

Integral University, Lucknow
Integral Institute of Agricultural Science and Technology
Evaluation Scheme of Undergraduate program
B. Tech. Agricultural Engineering
w.e.f. 2018-19

Semester V

Course Code	Subject	Periods Per h/week/sem			Evaluation Scheme Theory Mid sem			Evaluation Scheme Practical Examination					End sem Theory Exam	Subject total	Credit	Total Credit Points
		L	T	P	CT	TA	Total	Sessional			End sem exam	Sub Total (sessional + exam)				
								CT	TA	Total	Total					
AE350	Strength of Materials	2	0	2	10	10	20	5	5	10	20	30	50	100	2:0:1	3
EE308	Electrical Machines and Power Utilization	2	0	2	10	10	20	5	5	10	20	30	50	100	2:0:1	3
CA341	Database Management and Internet Applications	0	0	4	-	-	-	5	5	10	90	100	-	100	0:0:2	2
ME333	Heat and Mass Transfer	2	0	0	10	10	20	-	-	-	-	-	80	100	2:0:0	2
ME332	Machine Design	2	0	2	10	10	20	5	5	10	20	30	50	100	2:0:1	3
BM347	Agribusiness Management and Trade	3	0	0	10	10	20	-	-	-	-	-	80	100	3:0:0	3
BE361	Drying and Storage Engineering	3	0	2	10	10	20	5	5	10	20	30	50	100	3:0:1	4
AE351	Drainage Engineering	1	0	2	10	10	20	5	5	10	20	30	50	100	1:0:1	2
	TOTAL	15		14												22

Theory mid sem (20 marks) = Mid sem/ makeup (10 marks) + Quiz 1 (2.5 marks) + Quiz 2 (2.5 marks) + Attendance (5 marks)

Practical mid sem (10 marks) = CT (5 marks) + TA (2.5 marks) + Attendance (2.5 marks)

End sem exam practical (Taken by external examiner) = 20 marks

End sem final theory = 100 marks (40 marks objective type and 60 marks subjective type questions)

B. Tech. Agricultural Engineering

SEMESTER-V

Syllabus: Strength of Materials

Paper Code: AE350

w.e.f. Session 2018-19

3 (2+1)

Unit I

Slope and deflection of beams using integration techniques, moment area theorems and conjugate beam method.

Unit II

Columns and Struts. Riveted and welded connections. Stability of masonry dams. Analysis of statically intermediate beams. Propped beams.

Unit III

Fixed and continuous beam analysis using superposition, three moment equation and moment distribution methods.

Practical: To perform the tension test on metal specimen (M.S., C.I.), to observe the behaviour of materials under load, to calculate the value of E, ultimate stress, permissible stress, percentage elongation etc. and to study its fracture; To perform the compression test on; Concrete cylinders & cubes, C.I., M.S. & Wood specimens and to determine various physical and mechanical properties; To perform the bending test on the specimens; M.S. Girder, Wooden beam, Plain concrete beams & R.C.C. beam, and to determine the various physical and mechanical properties; To determine Young's modulus of elasticity of beam with the help of deflection produced at centre due to loads placed at centre & quarter points; To study the behaviour of materials (G.I. pipes, M.S., C.I.) under torsion and to evaluate various elastic constants; To study load deflection and other physical properties of closely coiled helical spring in tension and compression; To perform the Rockwell, Vicker's and Brinell's Hardness tests on the given specimens; To perform the Drop Hammer Test, Izod Test and Charpay's impact tests on the given specimens; To determine compressive & tensile strength of cement after making cubes and briquettes; To measure workability of concrete (slump test, compaction factor test); To determine voids ratio & bulk density of cement, fine aggregates and coarse aggregates; To determine fatigue strength of a given specimen; To write detail report emphasizing engineering importance of performing tension, compression, bending, torsion, impact and hardness tests on the materials.

B. Tech. Agricultural Engineering
SEMESTER-V
Syllabus: Electrical Machines and Power Utilization
Paper Code: EE308
w.e.f. Session 2018-19

3 (2+1)

Unit I:

Electro motive force, reluctance, laws of magnetic circuits, determination of ampere-turns for series and parallel magnetic circuits, hysteresis and eddy current losses, Transformer: principle of working, construction of single phase transformer, EMF equation.

Unit II:

Phasor diagram on load, leakage reactance, transformer on load, equivalent circuit, voltage regulation, power and energy efficiency, open circuit and short circuit tests, principles, operation and performance of DC machine (generator and motor), EMF and torque equations, armature reaction, commutation, excitation of DC generator and their characteristics,

Unit III:

DC motor characteristics, starting of shunt and series motor, starters, speed control methods-field and armature control, polyphase induction motor: construction, operation, equivalent circuit, phasor diagram, effect of rotor resistance, torque equation, starting and speed control methods.

Unit IV:

Single phase induction motor: double field revolving theory, equivalent circuit, characteristics, phase split, shaded pole motors, disadvantage of low power factor and power factor improvement, various methods of single and three phase power measurement.

Practical: To get familiar with AC, DC machines and measuring instruments; To perform open circuit and short circuit tests on a single phase transformer and hence find equivalent circuit, voltage regulation and efficiency; To study the constructional details of D.C. machine and to draw sketches of different components; To obtain load characteristics of d.c. shunt/series /compound generator; To study characteristics of DC shunt/ series motors; To study d.c. motor starters; To Perform load-test on 3 ph. induction motor & to plot torque V/S speed characteristics; To perform no-load & blocked –rotor tests on 3 ph. Induction motor to obtain equivalent ckt. parameters & to draw circle diagram; To study the speed control of 3 ph. induction motor by cascading of two induction motors, i.e. by feeding the slip power of one motor into the other motor; To study star- delta starters physically and (a) to draw electrical connection diagram (b) to start the 3 ph. induction motor using it. (c) to reverse the direction of 3 ph. I.M.; To start a 3-phase slip –ring induction motor by inserting different levels of resistance in the rotor ckt. and to plot torque –speed characteristics; To perform no load & blocked –rotor test on 1 ph. induction motor & to determine the parameters of equivalent ckt. drawn on the basis of double revolving field theory; To perform load –test on 1 ph. induction motor & plot torque – speed characteristics.

B. Tech. Agricultural Engineering
SEMESTER-V

Syllabus: Database Management and Internet Applications

Paper Code: CA341

w.e.f. Session 2018-19

2 (0+2)

Practical: Basic database concepts, introduction to RDBMS, SQL Commands, Data constraints, Joins, set operations, working with forms, Basics of HTML, developing web pages using meta tags, dynamic pages using Java scripts, connectivity with RDBMS, Project. Basic database concepts; Introduction to RDBMS; SQL Commands DDL, DML; Select command, Joins and functions; Group functions, Set functions; Working with Forms; Basic of HTML; Development of Web pages using meta tags; Dynamic pages using Java Scripts; Connectivity of Web pages with databases; Project.

B. Tech. Agricultural Engineering

SEMESTER-V

Syllabus: Heat and Mass Transfer

Paper Code: ME333

w.e.f. Session 2018-19

2 (2+0)

Unit I

Introductory concepts, modes of heat transfer, thermal conductivity of materials, measurement. General differential equation of conduction. One dimensional steady state conduction through plane and composite walls, tubes and spheres with and without heat generation.

Unit II

Electrical analogy. Insulation materials, critical thickness of insulation. Fins, Free and forced convection. Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection. Useful non dimensional numbers and empirical relationships for free and forced convection. Equation of laminar boundary layer on flat plate and in a tube.

Unit III

Laminar forced convection on a flat plate and in a tube. Combined free and forced convection. Introduction. Absorptivity, reflectivity and transmissivity of radiation. Black body and monochromatic radiation, Planck's law, Stefan-Boltzman law, Kirchoff's law, grey bodies and emissive power, solid angle, intensity of radiation. Radiation exchange between black surfaces, geometric configuration factor.

Unit IV

Heat transfer analysis involving conduction, convection and radiation by networks. Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units.

Unit V

Heat exchanger analysis restricted to parallel and counter flow heat exchangers. Steady state molecular diffusion in fluids at rest and in laminar flow, Flick's law, mass transfer coefficients. Reynold's analogy.

B. Tech. Agricultural Engineering

SEMESTER-V

Syllabus: Machine Design

Paper Code: ME332

w.e.f. Session 2018-19

3 (2+1)

Unit I

Meaning of design, Phases of design, design considerations. Common engineering materials and their mechanical properties. Types of loads and stresses, theories of failure, factor of safety, selection of allowable stress. Stress concentration.

Unit II

Elementary fatigue and creep aspects. Cotter joints, knuckle joint and pinned joints, turnbuckle. Design of welded subjected to static loads. Design of threaded fasteners subjected to direct static loads, bolted joints loaded in shear and bolted joints subjected to eccentric loading.

Unit III

Design of shafts under torsion and combined bending and torsion. Design of keys. Design of muff, sleeve, and rigid flange couplings. Design of helical and leaf springs. Design of flat belt and V-belt drives and pulleys. Design of gears.

Unit IV

Design of brackets, levers, columns, thin cylindrical and spherical shells. Design of screw motion mechanisms like screw jack, lead screw, etc. Selection of antifriction bearings. Design of curved beams; Crane hooks, circular rings, etc.

Practical: Problems based on load and stress analysis of machine components; Problems based on practical application of theories of failure and fatigue and determination of factor of safety; Design and drawing of pin connections, Knuckle joint; Design of bolted joints cases of electric loading; Exercises on design of levers rockers arm for diesel engines; Assignment test; Problems on design of shafts, keys and coupling; Problems in selection/ design of belts; Selection of roller bearings use of catalogue; Problems on design of helical and leaf spring; Problems on gear design of spur gears.

B. Tech. Agricultural Engineering
SEMESTER-V
Syllabus: Agribusiness Management and Trade
Paper Code:
w.e.f. Session 2018-19

3 (3+0)

Unit I

Management concepts and principles, process of management, functions of management, concept of agribusiness and application of management principles to agribusiness

Unit II

Production, consumption, and marketing of agricultural products, agricultural processing, meaning and theories of international trade,

Unit III

WTO provisions for trade in agricultural and food commodities, India's contribution to international trade in food and agri – commodities

B. Tech. Agricultural Engineering
SEMESTER-V
Syllabus: Drying and Storage Engineering
Paper Code: BE361
w.e.f. Session 2018-19

4 (3+1)

Unit I

Moisture content and methods for determination, importance of EMC and methods of its determination, EMC curve and EMC model, principle of drying, Theory of diffusion, mechanism of drying- falling rate, constant rate, thin layer, deep bed and their analysis, critical moisture content, drying models, calculation of drying air temperature and air flow rate, air pressure within the grain bed.

Unit II

Shred's and Hukill's curve, different methods of drying including puff drying, foam mat drying, freeze drying, etc. Study of different types of dryers- performance, energy utilization pattern and efficiency, study of drying and dehydration of agricultural products.

Unit III

Types and causes of spoilage in storage, conditions for storage of perishable products, functional requirements of storage, control of temperature and relative humidities inside storage, calculation of refrigeration load; Modified atmospheric storage and control of its environment, air movement inside the storage,

Unit IV

Storage of grains: destructive agents, respiration of grains, moisture and temperature changes in stored grains; conditioning of environment inside storage through natural ventilation, mechanical ventilation, artificial drying, grain storage structures such as Bukhari, Morai, Kothar, silo, CAP, warehouse - design and control of environment.

Unit V

Storage of cereal grains and their products, storage of seeds, hermetically sealed and air-cooled storages-refrigerated, controlled atmosphere, modified atmospheric and frozen storages. Storage condition for various fruits and vegetables under cold and CA storage system. Economic, aspects of storage.

Practical: Study of mechanics of bulk solids affecting cleaning, drying and storage of grains; Measurement of moisture content during drying and aeration; Measurement of relative humidity during drying and aeration using different techniques; Measurement of air velocity during drying and aeration; Drying characteristic and determination of drying constant; Determination of EMC and ERH; Study of various types of dryers; To study the effect of relative humidity and temperature on grains stored in gunny bags; Design and layout of commercial bag storage facilities; Design and layout of commercial bulk storage facilities; Study of different domestic storage structures; Visits to commercial handling and storage facilities for grains.

B. Tech. Agricultural Engineering

SEMESTER-V

Syllabus: Drainage Engineering

Paper Code: AE351

w.e.f. Session 2018-19

2 (1+1)

Unit I

Drainage, objectives of drainage, familiarization with the drainage problems of the state, Surface drainage, drainage coefficient, types of surface drainage, design of open channel, sub-surface drainage purpose and benefits,

Unit II

Investigations of design parameters, hydraulic conductivity, drainable porosity, water table etc., types and use of subsurface drainage system, Design of surface drains, interceptor and relief drains. Derivation of ellipse (Hooghoudt's) and Ernst's drain spacing equations.

Unit III

Design of subsurface drainage system. Drainage materials, drainage pipes, drain envelope. Layout, construction and installation of drains. Drainage structures. Vertical drainage. Bio-drainage. Tile Drains. Drainage of irrigated and humid areas.

Unit IV

Salt balance, reclamation of saline and alkaline soils. Leaching requirements, conjunctive use of fresh and saline waters. Economic aspects of drainage.

Practical: *In-situ* measurement of hydraulic conductivity; determination of drainage coefficients; installation of piezometer and observation well; preparation of iso-bath and isobar maps; measurement of hydraulic conductivity and drainable porosity; design of surface drainage systems; design of subsurface drainage systems; determination of chemical properties of soil and water; fabrication of drainage tiles; testing of drainage tiles; determination of gypsum requirement for land reclamation; installation of sub-surface drainage system; cost analysis of surface and sub-surface drainage system.