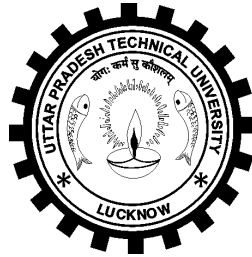


U.P. TECHNICAL UNIVERSITY, LUCKNOW



Syllabus

2nd Year (III & IV Sem.)

[Effective from session 2009-10]

B. TECH. AGRICULTURAL ENGINEERING

U P TECHNICAL UNIVERSITY , LUCKNOW

Study & Evaluation Scheme

B Tech Agricultural Engineering .

[Effective from session 2009-10]

Second Year , III Semester

S.No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme			SUBJECT TOTAL	Credit	
						SESSIONAL EXAM					ESE
			L	T	P	CT	TA	Total			
THEORY											
1	EAG-301	Fluid Mechanics	3	1	0	30	20	50	100	150	4
2	EOE-031- EOE038-	Science Based Open Elective	3	1	0	30	20	50	100	150	4
3	EHU301/ EHU302	Industrial Psychology/ Industrial Sociology	2	0	0	15	10	25	50	75	2
4	EAG-302	Farm Machinery	3	1	0	30	20	50	100	150	4
5	EAG-303	Basic Electronics and Instrumentation	3	1	0	30	20	50	100	150	4
6	EAG-304	Theory of Machine	2	1	0	15	10	25	50	75	3
7	EHU-111	*Human Values & Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / TRAINING / PROJECT											
8	EAG-351	Fluid Mechanics Lab	0	0	2	10	10	20	30	50	1
9	EAG-352	Farm Machinery Lab	0	0	2	10	10	20	30	50	1
10	EAG-353	Basic Electronics and Instrumentation Lab	0	0	2	10	10	20	30	50	1
11	EAG-354	Theory of Machine Lab	0	0	2	10	10	20	30	50	1
12	GP301	General Proficiency						50		50	1
		Total								1000	26

* Human Values & Professional Ethics will be offered as compulsory Audit Course for which passing marks are 40% in theory & 50% in aggregate. Students will be required to audit it within the period of his/her study. There will not be carry over in this course and a failure student will require to repeat this course.

Science Based Open Electives :

Paper Code	Name
EOE-031/EOE-041	Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)
EOE-032/EOE-042	Nano Sciences
EOE033/EOE-043	Laser Systems and Applications
EOE-034/EOE-044	Space Sciences
EOE035/EOE-045	Polymer Science & Technology
EOE-036/EOE-046	Nuclear Science
EOE037/EOE/047	Material Science
EOE-038/EOE-048	Discrete Mathematics

U P TECHNICAL UNIVERSITY , LUCKNOW

Study & Evaluation Scheme

B Tech Agricultural Engineering .

[Effective from session 2009-10]

Second Year , IV Semester

Year IInd Semester IVth

S.No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				SUBJECT TOTAL	Credit
			L	T	P	SESSIONAL EXAM			ESE		
						CT	TA	Total			
THEORY											
1	EHU402/ EHU401	Industrial Sociology/ Industrial Psychology	2	0	0	15	10	25	50	75	2
2	EAG-401	Electrical Circuits & Machines	3	1	0	30	20	50	100	150	4
3	EAG402	Soil Mechanics	3	1	0	30	20	50	100	150	4
4	EAG-403	Farm Power	3	1	0	30	20	50	100	150	4
5	EAG-404	Heat & Mass Transfer	3	1	0	30	20	50	100	150	4
6	EAG-405	Strength of Material	2	1	0	15	10	25	50	75	3
7	EHU-111	*Human Values & Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / TRAINING / PROJECT											
8	EAG-451	Electrical Circuits & Machines Lab	0	0	2	10	10	20	30	50	1
9	EAG-452	Soil Mechanics Lab	0	0	2	10	10	20	30	50	1
10	EAG-453	Farm Power Lab	0	0	2	10	10	20	30	50	1
11	EAG-454	Strength of Material Lab	0	0	2	10	10	20	30	50	1
12	GP401	General Proficiency						50		50	1
		Total								1000	26

Semester –III

EAG-301 : Fluid Mechanics

4 (3+1)

Unit-1

Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal's law, pressure forces on plane and curved surfaces, centre of pressure, buoyancy, metacentre and metacentric height, condition of floatation and stability of submerged and floating bodies;

Unit-2

Kinematics of fluid flow: continuity equation, path lines, streak lines and streamlines, stream tube, stream function, velocity potential function, and flow net. Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion; Dynamics of fluid flow, Bernoulli's theorem, venturimeter, orifice-meter, Introduction to orifice and notch.

Unit-3

Laminar flow: shear stress distribution and velocity distribution in circular pipes and two parallel plates; kinetic energy correction factor and momentum energy correction factor, average velocity, shear stress and pressure gradient; Turbulent flow in pipes, Darcy equation

Unit-4

Minor and major hydraulic losses through pipes and fittings, flow through network of pipes, hydraulic gradient and energy gradient, siphon; power transmission through pipe and nozzle; water hammer.

Unit-5

Dimensional analysis and similitude: Rayleigh's method and Buckingham's π -theorem, types of similarities, dimensionless numbers, model's law.

EAG-351 : Fluid Mechanics Lab

- (1) Study of manometers and pressure gauges; Verification of Bernoulli's theorem;
- (2) Determination of coefficient of discharge of venturimeter and orifice meter;
- (3) Determination of coefficient of friction in pipeline;
- (4) Determination of coefficient of discharge for rectangular and triangular notch;

- (5) Determination of coefficient of discharge, coefficient of velocity and coefficient of contraction for flow through orifice;
- (6) Determination of coefficient of discharge for mouthpiece;
- (7) Measurement of force exerted by water-jets on flat and hemispherical vanes;
- (8) Determination of metacentric height;
- (9) Determination of efficiency of hydraulic ram; Performance evaluation of Pelton and Francis turbine;
- (10) Study of current meter; Velocity distribution in open channels and determination of Manning's coefficient of rugosity.

Text book

R K Bansal, Text Book fluid mechanics and machinery, Laxmi Publication

D S Kumar, fluid mechanics fluid power Egg, kaitson publication

EAG-302 : Farm Machinery

4 (3+1)

Unit-1

Objectives of farm mechanization. Classification of farm machines. Materials of construction & heat treatment. Principles of operation and selection of machines used for production of crops. Field capacities & economics.

Unit-2

Tillage; primary and secondary tillage equipment. Forces acting on tillage tools. Hitching systems and controls. Draft measurement of tillage equipment: Measurement of forces of tillage tools, Types of dynamometer; spring, hydraulic, and strain gauge types

Unit-3

Earth moving equipment - their construction & working principles viz Bulldozer, Elevators etc.; sowing, planting & transplanting equipment Seed and fertilizer metering devices, furrow openers and covering devices – their calibration and adjustments. Fertilizer application equipment.

Unit-4

Weed control and Plant protection equipment - sprayers and dusters, their calibration, selection, constructional features of different components and adjustments. Principles & types of cutting mechanisms. Construction & adjustments of shear & impact-type cutting mechanisms.

Unit-5

Crop harvesting machinery: mowers, windrowers, reapers, reaper binders and forage harvesters. Forage chopping & handling equipment. Threshing : threshers, straw combines & grain combines, .

EAG-352 : Farm Machinery Lab

- (1) Introduction to various farm machines,
- (2) Visit to implements shed and research hall;
- (3) Field capacity and field efficiency measurement for at least two machines/implements;
- (4) Draft & fuel consumption measurement for different implements under different soil conditions;
- (5) Construction details, adjustments and working of M.B. plow,
- (6) Disc plow and discharrow and secondary tillage tools;
- (7) Introduction, construction and working of earth moving equipment;
- (8) Construction and working of rotavators and other rotary tillers,
- (9) Working of seed-cum-fertilizer drills, planters and their calibration in field;
- (10) Working of transplanters and operation;
- (11) Weeding equipments and their use;
- (12) Study of sprayers, dusters, measurement of nozzle discharge, field capacity etc.

Text Book

Principle of Farm Machinery, R.A Kepner, Roy Bainer;: CBS Publication

Element of Agricultural Engg; J Sahay: Standard Publication

Agricultural Engineering;Radhey Lal: Saroj Publication

EAG-303

Basic Electronics and Instrumentation 4(3+1)

Unit-1

Semiconductors, p-n junction, V-I characteristics of p-n junction, diode as a circuit element, rectifier, clipper, clamper, capacitive filter,

Unit-2

Bipolar junction transistor: operating point, classification(A,B & C) of amplifier, various biasing methods (fixed, self, potential divider),

h-parameter model of a transistor, analysis of small signal, CE amplifier,

Unit-3

Phase shift oscillator, analysis of differential amplifier using transistor, ideal OP-AMP characteristics, linear and non-linear applications of OP-AMP (adder, subtractor, integrator),

Unit-4

Half wave, full wave and bridge rectifier; comparator, differentiator, Zener diode voltage regulator, transistor series regulator, OP-AMP voltage regulators, LVDT

Unit-5

Basic theorem of Boolean algebra, Combinational logic circuits(basic gates, SOP rule and Kmap), D/A converter, successive approximation A/D converter, generalized instrumentation, measurement of displacement, temperature, velocity, force and pressure using potentiometer, resistance thermometer, thermocouples, bourden tube, LVDT, strain gauge and tacho-generator.

EAG-353 : Basic Electronics and Instrumentation Lab

- 1 To study V-I characteristics of p-n junction diode;
- 2 To study half wave, full wave and bridge rectifier;

- 3 To study transistor characteristics in CE configurations;
- 4 To design and study fixed and self bias transistor;
- 5 To design and study potential divider bias transistor;
- 6 To study a diode as clipper and clamper;
- 7 To study a OP-AMP IC 741 as inverting and noninverting amplifier;
- 8 To study a OP-AMP IC 741 as differentiator amplifier;
- 9 To study a differential amplifier using two transistor;
- 10 To study a OP-AMP IC 741 as differential amplifier;
- 11 To study a zener regulator circuit;
- 12 To study a OP-AMP IC 741 as a active rectifier;
- 13 To study a OP-AMP IC 741 as a comparator;
- 14 To familiarize with various types of Transducers

Text Book

EAG-304 : Theory of Machines

3 (2+1)

UNIT-1

Elements, links, pairs, kinematics chain, and mechanisms. Classification of pairs and mechanisms. Lower and higher pairs. Four bar chain, slider crank chain and their inversions, Degree of freedom.

Determination of velocity and acceleration using graphical (relative velocity and acceleration) method. Instantaneous centers.

UNIT-2

Cam, Types of cam, Terminology used in cam-follower system, Cam profile, Gear train, Simple, compound, reverted, and epicyclical gear trains. Determination of velocity ratio and train value by tabular method.

UNIT-3

Introduction to Belt drives, types of drives, belt materials, Length of belt, power transmitted, velocity ratio, belt size for flat and V belts. Effect of centrifugal tension, Creep and Slip on power transmission, Chain drives.

Introduction to Clutches, Types of clutches (Single disc, multiple disc, and cone clutches).

UNIT-4

Introduction to Governor, Types of governors, Constructional details and Analysis of Watt, Porter, Proell governor, Sensitiveness, stability, hunting, isochronisms, power and effort of a governor.

Introduction to flywheel, Static and dynamic balancing. Balancing of rotating masses in one and different planes. Partial primary balancing of reciprocating masses.

EAG-354 : Theory of Machines Lab

1. Analysis of 4-bar mechanism slides crank mechanism and their inversions.
2. Complete velocity and acceleration analysis (Graphical or Analytical) of few practical linkage mechanisms.
3. Study of gear trains and motion analysis of some practical complex compound gear train.
4. Motion analysis of Epicyclical gear trains using tabular and formula methods.
5. To study the flywheel and governor action in laboratory.
6. To graphically synthesize the cam profile for a desired standard follower motion.
7. To Study on the cam follower demonstration machine for follower displacement as a function of cam rotation angle and phenomenon of follower jump;
8. Demonstration of static and dynamic balancing in the laboratory.
9. Calculations on balancing a multi rotor unbalanced system by putting masses in two different planes.
10. To Study on Different Governors.

Text Books:

1. S.S.Rattan (T.M.H.)
2. R.S.Khurmi. (S.Chand)

Semester –IV

EAG-401 : Electrical Circuits and Electrical machine

4 (3+1)

Unit-1

Independent and dependent sources, loop current and loop equations (Mesh current method), node voltage and node equations (Nodal voltage method), Network theorems: Thevenin's, Norton's, Superposition, Reciprocity and Maximum power transfer, Star-Delta conversion solution of DC circuit by Network theorems,

Unit-2

Average and effective value of sinusoidal and linear periodic wave forms. Sinusoidal steady state response of circuits, Instantaneous and average power, power factor, reactive and apparent power, Series and parallel resonance, Classification of filters, constant-k, m-derived, terminating half network and composite filters.

Unit-3

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, phasor diagram on load, leakage reactance, transformer on load, equivalent circuit, voltage regulation, power and energy efficiency, open circuit and short circuit tests,

Unit-4

Principles, operation and performance of DC machine (generator and motor), EMF and torque equations, armature reaction, commutation, excitation of DC generator and their characteristics, DC motor characteristics, starting of shunt and series motor, starters, speed control methods-field and armature control,

Unit-5

Polyphase induction motor: construction, operation, equivalent circuit, phasor diagram, effect of rotor resistance, torque equation, starting and speed control methods, 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.

EAG-451 : Electrical Circuits and Electrical machine Lab

1. To familiarize with the components and equipments used in Laboratory;
2. To verify Kirchhoff's current laws; To verify Kirchhoff's voltage laws;
3. To verify Thevenin theorems;
4. To verify Norton's theorems;
5. To verify superposition theorem;
6. To verify reciprocity theorem;
7. To study the sinusoidal response of RL series circuit;
8. To study the sinusoidal response of RC series circuit;
9. To study the step response of RL series circuit;
10. To perform open circuit and short circuit tests on a single phase transformer
11. To study characteristics of DC shunt/ series motors;
12. To study d.c. motor starters;
13. To Perform load-test on 3 ph. induction motor & to plot torque V/Speed characteristics;
14. To perform no-load & blocked –rotor tests on 3 ph. Induction motor to obtain equivalent ckt.
15. To start the 3 ph. induction motor using it. (c) to reverse the direction of 3 ph. I.M.;

EAG-402 : Soil Mechanics

4 (3+1)

Unit-1

Introduction of soil mechanics, field of soil mechanics, phase diagram physical and index properties of soil classification of soils, general classification based on particles size, textural classification and I.S. soil classification system stress condition in soils, effective and neutral stress, elementary concept of Bousinesque and Westergaard's analysis, newmark influence chart.

Unit-2

Shear strength mohr stress circle, theoretical relationship between principle stress circle, theoretical relationship between principal stress mohr-coulomb failure theory, effective stress principle. Determination of shear parameters by direct shear to be circle, theoretical test. Numerical exercise based on various types of tests.

Unit-3

Compaction composition of soils standard and modified protector test, abbot compaction and Jodhpur mini compaction text field compaction method and control. Consolidation of soil:

Unit-4

Consolidation of soils, one dimensional consolidation spring analogy, Terzaghi's theory Laboratory consolidation text, calculation of void ratio and coefficient of volume change, Taylor's and Casagrand's method, determination of coefficient of consolidation.

Unit-5

Earth pressure: Plastic equilibrium in soils, active and passive states, Rankine's theory of earth pressure active and passive earth pressure for cohesive soils, simple numerical exercise. Stability of slopes: Introduction to stability analysis of infinite and finite slopes friction circles method Taylor's stability number.

EAG-452 : Soil Mechanics Lab

- 1 Determination of water content of soil;
- 2 Determination of specific gravity of soil;
- 3 Determination of field density of soil by core cutter method;
- 4 Determination of field density by sand replacement method;
- 5 Grain size analysis by sieving (Dry sieve analysis);
- 6 Grain size analysis by hydrometer method;
- 7 Determination of liquid limit by Casagrande's method;
- 8 Determination of liquid limit by cone penetrometer and plastic limit;
- 9 Determination of shrinkage limit;
- 10 Determination of permeability by constant head method;

- 11 Determination of permeability by variable head method;
- 12 Determination of compaction properties by standard proctor test;
- 13 Determination of shear parameters by Direct shear test;
- 14 Determination of unconfined compressive strength of soil;
- 15 Determination of shear parameters by Triaxial test;
- 16 Determination of consolidation properties of soils.

Text Books:

Soil Mechanics, B. C. Punmia; Laxmi Publication (P) Ltd. New Del

EAG -403 : Farm Power

4(3+1)

Unit-1

Sources of farm power -conventional & non-conventional energy sources. Classification of tractors and IC engines. Review of thermodynamic principles of IC (CI & SI) engines and deviation from ideal cycle.

Unit-2

Study of engine components their construction, operating principles and functions. Engine systems : valves & valve mechanism. firing order and diagram, criteria for firing order selection.

Unit-3

Fuel & air supply, cooling, lubricating, ignition, starting, Engine governing systems and electrical systems. Study of constructional details, adjustments & operating principles of these systems

Unit-4

IC engine fuels - their properties & combustion of fuels, gasoline tests and their significance, diesel fuel tests and their significance, detonation and knocking in IC engines, study of properties of coolants, anti freeze and anti-corrosion materials, lubricant types & study of their properties.

Unit-5

Transmission systems of wheel and track type tractors: clutch, gear box, differential and final drive mechanism PTO system, type, standardization, belt and pulley on tractor and their standardization

EAG -453 : Farm Power Lab

- 1 Introduction to different systems of an CI engine;
- 2 Engine parts and functions, working principles etc;
- 3 Valve system – study, construction and adjustments;
- 4 Oil & Fuel - determination of physical properties;
- 5 Air cleaning system;
- 6 Fuel supply system of SI engine;
- 7 Diesel injection system & timing;
- 8 Cooling system, and fan performance, thermostat and radiator 9 performance evaluation;
- 10 Part load efficiencies & governing; Lubricating system &
- 11 adjustments; Starting and electrical system; Ignition system;
- 12 Tractor engine heat balance and engine performance curves;
- 13 Visit to engine manufacturer/ assembler/ spare parts agency.

Text Book

Tractors and their Power Units, John B. Lijiedahal, Paul K. Turnquist :CBS Publication

Farm Tractor maintenance and repair, S.C.Jain; Standard Publishers Distributors

EAG-404 : Heat and Mass Transfer 4 (3+1)

Unit-1

Modes of heat transfer, thermal conductivity of materials, General differential equation of conduction, One dimensional steady state conduction through plane and composite walls, tubes and spheres with and without heat generation. Electrical analogy. Insulation materials, critical thickness of insulation.

Unit-2

Introduction to Fins, Free and forced convection, Heat transfer coefficient in convection. Newton's law of cooling. Dimensional analysis of free and forced convection. Useful non-dimensional numbers and empirical relationships for free and forced convection,

Reynolds's analogy, Equation of laminar boundary layer on flat plate and in a tube, Laminar forced convection on a flat plate and in a tube, combined free and forced convection.

Unit-3

Introduction to Heat Exchanger, types of heat exchangers, log mean temperature difference, heat exchanger performance, transfer units. Heat exchanger analysis restricted to parallel and counter flow heat exchangers,

Unit-4

Introduction to 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-5

Introduction to mass transfer, Flick's law, and mass transfer coefficients.

Text Book

Heat and Mass Transfer , R K Rajput

Heat and Mass Transfer, R Yadav

Heat and Mass Transfer,

EAG – 405 : Strength of Materials

3(2+1)

Unit -1

Poisson's ratio , volumetric strain, Temperature stresses.Review of simple and compound stresses, Mohr's circle.

Unit-2

Stresses in thin cylinder and spherical shells, derivation of equations for circumferential and longitudinal stresses in shells and their applications.

Unit-3

Review of pure bending, Direct and shear stresses in beams due to transverse and axial loads, Composite beams

Deflection of beams, Equation of elastic curve, Macaulay's method, moment area method.

Unit-4

Stability of dam, columns and struts, derivation of buckling load equation for both end hinged, one end fixed and other end free, both end fixed & one end fixed and other end hinged, Empirical formula for columns.

EAG – 454 : Strength of Materials

1. To perform the tension test on metal specimen (M.S., C.I.),
2. 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;
3. To perform the compression test on;
4. Concrete cylinders & cubes, C.I., M.S. & Wood specimens and to determine various physical and mechanical properties;
5. 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;
6. 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;
7. To study the behaviour of materials (G.I. pipes, M.S., C.I.) under torsion and to evaluate various elastic constants;
8. To study load deflection and other physical properties of closely coiled helical spring in tension and compression;
9. To perform the Rockwell, Vicker's and Brinell's Hardness tests on the given specimens;
10. To perform the Drop Hammer Test, Izod Test and Charpy's impact tests on the given specimens;
11. To determine compressive & tensile strength of cement after making cubes and briquettes;
12. To measure workability of concrete (slump test, compaction factor test);
13. To determine voids ratio & bulk density of cement, fine aggregates and coarse aggregates;
14. To determine fatigue strength of a given specimen;
15. To write detail report emphasizing engineering importance of performing tension, compression, bending, torsion, impact and hardness tests on the materials

Text Book

Strength of Materials, R. K. Bansal

Strength of Materials, R. K. Rajput