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

Semester - I

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
								Sessional			End sem exam (Taken by external examiner)	Sub Total (sessional + exam)[b] +[c]				
		L	T	P	CT	TA	Total[a]	CT	TA	Total[b]	Total[c]					
MT133	Mathematics in Agricultural Engineering -I	2	0	2	10	10	**20**	5	5	10	20	**30**	**50**	**100**	2:0:1	3
PY110	Engineering Physics	2	0	2	10	10	**20**	5	5	10	20	**30**	**50**	**100**	2:0:1	3
CH116	Engineering Chemistry	2	0	2	10	10	**20**	5	5	10	20	**30**	**50**	**100**	2:0:1	3
AE112	Principles of Soil Science	2	0	2	10	10	**20**	5	5	10	20	**30**	**50**	**100**	2:0:1	3
AE101	Surveying and Leveling	1	0	4	10	10	**20**	5	5	10	20	**30**	**50**	**100**	1:0:2	3
AE111	Engineering Mechanics	2	0	2	10	10	**20**	5	5	10	20	**30**	**50**	**100**	2:0:1	3
AE113	Engineering Drawing	0	0	4	10	-	-	-	5	5	10	90	**100**	**100**	0:0:2	2
ME111	Heat and Mass Transfer	2	0	0	10	10	**20**	-	-	-	-	**-**	**80**	**100**	2:0:0	2
	Total	**13**		**18**												**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-I
Syllabus: Mathematics in Agricultural Engineering -I
Paper Code: MT133
w.e.f. Session 2018-19

3(2+1)

Unit 1:
Matrices: Elementary transformations, rank of a matrix, reduction to normal form, Gauss- Jordon method to find inverse of a matrix, Eigen values and Eigen vectors, Cayley-Hamilton theorem, linear transformation, orthogonal transformations, diagonalisation of matrices, quadratic forms. PAQ form, Echelon form

Unit 2:
Solution of linear equations, nature of rank, using Cayley-Hamilton theorem to find inverse of A. Differential calculus: Taylor's and Maclaurin's expansions; indeterminate form; curvature, function of two or more independent variables, partial differentiation, homogeneous functions and Euler's theorem, composite functions, total derivatives, maxima and minima.

Unit 3:
Integral calculus: volumes and surfaces of revolution of curves; double and triple integrals, change of order of integration, application of double and triple integrals to find area and volume. Vector calculus: Differentiation of vectors, scalar and vector point functions, vector differential operator Del, Gradient of a scalar point function.

Unit 4:
Divergence and Curl of a vector point function and their physical interpretations, identities involving Del, second order differential operator; line, surface and volume integrals, Stoke's, divergence and Green's theorems (without proofs).

Practical: Tutorials on rank of a matrix, reduction to normal form, consistency and solution of linear equations, eigen values and eigen vectors, Cayley-Hamilton theorem, diagonalization of matrices, quadratic forms; Taylor's and Maclaurin's expansion, indeterminate form, curvature, tracing of curves, partial differentiation, maxima and minima, volume and surface of revolution, multiple integrals, Beta and Gama functions, differentiation of vectors, gradient, divergence and curl of a vector point function, line, surface and volume integrals, Stoke's divergence and Green's Theorems.

Suggested Readings:

1. Narayan Shanti. 2004 . Differential Calculus. S. Chand and Co. Ltd. New Delhi.
2. Narayan Shanti. 2004. Integral Calculus. S. Chand and Co. Ltd. New Delhi.
3. Grewal B S. 2004. Higher Engineering Mathematics. Khanna Publishers Delhi.
4. Narayan Shanti. 2004. A Text Book of Vector. S. Chand and Co. Ltd. New Delhi.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Engineering Physics
Paper Code: PY110
w.e.f. Session 2018-19

3(2+1)

Unit 1:
Dia, Para and ferromagnetism-classification. Langevin theory of dia and paramagnetism. Adiabatic demagnetization. Weiss molecular field theory and ferromagnetism. Curie-Weiss law. Wave particle quality, de-Broglie concept, uncertainty principle. Wave function. Time dependent and time independent Schrodinger wave equation, Qualitative explanation of Zeeman effect, Stark effect and Paschan Back effect, Raman spectroscopy.

Unit 2:
Statement of Bloch's function. Bands iii solids, velocity of Bloch's electron and effective mass. Distinction between metals. insulators and semiconductors. Intrinsic and extrinsic semiconductors, law of mass action. Determination of energy gap in semiconductors. Donors and acceptor levels. Superconductivity, critical magnetic field. Meissner effect.

Unit 3:
Isotope effect. Type-I and II superconductors, Josephson's effect DC and AC, Squids. Introduction to high Tc superconductors. Spontaneous and stimulated emission, Einstein A and B coefficients. Population inversion, He-Ne and Ruby lasers. Ammonia and Ruby masers, Holography-Note. Optical fiber.

Unit 4:
Physical structure. basic theory. Mode type, input output characteristics of optical fiber and applications. Illumination: laws of illumination, luminous flux, luminous intensity, candle power, brightness.

Practical: To find out the frequency of A.C. supply using an electrical vibrator; To find the low resistance using Carey Foster bridge without calibrating the bridge wire; To determine dielectric constant of material using De Sauty's bridge; To determine the value of specific charge (e/m) for electrons by helical method; To study the induced e.m.f. as a function of velocity of the magnet; To obtain hysteresis curve (B-H curve) on a C.R.O. and to determine related magnetic quantities; To study the variation of magnetic field with distance along the axis of a current carrying circular coil and to detuning the radius of the coil; To determine the energy band gap in a semiconductor using a p-n Junction diode; To determine the slit width from Fraunhofer diffraction pattern using laser beam; To find the numerical aperture of optical fiber: To set up the fiber optic analog and digital link; To study the phase relationships in L.R. circuit; To study LCR circuit; To study the variations of thermo emf of a copper-constantan thermo-couple with temperature; To find the wave length of light by prism.

Suggested Readings:

1. Brijlal and Subramanyam. Text Book of optics. S. Chand and Co., New Delhi.
2. Sarkar Subir Kumar. Optical State Physics and Fiber Optics. S. Chand and Co., New Delhi.
3. Gupta S L, Kumar V Sharma R C. Elements of Spectroscopy. Pragati Prakasam, Meeruth.
4. Saxena B S and Gupta R C. Solid State Physics. Pragati Prakasam, Meeruth.
5. Srivastava B N. Essentials of Quantum Mechanics. Pragati Prakasam, Meeruth.
6. Vasudeva D N. Fundamentals of Magnetism and Electricity. S. Chand and Co., New Delhi.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Engineering Chemistry
Paper Code: CH116
w.e.f. Session 2018-19

3(2+1)

Unit 1:
Phase rule and its application to one and two component systems. Fuels: classification, calorific value. Colloids: classification. properties. Corrosion: causes. types and method of prevention. Water: temporary and permanent hardness. disadvantages of hard water, scale and sludge formation in boilers, boiler corrosion.

Unit 2:
Analytical methods like thermo-gravimetric. polarographic analysis. nuclear radiation. detectors and analytical applications of radioactive materials. Enzymes and their use in the manufacturing of ethanol and acetic acid by fermentation methods.

Unit 3:
Principles of food chemistry. Introduction to lipids, proteins, carbohydrates, vitamins, food preservators, colouring and flavouring reagents of food.

Unit 4:
Lubricants: properties. mechanism. classification and tests. Polymers. types of polymerization. properties. uses and methods for the determination of molecular weight of polymers. Introduction to IR spectroscopy.

Practical: Determination of temporary and permanent hardness of water by EDTA method: Estimation of chloride in water: Estimation of dissolved oxygen in water: Determination of BOD in water sample: Determination of COD in water sample: Estimation of available chlorine in bleaching powder: Determination of viscosity of oil: Estimation of activity of water sample: Estimation of alkalinity of water sample: Determination of carbonate and non-carbonate hardness by soda reagent: Determination of coagulation of water and chloride ion content: Determination of specific rotation of an optically active compound: Determination of λ_{max} and verification of Beer Lambert Law: Determination of calorific value of fuel: Identification of functional groups (alcohol, aldelyde, ketones, carboxylic acid and amide) by IR: Chromatographic analysis: Determination of molar refraction of organic compounds.

Suggested Readings:

1. Jain PL and Jain M. 1994. Engineering Chemistry. Danpat Rai publishing company Pvt. Ltd., Delhi.
2. Bahl BS, Arun Bahl and Tuli BD. 2007. Essentials of Physical Chemistry. S. Chand and Co. Ltd., Delhi.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Principles of Soil Science
Paper Code: AE112
w.e.f. Session 2018-19

3(2+1)

Unit 1:
Nature and origin of soil; soil forming rocks and minerals, their classification and composition, soil forming processes, classification of soils – soil taxonomy orders; important soil physical properties; and their importance; soil particle distribution

Unit 2:
soil inorganic colloids – their composition, properties and origin of charge; ion exchange in soil and nutrient availability; soil organic matter – its composition and decomposition, effect on soil fertility; soil reaction – acidic, saline and sodic soils; quality or irrigation water;

Unit 3:
essential plants nutrients – their functions and deficiency symptoms in plants; important inorganic fertilizers and their reactions in soils. Use of saline and sodic water for crop production

Unit 4:
Gypsum requirement for reclamation of sodic soils and neutralizing RSC; Liquid fertilizers and their solubility and compatibility.

Practical: Identification of rocks and minerals; Examination of soil profile in the field; Collection of Soil Sample; Determination of bulk density; particle density and porosity of soil; Determination of organic carbon of soil; Determination of Nitrogen, Determination of Phosphorus and Determination of Potassium; Identification of nutrient deficiency symptoms of crops in the field; Determination of gypsum requirement of sodic soils; Determination of water quality parameters.

Suggested Readings:

1. Brady Nyle C and Ray R Well. 2002. Nature and properties of soils. Pearson Education Inc., New Delhi.
2. Indian Society of Soil Science. 1998. Fundamentals of Soil Science. IARI, New Delhi.
3. Sehgal J.A. Textbook of Pedology Concepts and Applications. Kalyani Publishers, New Delhi.
4. Hillel D. 1982. Introduction to Soil Physics. Academic Press, London.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Surveying and Levelling
Paper Code: AE101
w.e.f. Session 2018-19

3(1+2)

Unit 1:
Surveying: Introduction, classification and basic principles, Linear measurements. Chain surveying. Cross staff survey, Compass survey. Planimeter, Errors in measurements, their elimination and correction.

Unit 2:
Plane table surveying. Levelling, Leveling difficulties and error in leveling, Contouring, Computation of area and volume. Theodolite traversing. Introduction to setting of curves. Total station, Electronic Theodolite. Introduction to GPS survey.

Practical: Chain survey of an area and preparation of map; Compass survey of an area and plotting of compass survey; Plane table surveying; Levelling. L section and X sections and its plotting; Contour survey of an area and preparation of contour map; Introduction of software in drawing contour; Theodolite surveying; Ranging by Theodolite, Height of object by using Theodolite; Setting out curves by Theodolite; Minor instruments. Use of total station.

Suggested Readings:

1. Punmia, B C 1987. Surveying (Vol.I). Laxmi Publications, New Delhi.
2. Arora K R 1990. Surveying (Vol.I), Standard Book House, Delhi.
3. Kanetkar T P 1993. Surveying and Levelling. Pune Vidyarthi Griha, Prakashan, Pune.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Engineering Mechanics
Paper Code: AE111
w.e.f. Session 2018-19

3(2+1)

Unit 1:
Basic concepts of Engineering Mechanics. Force systems, Centroid, Moment of inertia, Free body diagram and equilibrium of forces. Frictional forces Analysis of simple framed structures using methods of joints, methods of sections and graphical method.

Unit 2:
Simple stresses. Shear force and bending moment diagrams. Stresses in beams. Torsion. Analysis of plane and complex stresses.

Practical: Problems on composition and resolution of forces, moments of a force, couples, transmission of a couple, resolution of a force into a force & a couple; Problems relating to resultant of; Co-planer force system, collinear force system, concurrent force system, co-planer concurrent force system, co-planer non-concurrent force system, Non-co-planer concurrent force system, Non-co-planer non-concurrent force system, system of couples in space; Problems relating to centroids of composite areas; Problems on moment of inertia, polar moment of inertia, radius of gyration, polar radius of gyration of composite areas; Equilibrium of concurrent - co-planer and non concurrent – co-planer force systems; Problems involving frictional forces; Analysis of simple trusses by method of joints and method of sections; Analysis of simple trusses by graphical method; Problems relating to simple stresses and strains; Problems on shear force and bending moment diagrams; Problems relating to stresses in beams; Problems on torsion of shafts; Analysis of plane and complex stresses.

Suggested Readings:

1. Sundarajan V 2002. Engineering Mechanics and Dynamics. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. Timoshenko S and Young D H 2003. Engineering Mechanics. McGraw Hill Book Co., New Delhi.
3. Prasad I B 2004. Applied Mechanics. Khanna Publishers, New Delhi.
4. Prasad I B 2004. Applied Mechanics and Strength of Materials. Khanna Publishers, New Delhi. Bansal R K 2005. A Text Book of Engineering Mechanics. Laxmi Publishers, New Delhi.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Engineering Drawing
Paper Code: AE113
w.e.f. Session 2018-19

2(0+2)

Practical: Introduction of drawing scales; First and third angle methods of projection. Principles of orthographic projections; References planes; Points and lines in space and traces of lines and planes; Auxiliary planes and true shapes of oblique plain surface; True length and inclination of lines; Projections of solids (Change of position method, alteration of ground lines); Section of solids and Interpenetration of solid surfaces; Development of surfaces of geometrical solids; Isometric projection of geometrical solids. Preparation of working drawing from models and isometric views. Drawing of missing views. Different methods of dimensioning. Concept of sectioning. Revolved and oblique sections. Sectional drawing of simple machine parts. Types of rivet heads and riveted joints. Processes for producing leak proof joints. Symbols for different types of welded joints. Nomenclature, thread profiles, multi start threads, left and right hand threads. Square headed and hexagonal nuts and bolts. Conventional representation of threads. Different types of lock nuts, studs, machine screws, cap screws and wood screws. Foundation bolts. Forms of screw threads, representation of threads, Bolts- headed centre, stud screws, set screws, butt, hexagonal and square; keys-types, taper, rank taper, hollow saddle etc.

Suggested Readings:

1. Bhat N D. 2010. Elementary Engineering Drawing. Charotar Publishing House Pvt. Ltd., Anand.
2. Bhatt N D and Panchal V M. 2013. Machine Drawing. Charotar Publishing House Pvt. Ltd., Anand.
3. Narayana K L and Kannaiah P. 2010. Machine Drawing. Scitech Publications (India) Pvt. Ltd., Chennai.

B. Tech. Agricultural Engineering
SEMESTER-I
Syllabus: Heat and Mass Transfer
Paper Code: ME111
w.e.f. Session 2018-19

2(2+0)

Unit 1:
Concept, 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. Electrical analogy. Insulation materials. Fins, Free and forced convection.

Unit 2:
Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection. Useful non dimensional numbers. 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. 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. Heat transfer analysis involving conduction, convection and radiation by networks.

Unit 4:
Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units. 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.

Suggested Readings:

1. Geankoplis C.J. 1978. Transport Port Processes and Unit Operations. Allyn and Bacon Inc., Newton, Massachusetts.
2. Holman J.P. 1989. Heat Transfer. McGraw Hill Book Co., New Delhi.
3. Incropera F.P. and De Witt D.P. 1980. Fundamentals of Heat and Mass Transfer. John Wiley and Sons, New York.
4. Gupta C.P. and Prakash R. 1994. Engineering Heat Transfer. Nem Chand and Bros., Roorkee.