

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



Department Of Agricultural Engineering

Evaluation Scheme & Syllabus for

Diploma- Agriculture Engg.

(II Semester)

(Effective from session 2025-26)

EVALUATION SCHEME
DIPLOMA - AGRICULTURE ENGINEERING(2nd Sem)

Study And Evaluation Scheme For Diploma Agriculture Engineering

YEAR-1st /SEMESTER-2nd

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	
DAPPLAE201	Applied Mathematics-II	3	1	0	4	30	-	30	70	-	70	100
DAPPLAE202	Applied Physics-II	2	1	0	3	30	-	30	70	-	70	100
DAPPLAE203	Applied Mechanics	3	1	0	4	30	-	30	70	-	70	100
DMATEAE204	Material & Construction Technology	3	0	0	3	30	-	30	70	-	70	100
DAPPLAE205	Applied Mechanics Lab	0	0	2	1	-	25	25	-	25	25	50
DAPPLAE206	Applied Physics-II Lab	0	0	2	1	-	25	25	-	25	25	50
DMATEAE207	Material & Construction Technology Lab	0	0	2	1	-	25	25	-	25	25	50
Total		11	3	6	17	120	75	195	280	75	355	550

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I Year II Semester

L	T	P
3	1	0

DAPPLAE201: APPLIED MATHEMATICS-II

1. INTEGRAL CALCULUS - I:

Methods of Indefinite Integration :-

- 1.1 Integration by substitution.
- 1.2 Integration by rational function.
- 1.3 Integration by partial fraction.
- 1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :

- 2.1 Meaning and properties of definite integrals, Evaluation of definite integrals. Integration of special function.
- 2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.
- 2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):

- 3.1 CIRCLE : Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.
- 3.2 Standard form and simple properties
 - Parabola $x^2=4ay$, $y^2=4ax$
 - Ellipse $x^2/a^2 + y^2/b^2=1$
 - Hyperbola $x^2/a^2 - y^2/b^2=1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):

- 4.1 Straight lines and planes in space -
Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),
- 4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz=d$ (Radius, Centre and General Equation)

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DAPPLAE202: APPLIED PHYSICS-II

1. Optics :

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only),
Law of Malus and Polaroid's.

2. Introduction To Fibre Optics :

Critical angle, Total internal reflection, Principle of fiber optics, Optical fiber, Pulse dispersion in step-index fibers, Graded index fiber, Single mode fiber, Optical sensor.

3. Lasers and its Applications :

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor, Energy of a charged capacitor, Effect of dielectric on capacitors.

5. D.C. Circuits :

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties:

Dia, Para and Ferro-magnetism, Ferrites, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics :

Concept of Energy bands in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister :

Majority and Minority charge carriers P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics :

Concept of binary numbers, Inter conversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources:

- (a) Wind energy : Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill.
- (b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

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DAPPLAE206: APPLIED PHYSICS-II LAB

L	T	P
0	0	2

Note: Any 4 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g = 4\pi^2 / \text{Slope of the graph line}$
3. Determine the force constant of combination of springs incase of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carry Foster bridge.
9. Determination of resistivity by P.O.Box.
10. Verification of Kirchhoff's Law.
11. To draw Characteristics of p-n Junction diode.
12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

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DAPPLAE203: APPLIED MECHANICS

L	T	P
3	1	0

1. Introduction:

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2.A. System of Forces :

Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.

B. General Condition of Equilibrium:

General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties Of a couple ; Simple applied problems such as pulley and shaft.

4. Friction:

Types of friction: statically, limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphere and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon; calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections.(simple problems only)

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DAPPLAE205: APPLIED MECHANICS LAB

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss. (King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and Efficiency of any three of the following machines:
 - (i) Simple wheel & axle.
 - (ii) Differential wheel & axle.
 - (iii) Differential pulley block
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina.

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DMATEAE204: MATERIAL & CONSTRUCTION TECHNOLOGY

1. Non Metallic Materials

- (a) Stone:** Formation of rocks, classification of rocks, quarrying of stones, characteristics and uses of following building stones: Granite, Sand stone, Lime Stone, Marble & Slate.
- (b) Bricks :** Characteristics, classification as per IS, special types of bricks - Fire Bricks, surkhi, brick ballast, general idea of tiles.
- (c) Lime :** Slaking of lime, commercial names, IS classification, characteristics, storage, precautions in handling and uses of lime.
- (d) Cement:** Natural and artificial cement, characteristics of cement, types of cement, their properties and uses. Method of storage, names of different factories of Northern India.
- (e) Timber :** Definition, types - hard wood, soft wood, defects of timber seasoning of timber - water seasoning and kiln seasoning, preservation of timber, market forms of timber, brief study of common Indian timbers, ply wood, hard board and batten boards (only properties and uses.)
- (f) Paints and Varnishes:** Objects of paints & varnishes, types of paints, characteristics, defects, selection of paints, storage of paints. Types of varnishes, characteristics and uses of varnishes.
- (g) Plastics:** Polymers and various composite material, classification, properties, and uses, linoleum, plastic coated paper, polythene sheets, thermocole and PVC.

(2) METALLIC MATERIALS

- (a) Ferrous Metals:** Classification of iron. i. Cast Iron : Types as per BIS, their properties and uses. ii. Classification according to carbon contents and as per BIS, properties various steel and uses. iii. Alloy Steel: Effects of various alloying elements, properties of common steel alloy steel.

(b) Non ferrous Metals: Basic idea of important ores ,properties and uses of following metals: Aluminium , Zinc Copper, Tin and Lead.

(3) Miscellaneous: Properties and uses of following materials: Asbestos, cork, felt, guttaparcha, mica, adhesives, bakelite,china clay and fibre glass. Leather, Canvass, Jute, rubber and other advance materials .

(B) CONSTRUCTION METHODS

(a) Introduction: Components of a building, section of a wall showing foundation, footing,D.P.C.,position of doors and windows, ventilators, lintels, flooring, roofing, and parapet etc. and give general idea of terms related to buildings.

(b) Foundation: Constructional details of spread footing .(Thumb rules only)

(c) Brick masonry: Study of various types of brick bonds with special emphasis on English and Flemish bonds,L,T & Cross junctions.

(d) Damp Proof Course: Materials & Method used.

(e) Doors and windows: Types and uses of doors, windows and ventilators.

(f) Plastering and Pointing : Types and Methods.

(g) Concrete : (i) Lime Concrete - Ingradient, specifications, preparation and uses. (ii) Cement Concrete - Ingradient, prepration, laying, compaction, curing, use of local materials as formwork, application of ferro cement.

(h) Lintels : Wooden, RCC and RB lintels.

(i) Floors : Common types, construction metods, drainage and cleaning of floors.

(j) Roofs : Roofing materials and timber trusses (sheds for cattle and work places.

Bamboo structures and its composite (Such as jute, canvas and bamboo sticks and other agricultural Bi products). Composite roof sheets from agricultural waste Materials.

(C) RURAL CONSTRUCTION:

(a) Rural Buildings : Cattle shed, barns, poultry house, grain bin and godowns, their construction details, capacity and functional requirement.

(b) Rural Sanitation : Constructional details of septic tank, soak pit, aqua privy and PRAI latrines.

(c) Farm Road : Kachcha Road, Tar Macadum and Pakka Road.

(d) Rural Drainage : Specification as per BIS standards.

(e) Rural Water Supply : Construction and working of India Mark -II pump, Over head tank and laying of pipe lines.

(f) Appropriate technology for low cost building construction by locally available materials

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DMATEAE207: MATERIAL & CONSTRUCTION TECHNOLOGY
LAB

PRACTICAL WORK :

1. Identification of different types of stones .
2. Identification of different types of timber.
3. To conduct field test of cement.
4. To determine normal consistancy of cement.
5. To determine setting time of cement.(a) Initial setting time (b) Final setting time.
6. To determine water absorption of bricks.
7. To determine compressive strength of brick.
8. To determine fineness of cement by sieve method.
9. To make brick bonds (English and Flemish bonds only)
10. To visit construction sites and write specific report about following activities:
Earth work in foundation, flooring, plastering, pointing, white washing and colour washing and installation of India Mark-II pump and Laying of water pipeline.
11. Make a roof sheet at polytechnic agricultural waste material, Cement, coarse sand mixture.