methods, process of drying such as constant rate period and falling rate period. Drying kinds: thin layer and deep-bed drying. Temperature and air flow requirement, natural air and heated air drying, solar drying. Direct and Indirect dryers, their efficiency and economics.

3. Cleaning and Grading :

Importance, elementary, study of related machines, their operations and maintenance such as scalper, air screen cleaner, rotary cleaner, spiral separator, indented cylinder separator, gravity separator, Debarred.

4. Seed Treatment:

Seed treatment methods, elementary study of seed treating equipments such as as powder and slurry seed treater and their advantages.

5. Bagging & Packaging:

Manual bagging, semi-automatic bagging Machines and automatic begging machines. Packaging materials and their utilization

6. Storage:

Storage of seed and grain, respiration and factors affecting it, changes in stored product during storage, loss of germination and seed viability. Design of storage system and equipments. I.S.I. code practice. Storage of fresh fruits, vegetables and dairy products.

7. Material Handling Equipment:

Belt conveyor, screw conveyor, pneumatic conveyor, bucket elevator, their operation and maintenance

8. Pretreatment/Conditioning of Agricultural Produce For Milling:

Parboiling of paddy, Methods and machinery used for parboiling, pretreatment of pulses and oil seeds for milling.

9. Milling of Cereals, Pulses and Oil Seeds & Indian Masalas (Spices):

Methods and machinery used for milling for cereals pulses and oil seeds such as paddy, wheat, arhar and mustard Elementary knowledge of solvent extraction plant.

10. Canning of Fruits and Vegetables :

Methods and machinary used for canning, advantage of canning.

11. Dehydration of Fruits and Vegetables :

Methods and machinery used for dehydration of fruits and vegetables such frey drier, solam drier, Advantage of dehydration.

12. Processing of Fruits & vegetables For Preparation of Jam, Jelley Squash, Betchup, Etc.:

Methods and machinery used for preparation of Jam, Jelly, Squash, Betchup, Catney, Morabba, etc.

13. Utilization of By-Products :

Utilization of paddy husk, rice bran, paddy straw, corn cob; Bio-methanation of fruits and vegetable waste, Crasification of agricultural based celulosie materials.

10. Agro-Based Industires:

Sugarcane crushing, khandsari and Gur making process and equipment; Preparation of Soybean and Potato based products such as Soyamilk, Soypaneer, Soybiscuits Papad, chips Wafers, etc.; Briquetting of agricultural waste to use as fuel, Card Board preparation from paddy straw.

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L	T	P
3	1	0

DESTIAE503:ESTIMATING & COSTING

DETAILED CONTENTS:

1. Introduction:

Definition of estimating, purpose, types of estimate, preliminary estimate, cubical content estimate, plinth area estimate, approximate quantity method estimate, detailed or item rate estimate, rewised supplementary estimate, annual repair cost and special repair estimate. Bill of quantities, abstract of cost, prerequisites of estimating that is drawing, specification, rates, general and detailed specifications.

2. Measurement of work:

gas route, Formaldehyde from methanol, Chloromethane by direct chlorination of methane, Trichloroethylene Perchloroethyene by Pyrolysis of carbon tetrachloride ,Units of measurement, general rules of taking measurement, units of payment, method of measuring quantities- centre line method, long and short wall or out and in to in methods.

3. Analysis of Rates:

Schedule of rate, need of analysis of rates, requirement of labour for different works as per NBO, requirement of material for different works, preparation of analysis of rate of 10 important works.

4. Estimate of different work of a building & roads & farm structures:

(a) Earth work in foundation, steps, dwarf wall, boundary wall
(b) Concrete in foundation
(c) Brick masonary in footings
(d) Brick masonary upto plinth
(e) Brick masonary in super structure
(f) D.P.C.
(g) R.B. and R.C. works
(h) Flooring
(i) Sand/earth filling
(j) Plastering and pointing
(k) White washing and colour washing
(l) Site development

(m) Antitermite treatment
(n) Arches and roofs
(o) **Water supply and sanitary works:** (i) Bath room and W.C. including fittings
(ii) Septic tank and soakpit
(iii) P.R.A. type latrine
(p) Doors and windows(q) Misc. other works

5.Estimate of a complete Village House:

6. Calculation of materials:

Calculation of quantities of different materials from estimated quanties of items like brick work, cement concrete R.B. and R.C. work.

7. Estimate of earth work of road:

Calculation of land areas and volumes-Prismoidal formula, mass diagram, methods of taking out and scheduling quantities for various items such as culverts and bunds. Earth work volumes by spot levels and contours.

8. Estimates of irrigation and drainage channels:

Specifications and estimating quantity and cost of irrigation and drainage channels.

(B) MECHANICAL ESTIMATING:

1. Estimation of materials: Estimation of weight of a simple machine part.,

2. Estimation of Welding:

Material cost, fabrication cost, welding cost & finishing cost, overhead cost,labour accomplishment factor and cumulative effects of poor practices on cost. Calculation of cost of welding, gas consumption and welding electrodes.

3. Estimation of Forging:

Concept of losses in forging operation. Estimation for the stock required for hard forging considering scale and shear losses.

4. Estimation of cost:

Concept of costing, brief discription of direct materials, indirect materials, direct labour, indirect labour and overhead expenses.

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L	T	P
3	1	0

DAGRIAE504: AGRICULTURAL INDUSTRIAL FINANCE & RURAL ENTREPRENEURSHIP

(A) RURAL DEVELOPMENT

1. Introduction: Importance of rural development , need of development.
2. Spheres of rural development:
   (a)Social (b) Education (c) Health (d) Housing (e) Sanitation and drainage
   (f) Industrial (g) Energy
3. Govt Agencies involved in rural development: Block Development officer and its staff, Rural Engineering department.
4. Financing Agencies and their working: Development banks, regional rural bank, commercial banks, lead bank, cooperative banks.
5. Govt Schemes for rural development: Trysem, IRDP, IRD, ACID (Agriculture credit intensive development scheme),DRI (Differential rate of Intrest scheme of banks, Insurance schemes.
6. Community Development: Philosphy, principle and objectives,organisational set up of blocks, samiti, Gram vikas samiti etc.
7. Rural Extension: Rural Extension methods such Audio, Visual and Audio Visual. Use and role of information technology in rural development.

(B) ENTREPRENEURSHIP DEVELOPMENT

1. Introduction: Entrepreneur, entrepreneurship, its meaning & importance. Qualities of an entrepreneur. Entrepreneur Motivation Training (E M T). Ring toss, Achievement Planning, Tower Building.
2. Industries: Role and importance of small scale and other Industries. Classification of industries- village industry, tiny industry, small, medium and large scale industry. Ancillary industry. Identification of industry- resources, demand and skill based industry.

Financing Agencies for - Land, Infra Structure, Machinary, raw material, import of raw material and machinary. Marketing. Role and function of Govt. department connected with the development of industries in the State. Component of project report - Land, Building, Electricity,

water, Equipment and other utilities. Materials, its availability, cost, labour availability and wage rates. Price of finished product.

3. Market Survey: Project selection based on market survey, demand and supply estimation, fast moving brands etc.

4. Industrial Management: Production planning and control, marketing management and laison, Basic concept of marketing and salesmanship, marketing mix, working capital management, cash flow. Personnel management. Limiting cost ,budget and its control, book keeping, balance sheet, Break even analysis.

5. Industrial Legislation and Taxes:Indusatrial and Labour Laws, Production Tax. local tax, sales tax, excise duty, Income tax.

6. Project Report: Prject report preparation and provisional registration.

Preparation of detailed project preport (D. P. R.) for financial assistance.

(C) INDUSTRIAL MANAGEMENT:

1. Organisation:

Definition of good organisation. Principle of good organisation with merit & demerits.

2. Lay out:

Site selection of factory, influence of location on plant layout, factors considering for plant building. Definition of plant layout, objectives 2 principles. Types of plant layout.

3. Material Management:

Importance and function of material handling. Engineering & economics consideration devices. Relation between plant layout and material handling.

4. Replacement of Machinary:

Reason for machinary replacement. Depriciation, definition different method of calculation depriciation.

5. Purchase organisation:

Importance of good purchasing policy. Function of purchasing department. Duties of purchasing officer. Purchasing procedure.

6. Human Resoruce Management: Human resoruce management, selection, performance appraisal, motivation and leadership and controlling.

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L	T	P
3	1	0

DGREEAE505: GREEN HOUSE TECHNOLOGY HYDROPONICS &AQUAPONICS ENGG.

DETAILED CONTENTS :

1. INTRODUCTION TO GREEN HOUSE :

Types of green Houses, Environmental requirements in green house, Methods of Environmental control and fixtures, Chemical for control of insects, pest, etc. Soil mixture.

2. INTRODUCTION TO HYDROPONIC :

Hydroponic history, use of hydroponic on land and on roofs, Chemical mixtures of hydroponic crops, Lighting fixtures, Infrastructure needs for supporting the hydroponic.

3. INTRODUCTION TO AQUAPONIC :

Basic meaning of aquaponics, The commercial need of aquaponic, use of aquaponic on land and roof, Aquaponic use for production of vegetables and flowers, Aquaponic structures and fixtures.

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L	T	P
0	0	2

DMINOAE506: MINOR IRRIGATION & TUBE WELL ENGG LAB

LIST OF EXPERIMENTS:

1. Study and sketch of spill ways and outlet.
2. Study of different types of methods of irrigation adopted for different crops at formers field.
3. Study and sketch of infiltration and actual determinations of infilteration rate of soil in field.
4. Study and sketch different weirs, notches, orfices and flumes and flow measurement us channel.
5. Determination of discharge of a channel by (a) Float method (b) Current meter method
6. Studty and sketch of Tensometer and its use in determination of soil moisture.
7. To measure pressure head in saturated soil by pizometer.
8. To determine irrigation efficiencies in field:
   i. Water application ii. Water conveyance iii.water distribution
9. To determine consumptive use by weighing type evapotranspiration pan.
10. Preperation of drainage plans.
11. To determine yield of a tube well.
12. Study and sketch of the following: (Any two)
    i. Sprinkler Irrigation ii. Drip Irrigation iii. Wind Mill

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L	T	P
0	0	2

DPOSTAE507: POST HARVEST TECH. & AGRO BASED INDUSTRIES LAB

PRACTICALS :

Study and operation of the following:

1. Air screen cleaner and other cleaning equipments.
2. Heated air dryer.
3. Screw conveyor, bucket elevator & belt coveyer
4. Slurry seed treater and mixer
5. Case Study of the following available in through visits:

a. Modern Rice Mill

b. Cold Storage/Appropriate technology for short duration storage at village level.

c. Specific gravity separator

d. Processing and storage plant

e. Gur making unit

f. Soybean processing unit

g. Canning and packaging of fruits and vegetables.

h. Khandsari sugar making unit

i. Vegetable dehydrating unit

j. Seed germinating unit

6. Preparation of Mango, Guava, Karaunda and Apple jelly.
7. Preparation of Orange squash and Lemon squash.
8. Preparation of ketchup of different fruits.
9. Agro waste composite materials.

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L	T	P
0	0	2

DAGRIAE508: AGRICULTURAL INDUSTRIAL FINANCE & RURAL ENTREPRENEURSHIP LAB

PRACTICALS :

RURAL DEVELOPMENT|

1.Socioeconomic Survey of a village selected in visinity to polytechnic.

2. To find the problems of the village and suggest the solution in the development of the village from the study of the above survey in respect of :

a) Improvement suggested in agricultural activities.

b) Rural sanitation problems.

c) Rural Housing.

d) Energy development.

e) Promotion of traditional and other industries.

f) Farm mechanization

ENTREPRENEURSHIP DEVELOPMENT:

To prepare a Project report for opening agro based industry and arrange resources for the same from financing agencies.

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L	T	P
0	0	2

DGREEAE509: GREEN HOUSE TECHNOLOGY HYDROPONICS &AQUAPONICS ENGG. LAB

LIST OF PRACTICALS :

1. Construction of green house (Low Cost).
2. Green house with Poly Film based, Glass fibre sheet based, Poly corbonet sheet based covering materials.
3. Green house with different growing mediums.
4. Green house environment maintaining fixtures- cooling, heating system, different type ventilators, etc, lower shutters with exhaust systems.
5. Hydroponics in different pots of shape and sizes and their respective materials.
6. Hydroponic crop growing - capsicum, tomato etc.
7. Aquaponics- Selection of fish and their behaviour, their different tank etc.
8. Aquaponic -I .Fixtures like air circulation pump, water circulation pumps, heating system etc. II. Guidelines for recording the material on the Focused Topics in the Record note.

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DINDUAE507
INDUSTRIAL TRAINING

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of 4 weeks duration to be organized during the semester break starting after second year i.e. after 4th semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An external assessment of 50 marks has been provided in the study and evaluation scheme of 5th Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

Punctuality and regularity 15%
Initiative in learning new things 15%
Presentation and VIVA 15%
Industrial training report 55%