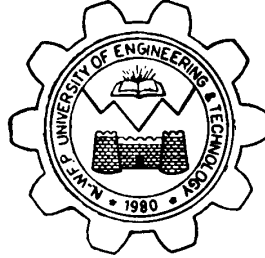


Curriculum of
Agricultural Engineering
(REVISED 2014)

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – I

Course: AE-104L: Fundamentals of Computer and Applications

Credit Hours: 01

Contact Hours: 03

Fundamentals of Computer:

Introduction to Computer, Computer System Hardware, Computer Memory, Input and Output Devices, Interaction of User and Computer, Operating System

Computer Applications:

Introduction to MS-Office (MS Word, MS Excel, MS PowerPoint)

Books:

1. Garry, B. S. and Vermaat, M. E. (2011). Discovering Computers, Complete: Your Interactive Guide to the Digital World. 1st Edition, Course Technology
2. Peter N. (2005). Introduction to Computers. 6th Edition. McGraw-Hill/Irwin, New York
3. Anita, G. (2010). Computer Fundamentals. Pearson Education India
4. Gini, C., Marquis, A. and Browning, K. (2001). Mastering Microsoft Office XP. Premium Edition, SYBEX Inc. Paris

Course: BSI-111: Linear Algebra

Contact Hours: 03

Credit Hours: 03

Vector Algebra

Introduction to scalars and vectors, Vectors in the plane, Scalar and Vectors Products, Line in R^2 , R^3 and planes, Spheres, Orthogonal Projections, Perpendicular distance from a point to a line and a plane, vector spaces, Subspaces, Linear combinations, linearly dependent and interdependent set of vectors, Spanning of a vector spaces, Bases of a vector spaces and its application in engineering and a business.

Matrix Algebra

Introduction to matrices, Matrix operations, matrix operations, Inverse Matrix, Rank of a matrix, Echelon form of a Matrix and its applications in our daily life situation problems, i.e., in line-communication as Air lines, Telephone-lines, Connecting cities by roads.

Determinants

Determinants and its properties, Inverse of a Matrix, Rank of a Matrix, Linearly dependent and independent by determinants.

Linear System of equations

Independent, Dependent and inconsistent system of equations and its graphical representation, trivial and non-trivial solution of homogeneous system of linear equations and its application as linear models in business, economics, Science, Electric Circuits and other branches of engineering. Solution of linear system of equations by determinants and its application as Leontief input-output matrix of the economy, coding and decoding theory.

Linear Transformation

Reflection operators, Projection operators, Rotation operators, Shear in X and Y directions, Dilation and contraction.

Eigen Values and Eigen Vectors

Eigen values and Eigen vectors and its applications as deformations, Markov processes as Mass Transit Problems, Forecasting of weather and to develop the solution of the system of differential equations for Mechanical systems/Electrical systems and Agricultural/Civil Engineering especially in Public Health Engineering Problems.

Books:

1. Linear Algebra and its Applications 2nd edition by David C. Lay, Addison-Wesley Publication, Jan. 1998.

Course: ME-105: Engineering Drawing & Graphics

Contact Hours: 02

Credit Hours: 02

Introduction to Engineering Drawing, Various types of lines, Basic geometrical constructions, Conic sections, Theory of Orthographic Projection, Dimensioning and Lettering, Introduction to Tolerance, Projections of Points, Projections of Straight lines, Projections of Planes and Solids in simple position, Sectioning of Solids, Isometric projections, Development of Surfaces.

Books:

1. Elementary Engineering drawing by N.D. Bhatt
2. Engineering Drawing and Graphic Technology 14th Edition by T.E. French, C.J. Vierk and R.J. Foster.

Course: ME-105L: Engineering Drawing & Graphics (Lab)

Credit Hours: 01

Contact Hours: 01

Introduction to Drawing instruments and their use, Various scales, Practice of Orthographic Projection, Missing lines in orthographic projection, Drawing three views of different objects, Practice of Dimensioning and Lettering, Practice of Sectioning, Conversion of orthographic projection into isometric view, Creating drawings of Engineering Fasteners like Rivets, Cotters Joints, threads etc.

Books:

1. Engineering Drawing and Graphics Technology 14th edition by T.E. French, C.J. Vierk and R.J. Foster.
2. First Year Engineering Drawing by A.C. Parkinson

Course: ME-106L: Engineering Workshops

Credit Hours: 01

Contact Hours: 03

Part – I

Basic Processes in Fitter Shop

Fitting, Sawing, Drilling, Dies and tapping, Reaming, Marking.

Basic Processes in Wood Shop

Timber, Its defects and Preservation methods, Different types of wood joints, Brief Introduction to Wood Sawing, Planning, Turning, Mortising processes. Pattern Making, Pattern Types and Allowances.

Basics of Electric Shop

Types and uses of cables, Electric Accessories for House Wiring and testing methods, Types of Wiring Systems, Circuit, Wires specifications.

Function of Forge and Foundry Shop

Brief Introduction, Tools and Accessories, Furnace types, Heat Treatment furnaces. Moulding sands, Mould Making, Casting, Forging Process and Operation.

Machine Shop

Introduction to Machine tools, Basic Lathe operations including Turning, Facing, Screw Cutting, Lathe Parts and Accessories.

Welding

Introduction to Soldering, Brazing and Welding, Brief Details of Gas, and Electric arc Welding, Spot Welding.

Part – II

Students will be assigned Practical jobs in Machine Shop, Electric Shop, Fitting Shop, Carpentry Shop and Smith Shop, Welding and Foundry Shop.

Books:

1. Chapman, W. A. J. (2001). Workshop Technology Part 1. Fifth Edition, CBS Publishers and Distributors, New Delhi, India.
2. Chapman, W.A J. (2007). Workshop Technology Part 2. Fourth Edition, CBS Publishers and Distributors, New Delhi, India.
3. Chapman, W.A J. (1995). Workshop Technology Part 3. Third Edition, CBS Publishers and Distributors, New Delhi, India.

- Herbert P. Richter, Frederic P. Hartwell (2014). Practical Electrical Wiring: Residential, Farm, Commercial & Industrial. 22nd Edition, Park Publishing, Inc.

Course No: BSI-101: Islamic Studies

Credit Hours: 02

Contact Hours: 02

Chapter 1: Subjective study of Holy Quran and Hadith

- 1. Fundamental Doctrine of Islam:** (Taw heed; oneness of Allah), Prophet Hood, The day of Judgment
- 2. Ibadaat (Worship):** Salat or Namaz, Zakat, Saum (Fasting), Hajj, Jihad
- 3. Amar nil Maroof Wa Nahi Anil Munkar (Command and Prohibition):** Importance of Preaching, How to Preach
- 4. Unity of Ummah**
- 5. Kasb-i-Halal (Lawful Earning)**
- 6. Fundamental Human Rights:** Right to life, Right to property, Right to protect one's Honor, Right to faith, Right to equality, Right to Economic Security, Right to Merit, Right to Justice,
- 7. Right of Women**
- 8. Relation with Non Muslims**
- 9. Khutba Hujjatul Wida. (Farewell Address)**

Chapter 2:

- 1. The Life of the Holy Prophet (P.B.U.H):** Birth of the Holy Prophet (P.B.U.H), Life before Prophethood, Prophethood, Preaching and difficulties, The Hijrath (Migration to Madina), Brother hood and treaty of Al-Madina,
- 2. Chazwat-e-Nahavi (Holy Wars):** Ghazwah-e-Badr, Ghazwah-e-Uhad, Ghazwah-e-Ahzab, Sulah-e-Hudaihiyah, Conquest of Makkah-al-Mukaramah, Ghazwah-e-Hunain, Ghazwah-e-Tabook

Chapter 3: Islamic Civilization

- 1. Influence of Islamic Civilization on the Sub Continent:** Definition of civilization, Civilization of sub continent before Islam, Fundamentals and Elements of Islamic civilization, Influence on sub-continent civilization (Social changes, Moral influence, Political consequences, Effect on family life)

2. International Influence of Islamic civilization: Islamic and Scientific knowledge, Influence of Human Thought, Social and Humanistic Effects

Course: AE-105: Basic Agriculture

Credit Hours: 03

Contact Hours: 03

Introduction

Introduction to the Engineering Profession and its Fields of Specialization with particular emphasis on Agricultural Engineering.

Crop Production

Major crops of Pakistan, Factors affecting crop production and distribution. Requirements for agricultural development. Classification of field crops based on agronomic use, special purpose and other basis.

Seed Technology

Role of seed in crop production. Concept of seed technology. Seed Structure and growth, Dormancy, Seed Production and its quality, Seed Processing and Seed Storage.

Farming Systems and Tillage Practices

Crop rotation. Definition and computation of cropping intensity. Farming systems and its kinds. Objectives of tillage. Effect of tillage on soil conditions, plant diseases and insects.

Dry Land Farming

Introduction, Importance, Rainfall pattern, Barani cultivation practices, Barani Agro-ecological zones, Problems and constraints of dry land, Dry land improvement, Dry land management, Barani cropping system

Land Resources and Management

Soil zones and Soil resources of Pakistan. Sustainability of land resources. Managing soil resources

Agro-Meteorology

Introduction, Weather and climate, Climatic components, Classification of climates, Climatic factors and crop production

Agro-Ecology

Introduction, Agro-ecological Features of Pakistan, Agro-ecological zones, Agro-ecology of Khyber Pakhtunkhwa

Books:

1. Nazir, S. (1994). Crop Production. National Book Foundation Islamabad.
2. Martin, J. H., W. H. Leonard and D. L. Stamp. (1990). Principles of Field Crop Production, 3rd edition. Macmillan Co. Inc New York.

Course: BSI-162: Engineering Mechanics

Credit Hours: 03

Contact Hours: 03

Concept of measurement of mass, force, time and space, Systems of units, Fundamentals and Derived units, Conversion of units, required Accuracy of results, General Principles of Static's, Vector addition, Subtraction and Products, Resultant of Distributed (Linear & Non-linear) force Systems, General conditions of equilibrium of Co-planer forces, Laws of Triangle, Parallelogram and Polygon of forces, Types of beams, Supports and Loads, Simple cases of Axial forces, Shear forces and Bending Moment diagrams, Problem involving friction on Flat surfaces, Geometrical Properties of Plane Areas, Work, Energy, Power, Impulse, Momentum, Conservation of Momentum and Energy, Rectilinear and Curvilinear motions, Tangential and Normal Components of Acceleration, Simple Harmonic motion

Books:

1. Engineering Mechanics, 4th Edition by Irving H. Shames, Prentice Hall

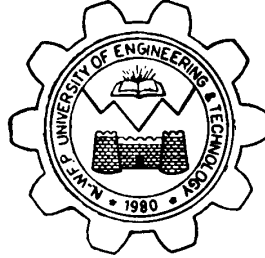
Course: BSI-162L: Engineering Mechanics (Lab)

Credit Hours: 01

Contact Hours: 03

1. Roof Truss
2. To find the various forces in various parts of wall crane
3. To Verify the Link Polygon on various forces
4. To find coefficient of friction between various materials on inclined plane
5. To verify the Principle of moment in the Disc Apparatus
6. Helical block
7. To draw a Load Efficiency curve for a Screw Jack

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – II

Course: BSI-110: Pakistan Studies

Credit Hours: 02

Contact Hours: 02

(1) Ideological Background of Freedom Movement:

Aims & Objectives of the Creation of Pakistan

- a) Reformist Movements:
- b) Sheikh Ahmad Serhindi
- c) Shah Walli-u-llah
- d) Syed Ahmad Berlvi

(3) Educational Movements:

- a) Sir Syed Ahmad Khan's Alligarh Movement & Two nation theory
- b) Mdrassai Deoband
- c) Nadwatul Ulema
- d) Sindh Madrassatul Islam
- e) Anjuman-e-Hirayat-e- Islam

(4) Muslim Nationalism in the Sub content:

- a) Partition of Bengal
- b) Muslim League (1906)
- c) Iqbal' Allabad address (1930)
- d) Government of India Act 1935
- e) Congress Ministries (1937)

(5) Pakistan Movement:

Pakistan Resolution (1940)

(6) Constitutional Development in Pakistan

The history, Features, of all the Constitutions of Pakistan up to date

(7) Pakistan's Foreign policy:

Pakistan's relations with the major powers and the Muslim countries of the World

Books:

1. Pakistan Studies (by Prof. Javed Iqbal)
2. Struggle for Pakistan (by I.H. Quraishi)
3. Towards Pakistan (by Wahiduzzaman)
4. Pakistan Studies (by Ikram Rabbani)
5. Mutalia Pakistan (Abdul Qader)

Course: BSI-122: Calculus

Credit Hours: 03

Contact Hours: 03

Single Variable Calculus

Basic concepts of single variable function, continuous, discontinuous and piecewise continuous functions, periodic, odd and even functions, algebraic functions, transcendental functions and its graphical representations, applications of functions in our daily life situations.

Differential Calculus

Limits and continuity, interpretation of a derivative, geometric interpretation, total differential and its applications in our daily life situations, the use of a table of different type derivatives, higher order derivatives, tangents and normal, approximations of a function at a particular point by Taylor's and Maclaurin's series, maximum and minimum values of a function, the first derivative test, the second derivative test, point of inflexion and its applications in business and engineering.

Integral Calculus

Basic concepts of integration, a table of integral formulas, some rules of integration, definite integrals, the area bounded by a curve, integration by parts, integration as the limit of a sum, volume revolution, and its application in daily life situations.

Multivariate Calculus

Basic concepts of multivariate function, level curves and surfaces, limit and continuity, partial differentiation, vector functions and its differentiation and integration, the directional derivative, the gradient, scalar and vector fields, normal properties of the gradient, divergence, curl, tangents planes and normal lines, extreme of functions of two variables, second partial test, extreme value theorem, methods of constrained optimization and Lagrange multipliers.

Books:

1. Mathematics for Engineers Second Edition by Robert Davison, Addison Wesley
2. Multivariate Calculus, Second Edition by Robert T. Smith, Roland B. Minton, McGraw-Hill Higher Education editions.

Course: BSI-142: English Composition and Comprehension

Credit Hours: 03

Contact Hours: 03

English Composition

- Vocabulary Building skills
- Words & expressions commonly misused.
- Articles; their use, Prepositions; Prepositional phrases.
- Punctuations
- Common Grammatical mistakes
- Elementary Principles of Composition
- Relative Pronouns & Clauses
- Conditional Sentences & types
- Adverbs & Adjectives; their forms & use

English Comprehension

- **Getting the essential information**
Finding the main idea
Defining vocabulary in context
Practice
- **Order of importance**
Using order in the writing to determine what is most important to the author
Similarities & Differences; using comparisons to determine the author's attitude
Sentence structure, degree of detail, description & tone.
Practice
- **Critical reading & thinking**
Evaluating evidence and author credibility, rejecting faulty reasoning Reading across the curriculum; asking the right questions to get the most out of reading in the natural sciences, social sciences & Humanities
- **Drawing Conclusions; putting it all together**

Books:

1. Practical English Grammar by A. J. Thomson and A. V. Martinet. Exercises 1. Third Edition. Oxford University Press. 1997. ISBN 0194313492
2. Practical English Grammar by A. J. Thomson and A. V. Martinet. Exercises 2. Third Edition. Oxford University Press. 1997. ISBN 0194313506

Course: AE-102: Engineering Materials

Credit Hours: 02

Credit Hours: 02

Stones

Classification and characteristics of good building stones. Tests of stones. Quarrying and dressing of stones. Artificial stones and its varieties, preservation of stone work.

Tiles and Bricks

Different kinds of tiles. Manufacture and uses of tiles. Coloring and glazing of tiles. Fire tiles and bricks. Qualities of good bricks. Refractory bricks and ceramics.

Lime and Cement

Classification of lime. Properties and applications of lime. Types of cement. Manufacturing process of cement. Determination of initial and final setting time. Normal consistency.

Concrete and Mortars

Aggregates for concrete and mortars. Types of concrete. Water cement ratio. Workability of concrete. Compaction and curing of concrete. Types and uses of mortars. Tests for mortars.

Timber

Classification of trees, growth of timber trees. Methods of seasoning and sawing. Decay and preservation of timber, Laminated materials.

Metals

Composition and properties of ferrous and non-ferrous metals. Effect of various heat treatments on the properties of steel and its alloys. Methods of corrosion control.

Paints, Plasters and Varnishes

Composition, preparation, properties, tests and uses of paints, plasters, varnishes and distemper.

Miscellaneous Materials

Composition, varieties, properties and uses of glass, plastics, Laminates and adhesive. Properties and uses of asphalt, rubber and asbestos.

Books:

1. Hussain, S. Z. (1985). Materials of Construction, Syed Oxford University Press Karachi.

Course: AE-102L: Engineering Materials (Lab)

Credit Hours: 01

Contact Hours: 03

1. Gradation of coarse aggregates
2. Gradation of fine aggregates
3. Fineness of cement
4. Setting time
 - i. Normal consistency
 - ii. Initial setting time
 - iii. Final setting time
5. Tensile strength of Briquette
6. Compressive strength of mortar cube
7. Soundness test of cement
8. Density of cement and Slump test

Course: AE-101: Soil Science

Credit Hours: 02

Contact Hours: 02

The Soil in Perspective

What is soil? Edaphology and Pedology, A field view of soil, Soil profile, Subsoil and Surface soil, Mineral vs. Organic soils. Four major Components of Soils, Mineral constituents in soils, Soil organic matter, Soil water, Soil air, clay and humus.

Important Physical Properties of Mineral Soils

Soil texture and Soil Structure, Classification of soil particles, Physical nature of soil separates, Soil texture classes. Mechanical analysis, Preparation of the Sample, Factors affecting dispersion, Methods for obtaining dispersion, Fractionation of the sample, Sieve method. Stokes' Law. Sedimentation methods, Determination of soil class, Particle and Bulk Density, Pore Space, Structure of mineral soils, Aggregation and its promotion, Structural management of soil, Soil Consistence.

Soil Colloids

General constitution of Silicate clays, Adsorbed cations, Silicate clay structure, Classification of Silicate clays, Chemical Composition of silicate clays, Cation exchange capacity of soils, Plasticity, Cohesion, Swelling, Shrinkage, Dispersion and Flocculation.

Soil Water

Structure and related properties of water, Soil water energy concept, Soil Moisture content versus Suction, Measuring Soil moisture, Capillary Fundamentals, Types of soil water movement, Saturated flow through soils, unsaturated flow in soils, Retention of soil moisture in the field, Conventional soil moisture classification, Factors affecting amount and use of available soil moisture, Capillarity and root extension.

Soil Air and Soil Temperature

Soil aeration definition, soil aeration problems in the field, Composition of soil air., Factors affecting the composition of soil air, Fick's Law, Aeration in relation to soil and crop management. Soil temperature, Specific Heat of soils, Volumetric Heat Capacity, Thermal diffusivity, and Conductivity, Fourier's Law, Movement of Heat in soil, Soil temperature control.

Plant Nutrients and Fertilizers

Factors controlling the growth of higher plants, The essential elements from air, water and soil, Soil solution, Soil and plant interrelations, fertilizer elements, Nitrogen Fertilizers, Phosphates Fertilizers, Potassium Fertilizers, Mixed Fertilizers, Methods of applying solid fertilizers, Application of liquid Fertilizers.

Saline and Sodic Soils

Climate and salinity, Some basic terms, Saline, Saline alkali and Sodic Soils, Diagnosis of Saline and Sodic Soils, Reclamation Steps of Salt-affected soils, Leaching Requirements, Crop tolerance to Salinity.

Books:

1. Brady, N.C. (1992). The Nature and Properties of Soils (8th Edition). Macmillan Co. Ltd. USA.
2. Rashid, A. and K. S. Memon. (1996). Soil Science. National Book Foundation, Islamabad.

Course No: AE-101L: Soil Science (Lab)

Credit Hours: 01

Contact Hours: 03

1. To determine Type of Soil
2. To determine the pH value of soil sample
3. To determine the Particle Density of given soil sample
4. To determine the Bulk Density of an undisturbed soil sample
5. To determine the Soil Moisture by Soil Tensiometer
6. To determine the Moisture Content by Gravimetric Method
7. To analyze the Soil Sample by Sieve Analysis
8. To determine the Density of Soil Suspension in grams per liter by using Hydrometer
9. To determine NPK of a given soil sample

Course: AE-106: Mechanics of Materials

Credit Hours: 02

Contact Hours: 02

Simple Stresses and Strains

Introduction, types of stresses and strains, elastic limit, modulus of elasticity, yield point, factor of safety, stresses in composite bars and rivet joints, stresses due to change of temperature. Elastic constant: Young's modulus, shear modulus, bulk modulus, Poisson's ratio and relation between elastic constants. Mechanical properties of materials.

Compound Stresses and Strains

Methods for the determination of stresses on oblique sections, use of Mohr's circle to stress problems, and failure theories; moment of inertia; bending stresses in beams, theory of simple bending, bending moments and shear forces in beams, derivation of flexure formula and section modulus. Deflection of beams; area moment method and Castigliano's theorem.

Torsion

Torsion theory for shafts of circular section, power transmitted by shaft, torsion combined with bending. Open and closely coiled helical springs subjected to axial loading. Stresses in thin cylinders and spherical shells

Books:

1. Muvdi, B.B. and W. McNabb. (1984). Engineering Mechanics of Materials. McMillan Publishing Co., New York.
2. Shigley, J.E. and C. R. Mischke, (2000). Mechanical Engineering Design. Fifth Edition. McGraw Hill Publications Inc. USA.

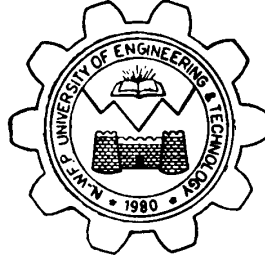
Course: AE-106L: Mechanics of Materials (Lab)

Credit Hours: 01

Contact Hours: 03

1. Investigation of Hook's law that is the proportional relation between force and stretching and in elastic deformation.
2. Determination of torsion and deflection
3. Measurement of forces on supports Statically determinant beams
4. Determination of shear forces in beams
5. Determination of bending moments in beams
6. Measurement of deflection in statically determinant beams
7. Measurement of strains in a bar
8. Bend test steel bar
9. Yield/Tensile strength of steel bar

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – III

Course: BSI-231: Differential Equations

Credit Hours: 03

Contact Hours: 03

Ordinary Differential Equations

Basic concepts of ordinary differential equation, General and particular solution, Initial and boundary condition, Linear and nonlinear differential equations, Solution of first order differential equation by separable variables and its application in our daily life situations, Techniques like change in variables homogeneous, non-homogeneous, exact, non-exact, linear and non-linear Bernoulli could be used in case of complications. Solution of second order differential equations by theory of operators and its application as forced and free oscillations, the extension of second order solution criteria to high order differential equations, solution of the system of differential equations by theory of operators and its application in daily life situations.

Partial Differential Equations

Basic Concepts, linear and non-linear P.D equations, Quasi linear and Quasi non-linear P.D equations, homogenous and non-homogenous P.D equations, solutions of P.D equations, boundary and initial conditions as dirichlet conditions, Neumann' s condition, Robin's/mixed condition, classification of P.D equations as Elliptic conditions, Parabolic and hyperbolic.

Analytic Solution by separation of Variables of the Steady State, two dimensional heat equation/Laplace equation and un-steady one dimensional heat equation/Diffusion equation with homogenous and non-homogenous boundary conditions. D'Alembert's solution of two dimensional wave equation homogenous and non-homogenous boundary conditions.

Fourier Series

Periodic waveforms and their Fourier representations, calculating a Fourier series, Fourier series of odd and even functions, Half range Fourier series, Fourier series solution for the above P.D equations.

Books:

1. Modern Differential Equations, 2nd Edition by Abell and Braselton, Books/Cole.
2. Advanced Engineering Mathematics, 6th Edition by Louis C. Barret, Mc Graw Hill International Editions.

Course: CE-205: Surveying-I

Credit Hours: 03

Credit Hours: 03

Introduction

Surveying instruments; Chains, Tapes, Steel Bands, their Types and Uses

Chain Surveying

Ranging and chaining of survey Lines. Fieldwork and plotting of chain survey.

Compass Surveying

Prismatic Compass and Surveyor Compass, Uses, Bearing, Local Attraction, Fieldwork and Plotting

Plane Table Surveying

Parts and Accessories, Methods of Surveying, Two Point and Three Point Problems

Leveling

General Principle, Types of Levels and their temporary and Permanent Adjustments, Methods of Leveling, Reduction of Level, Precise Leveling and Trigonometric Leveling

Theodolite

Types and uses of Theodolites, Temporary and Permanent Adjustments, Measurement of Horizontal and Vertical angles

Tachometrical Surveying

Methods of Tachometric Surveying. Fieldwork and computations.

Traversing

Traversing with Prismatic Compass, Theodolite and Plane Table, Computations and Adjustments of Traverse, Transformation of Co-ordinates

Omitted Measurements

Calculation of Areas and Volumes

Earth work calculation, D.M.D method, Simpson rule and Trapezoidal rule

BOOKS:

1. Kavanash, B. Surveying Principles and Application, Prentice Hall
2. Irvine, W. Surveying for Construction, Mc Graw Hill
3. Davis, R.E. Surveying Theory and Practice, Mc Graw Hill

Course: CE-205L: Surveying-I (Lab)

Credit Hours: 01

Contact Hours: 03

1. Practice on measurement of distances and introduction to measuring instruments
2. Chain Surveying and plotting
3. Compass Traversing
4. Plane Table by methods of radiations and intersections
5. Two Points Problem
6. Three Points Problem
7. Level adjustments by Two-Peg method
8. Profile and Cross-Sectioning
9. Theodolite Traversing

Course: AE-204: Fluid Mechanics

Credit Hours: 03

Contact Hours: 03

Introduction

Distinction between a solid and a fluid, gas and fluid, density, specific weight, specific volume, specific gravity, surface tension and compressibility, capillarity, viscosity, units and dimensions.

Fluid Statics

Pressure, Pressure-height relationship, Absolute and Gauge Pressure, Measurement of Pressure, Barometer, Bourden gauge, Piezometer, Manometers, Forces on Submerged Plane and Curved Surfaces.

Equilibrium Of Floating Bodies

Buoyancy and Stability of Submerged and floating bodies, Metacentric height.

Fluid Kinematics

Basic concepts about steady and unsteady flow, Laminar and Turbulent flow, Uniform flow and non-uniform flow, Path lines, Stream lines and Stream tubes

Basic Terms and definitions of Open Channel and Pipe Hydraulics

Equation of continuity, Energy and Momentum s, Uniform and non uniform flow, Specific energy, Laminar and turbulent , Hydraulic and energy gradients. Losses in pipe lines.

Flow Measurements

Venturimeter, Orifices, Mouthpieces and Nozzles, Pitot tube, Weirs, Notches and Flumes.

Books:

1. Fluid Mechanics by Daughtery and Franzini; 10th Edition, McGraw Hill Book Co. New York.
2. Fluid Mechanics for Engineers by Ablation, Barton and Simons.

Course: AE-204L: Fluid Mechanics (Lab)

Credit Hours: 01

Contact Hours: 03

1. Demonstration of various parts of Hydraulic Bench
2. Experimental study of laminar and turbulent Flow
3. Experimental study of tube gauges and Dead weight pressure gauges
4. Calibration of Orifices by Various Methods
5. Calibration of Venturimeter
6. Calibration of Rectangular and Triangular Notch
7. Verification of Bernoulli's theorem
8. Determination of Metacentric Height

Course: AE-203: Soil and Water Conservation Engineering

Credit Hours: 03

Contact Hours: 03

Water Erosion

Erosion agents. Geologic and accelerated erosion. Damages caused by soil erosion. Water erosion and its types. Factors affecting water erosion. Sedimentation and pollution in relation to water erosion. Water erosion prediction equation. Erosion control practices.

Wind Erosion

Factors affecting wind erosion. Types of soil movement. Mechanics of wind erosion. Wind erosion control principles. Wind erosion prediction equation.

Rainfall and Runoff

Rainfall intensity and duration. Infiltration, Factors affecting runoff. Damages caused by floods. Water harvesting.

Cropping System and Agronomic Measures for Erosion Control

Watershed management, Plant cover, Crop rotation, Strip-cropping, Conservation tillage, Contour cultivation, Land capability classification.

Terracing

Field terrace. Classification of terraces. Broad base terraces. Bench terraces. Terrace design. Planning the terrace system. Terrace construction and maintenance.

Vegetated Outlets

Use of vegetated outlets and water courses in the control of erosion. Design of vegetated outlets. Water-way construction and maintenance.

Conservation Structures

Drops Spillways, Chutes and Pipes Spillways; their requirements, components and limitations

Water Conservation

Definition of drought, Effects of drought. Water stored in soil. Decreasing runoff. Reducing evaporation. Reducing deep percolation. Preventing losses from storage.

Books:

1. Schwab G. O., D. D. Fangmeier, W. J. Elliot and R. K. Frevert (1992). Soil and Water Conservation Engineering, 4th Edition. John Wiley and Sons, N.Y.

2. Frederick R. T, J. A. Hobbs, R. L. Donahue (2004). Soil and Water Conservation for Productivity and Environmental Protection. 4th Edition, Pearson Education, Inc., Prentice Hall, New Jersey (USA).

Course: AE-203L: Soil and Water Conservation Engineering (Lab)

Credit Hours: 01

Contact Hours: 03

1. Measurements of soil loss from splash erosion by rainfall simulator.
2. Measurements of soil loss using universal soil loss equation.
3. Demonstration of moisture conservation techniques.
4. Practical demonstration of the Soil and Water Conservation Practices and Techniques
5. Visits to NARC, Islamabad and Fateh Jhang (Attock).

Course: AE-209L: Computer Aided Design

Credit Hours: 01

Contact Hours: 03

Introduction to Computer Aided Design and drawing construction. Introduction to graphics commands: point, line, arc, circle, fillet etc. editing a drawing: erase, break, cancel, move, copy, Savings and printing a drawing. Dimensioning commands. Object snaps. Layers, Isometric drawing. Application of CAD in the preparation and detailing of assembly drawings.

Books:

1. Introduction Engineering Drawing, by A.C. Parkinson. Pintman & Sons
2. Engineering Drawing and Graphics Technology, By T.E. French, C.J. Vierck and R.T. Foster. McGraw-Hill Illustrated AutoCAD, BPP Publications, India
3. Frey, D. (1999). AutoCAD 2000, 1st edition. BPB Publications, New Delhi.

Course: AE-201L: Computer Programming

Credit Hours: 01

Contact Hours: 03

Objective: Learn programming in C++ for solving engineering problems

Contents:

Introduction: Problem Solving, Algorithms, Flowchart, Programming Languages, Types of codes and language processors, Programming Techniques

Introduction to C++: Features, Structure of C++, Program running process, Debugging and Errors

Programming in C++: Data types, Variables, Integer under and overflow, Range and Precision Constants, Expressions, Operators, Type casting, Comments

Input and Output: Standard output, Escape sequences, Manipulators, Standard input

Conditional and Looping structures in C++: Control structures, Relational operators, if statement, switch structure, conditional operator, goto statement, While and do while loop, for loop, nested loops

Arrays and Structures: Arrays, Searching in arrays, Array Sorting, Multidimensional Arrays, Structures, Array of structures, Nested structures, Unions

Functions: User defined functions, Passing parameters to functions, Local, Global and Static Variables, Register variables, Functions and Arrays, Functions and structures, Inline and command line parameters, Function Overloading,

Built-in functions: Pointers, Operations on pointers, Pointers and Arrays, Pointers and Strings, Pointers and Structures, Memory management with structures

Object Oriented Programming: Classes, Creating Objects, Constructors, Destructors, Objects as function parameters, Static data member, Friend Functions, Friend Classes, Static functions

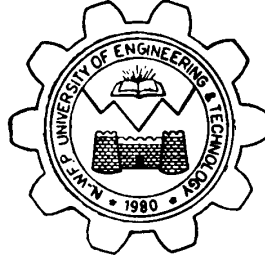
Practical:

- Programming of relevant engineering problems in C++.

Books Recommended:

1. Perry, G. and M.Johnsons. 1992. Turbo C++ by Examples. Prentice Hall Computer Publishing, New York.
2. Robert Lafore, "Object-Oriented Programming in C++", Fourth Edition, 2002, Prentice Hall, ISBN: 0672323087, ISBN-13: 9780672323089
3. Tasleem Mustafa, Tariq Mahmood, Imran Saeed, Ahsan Raza Sattar, "Object Oriented Programming Using C++" Second Edition, IT Series Publications.

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – IV

Course: BSI-120: Professional Ethics

Credit Hours: 02

Contact Hours: 02

Introduction to Ethics and Professional Ethics:

1. Engineering Ethics:

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas. Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Professions and Professionalism – Professional ideals and virtues – Theories about right action – Self-interest – Customs and religion – Use of Ethical Theories

2. Engineering as Social:

Engineering as experimentation – Engineers as responsible experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study.

3. Engineer’s Responsibility for Safety:

Safety and risk – Assessment of safety and risk – Risk Benefit Analysis – Reducing risk – The Three Mile Island and Chernobyl Case Studies

4. Responsibilities and Rights:

Collegiality and loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Discrimination.

5. Global Issues:

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample code of conduct.

Codes of Ethics in Pakistan Engineering Council

Books:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York, 1996
2. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 1999
3. Laura Schlesinger, How Could You Do That: The Abdication of Character, Courage, and Conscience, Harper Collins, New York, 1996.
4. Stephen Carter, Integrity, Basic Books, New York 1996.
5. Tom Rusk, The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life, Viking, New York, 1993

Course: BSI-242: Numerical Analysis

Credit Hours: 03

Contact Hours: 03

Interpolation and Extrapolation:

Finite difference, Forward, backward and central difference and its operators form, Interpolation and extrapolation; Linear and higher order interpolating polynomials, Newton's Gregory forward & backward difference interpolation formulas and its utilization as extrapolation, Lagrange interpolation and extrapolation, Numerical differentiation based on differences,

Numerical integration:

Trapezoidal and Simpson' approximations, Trapezoidal and Simpson's extrapolations by Romberg integration process

Numerical Solution of non-linear equations:

Bracketing and iteration methods and its applications as multiple root methods,

Direct solution of the system of linear equations:

Gauss-elimination, Direct and indirect factorization, symmetric factorization, tridiagonal factorization, Iterative methods like Jacob's iteration and Gauss-Seidel iteration,

Numerical solution of initial value problems:

Single-Step methods like Euler's method, Euler's modified method, Runge-Kutta method and its comparison with Taylor's series expansion, Multi-steps methods like Adams Bashforth and Moulton two and three step methods, Higher order differential equations, system of differential equations,

Numerical solution of linear and nonlinear boundary value problems

Books:

1. Numerical Methods for Engineering Science and Mathematics, 2nd Edition by Prof. Mumtaz Khan, Dec.
2. Ordinary & Partial Differential Equations with Numerical Techniques for Engineering Science and Mathematics, 2nd Edition by Prof. Mumtaz Khan, April

Course: AE-202: Machine Design

Credit Hours: 03

Contact Hours: 03

Introduction

Meaning of Mechanical Engineering Design, Phases of design, Design considerations, Safety and product reliability, Codes and standards, evaluation and presentation

Design of Simple Machine Components:

Design of shafts, torsion of circular shafts, horsepower transmitted by the shafts, design of clutches, bearings, gears, flange couplings, pulleys and connecting rod

Design of Fasteners and Connections

Different types of fasteners. Thread standards and definitions, Mechanics of power screws. Bolts strength and selection of units, Bolt preload, torque requirement, Bolted, riveted and welded joints loaded in shear, Keys pins, and retainers

Elements of Rotary Power Transmission

Belts, Stresses in belts, Chain and sprocket drives, Gears drives, Flexible shafts, Bearings

Books:

1. Shigley, J.E. and C. R. Mischke, (2000). Mechanical Engineering Design. Fifth Edition. McGraw Hill Publications Inc. USA.
2. Parkinson, A.C. (1968). A First Year Engineering Drawing, sixth Ed., Sir Issac Pitman & Sons Ltd. London.
3. Spotts, M.F. (1978). Design of Machine Elements. Englewood Cliff Prentice Hall, London.

Course: CE-207: Surveying-II

Credit Hours: 03

Contact Hours: 03

Theodolite Traversing

Method of Running Traverses with Theodolite, Traverse Computations, Transformation of Coordinates. Omitted measurements

Setting out Works

Computations and Setting out Method for: Simple Circular Curves, Compound Curves, Reverse Curves, Transition Curves and Vertical Curves

Geodetic Surveying

(a). Triangulation: Classification of Triangulation Systems, Intervisibility of Stations. Base Line Measurements. Correction to Measured Length, Measurement of Horizontal Angle. Satellite Stations

(b). Precise Traversing: Methods of Running Traverses

Trigonometrical Leveling

Theory and object of Trigonometric Leveling, Computations

Contouring

Method of Contouring, Characteristics of Contour Lines, Interpolation, Plotting of Contour Maps

Hydrographical Surveying

Object of Hydrographical Surveying, Horizontal & Vertical Controls, Shore line Surveys, Sounding, Methods of Sounding.

Tunneling

Surface Alignment, Setting out from the Ends, Transferring Alignment Underground, Transferring levels Underground. Under-ground Bench Marks

Photogrammetry

Elements and Uses of Terrestrial Photogrammetry

Astronomy

Definition of various Astronomical Terms, Co-ordinate Systems, Local and Standard time, Methods of determining Azimuth, Longitude and Latitude by Solar observations

BOOKS:

1. Kavanash, B. Surveying Principles and Applications, Prentice Hall
2. Irvine, W. Surveying for Construction, McGraw Hill
3. Davis, R.E. Surveying Theory and Practice, McGraw Hill

Course: CE-207L: Surveying-II

Credit Hours: 01

Contact Hours: 03

1. Study and Use of advanced surveying equipment
2. Trigonometrical Leveling
3. Contouring
4. Simple Curve
5. Compound Curve
6. Transition Curve

Course: CE-209: Geo-Technical Engineering-I

Credit Hours: 03

Contact Hours: 03

Soil Formation

Soil and its Constituents, Weathering of Rocks and Types of Soils, Description and identification of soil (Visual-Manual Procedure), Mineralogy of Solids.

Physical Properties

Water Content, Void Ratio, Porosity, Degree of Saturation, Specific Gravity, Unit Weight and their determination, Atterberg limits, Sieve Analysis, Hydrometer and Pipette Analysis, Stoke's Law, Grain Size distribution

Classification of Soils

Grain Size Classification; Bureau of Soils, M.I.T. Unified, AASHTO and ASTM Classification systems. Textural Classification by Triangular Chart, Unified Soil Classification, AASHTO Soil Classifications.

Permeability and Seepage

Definition, Hydraulic Gradient, Darcy's Law, Factors affecting Permeability, Permeability of stratified soils, Laboratory and Field determination of coefficient of Permeability Seepage Force, Quick Sand Condition Flow nets, Boundary Conditions, Graphical Method of Flow net construction, Determination of Quantity of Seepage, Two Dimensional Flow, Laplace Equation, seepage through Earth Dams, Design of Filters

Compaction

Purpose and theory of Compaction, Moisture Content and Dry Density relationship, Standard Proctor Compaction Test, Modified Proctor compaction Test, Degree of Compaction and its determination in the Field. Methods of Compaction in the Field; Factors Affecting Compaction of Soils.

Vertical Stresses in Soils

Definition, Stresses caused by self weight of soil, Geostatic stresses, stresses caused by Point Loads and Uniformly distributed Loads: Boussinesq and Westergarrd theories, Pressure bulb, Stress distribution diagram on horizontal and vertical, Stress at a point outside loaded area, Newmark's charts and 2:1 Method

Soil Exploration

Importance of Soil Exploration, Soil Exploration methods, Probing, Test Trenches and Pits, Auger boring, wash boring, rotary boring, Percussion drilling and Geophysical methods, Sol Samples, Disturbed and Un-disturbed samples, In-situ Tests (SPT, CPT and PLT)

BOOKS:

1. An Introduction to Mechanics of Soils and Foundation by “John Atkinson”
2. Soil Mechanics by R.F Craig
3. Principles of Geotechnical Engineering by Braja M. Das

Course: CE-209L: Geo-Technical Engineering-I (Lab)

Credit Hours: 01

Contact Hours: 03

1. Identification of Soil (Visual and Manual)
2. Determination of Moisture Content of Soil
3. Determination of Specific Gravity of Soil
4. Determination of Liquid Limit of Soil
5. Grain Analysis of Soil (including both Mechanical and Hydrometer Analysis)
6. Determination of Plastic Limit and Plasticity Index of Soil
7. Determination of Shrinkage Limit of Soil
8. Classification of Soil according to AASHTO and USCS
9. Modified/Proctor Compaction Test
10. Constant Head Permeability Test (Granular Soil)
11. Falling Head Permeability (Granular and Fine Grained Soils)

Course: AE-208: Quantity Survey and Cost Estimation

Credit Hours: 02

Contact Hours: 02

Scope: Scope of engineering works; General practice in government departments for schedule of rates and specifications; Rate analysis; Specifications for various items of construction.

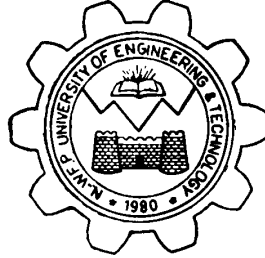
Bill of Quantities (B.O.Q) & Measurement Book (M.B): Types and methods of estimates, Working out quantities, rates and cost analysis of construction materials; Valuation, depreciation and sinking fund. Contents and preparation of bills of quantities for different projects like irrigation, roads, sanitary, building etc. and maintaining of Measurement Books. Measurement, specification and costing of excavation and back filling, mass concrete retaining walls, beams, concrete piles, steel or wooden truss or steel framed gantry, estate road, sewer and water main pipe works, Priced bill of quantity.

Tendering: Preparation of engineering contracts and tender documents. Introduction to claims and conflicts resolution e.g. escalation, indexation, arbitration and litigation. Evaluation of proposals and contracts.

BOOKS:

1. E.W. Steel and Terence J. Mc GHEE, Estimating & Costing.
2. S. Dutta, Estimating and Costing in Civil Engineering, 22nd PP ed. S. Dutta & Co. Lakhnow.
3. D.D.Kohli, Estimating, Costing and Accounts, 9th PP ed. S.Chand & Co. Pvt. Ltd.
4. Keith Collier, Fundamentals of Construction Estimating and Cost Accounting With Computer Application, Prentice Hall College Div; 2nd edition (March 1987)

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – V

Course: AE-302: Engineering Hydrology

Credit Hours: 02

Contact Hours: 02

Introduction

Hydrology, Scope of Hydrology, Hydraulics and Hydrology, Hydrologic cycle, Hydrologic equation.

Meteorology

Introduction, Atmosphere, meteorological observations and instruments

Precipitation

Factors affecting precipitation, Classification of precipitation, Measurement of Precipitation, Analysis of Precipitation data, Areal Precipitation, Seasonal variation, Major storm studies and Snow melt.

Runoff

Base flow and surface runoff, Factors affecting runoff. Estimation of runoff. Rational Method

Stream Gauging

Stage-Gauge, Selection of gauge site, Measurement of stage, Current meter, Method of discharge measurement, Common errors in discharge measurements, Stage discharge rating curves.

Hydrograph Analysis

Hydrograph, Time of concentration, Components of hydrographs, Separation of Hydrograph Components, Factors affecting Hydrograph shape, Unit Hydrograph, The S-Curve.

BOOKS:

1. Shaw, E. M. (1994). Hydrology in Practice. 3rd edition. Chapman & Hall, London.
2. Awan, N. M. (1981). Surface Water Hydrology, Vol. I & II: 1st Ed., National Book Foundation, Islamabad, Pakistan.

Course: CE-401: Environmental Engineering-I

Credit Hours: 03

Contact Hours: 03

Introduction to Environmental Engineering:

Water Quantity:

Population Forecast, Water Uses & Consumption, Types and Variation in Demand, Maximum demand & Fire Demand, Rural Water Supply, Appropriate Technology

Water Quality:

Water impurities and their health significance, Water Quality Standards (U.S & WHO etc), Water Quality Monitoring

Water Distribution:

Lay out & Design of Water Transmission works and Distribution networks, Service Reservoirs, Fixtures and their installation, Tapping of Water mains

Water Treatment:

Treatment of Surface and Ground Water, Screening, Sedimentation, Coagulation, Coagulants & dosages, Filtration, design Aspects of Slow Sand & Rapid Sand Filters, Filtration Rates, Operation Head Loss, Back wash and Filter Efficiency, Pressure Filters, Fluoridation, Hardness Removal, Iron & Manganese removal, Water Softening Methods, Water Disinfection & Chemicals, Use of Chlorine, Quantity, Dosage and Efficiency, Dosage & Efficiency Treatment Methods

Water Sampling & Testing:

Sampling Techniques & Examination of Water (Physical, Chemical & Microbiological Parameters), Diseases, Waterborne, Food borne, Milk borne and Vector borne Diseases

Pollutants:

Effects and Control of Environmental Pollution, Toxic/Hazardous Waste

Introduction to relevant Software Packages

BOOKS:

1. Mackenzie, L. Davis, David A. Cornwell, McGraw Hill, Introduction to Environmental Engineering, 3rd Edition 1998, Mc Graw-Hill New York
2. Terence. J, McGhee, McGraw Hill, Water Supply & Sewerage, 6th Edition, 1991

Course: CE-401L: Environmental Engineering-I (Lab)

Credit Hours: 01

Contact Hours: 03

Water Parameters:

Physical Tests:

Total Solids, Suspended Solids, Dissolved Solids, Turbidity, Conductivity, Color

Chemical Tests:

pH value, Total hardness, Total alkalinity, Chloride, Sulphate, Coagulation (Jar test)

Bacteriological Tests:

Total Coli-form, Faecal Coli-form

Course: BSI-351: Statistics & Probability

Credit Hours: 03

Contact Hours: 03

Statistics

Mean value, Measures of central tendency, Measures of variation, Standard deviation, Expected value of a random variable, Standard deviation of a random variable, The Poisson distribution, The uniform distribution, The exponential distribution, The normal distribution, The standard normal, The standard normal distribution.

Probability

Sets, Application of Venn Diagrams, Introducing probability, Mutually exclusive events, The addition law of probability, Complementary events, Concepts from communication theory, Problems related to engineering, Conditional probability, The multiplication law, Independent events, Baye's formula, Permutations and combinations, Multiplication principle, Problems related to engineering, science and management, Applications of counting, Bernoulli trials, Binomial probability, Markov chains, Probability distribution, Expected value, Decision making, Problems related to engineering and management.

BOOKS:

1. Blind, D.A. & R.D. Mason, Basic Statistics for Business & Economics, Irwin Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics 8th Edition, John Wiley & Sons Publication
3. Walpole R.E. (1982). Introduction to Statistics, McMillan publishing Co, Inc. new York

Course No: AE-206: Agricultural Processing Engineering

Credit Hours: 03

Contact Hours: 03

Fluid Flow Measurement

Pumps

Centrifugal pumps, Characteristics Curves, Centrifugal pump laws, Pump performance on a system.

Fans

Classification of fans and types, Fan theory, Factors affecting fan selection, General performance of fans.

Size Reduction

Size characteristics, Tyler sieves, Fineness modulus, Size reduction procedures, Reducing devices, Performance characteristics.

Cleaning and Sorting

Functions of cleaning, Grade factors, cleaning methods, Sorting fruits and vegetable, Cleaning and sorting grain, nuts and seeds.

Material Handling

Belt Conveyors, Chain conveyors, Screw conveyors, Bucket elevators, Gravity conveyors, lift and carrying trucks and carts.

Heat Transfer

Conduction, Study state conduction through composite walls, Convection, Radiation, Heat exchanger.

Drying

Importance of drying, moisture content determination, methods of drying, drying procedures.

Refrigeration

Natural refrigeration. Mechanical refrigeration, refrigeration cycle, Qualities of refrigerants. Components of refrigeration system, Heat pumps.

Cost Analysis

Items of cost, Calculation of depreciation, life expected, interest on investment, Housing, other factors.

BOOKS:

1. Henderson S.M. & Perry K.L. 1976. Agricultural Process Engineering (3rd Edition) the A VI Publication comp Westport, Connecticut. Marks Handbook McGraw Hill Co.
2. Gay C.C.V. Fawcett C.T. Mechanical and Electrical Equipment for building, John Willey and Sons, N.Y.

Course: AE-303: Engineering Economics & Management

Credit Hours: 02

Contact Hours: 02

Management Fundamentals

Management, Administration, Leadership, Relationship Vs Task Management, Project and Program, Project Life Cycle, Trade Off. Line/Project Organization, Functional Organization, Matrix and Mixed Organization. Role and Responsibilities, Career Path, Special Demands on the Project Manager, Common Characteristics of a most effective Team, Selection of a Project Manager.

Project Scheduling and Control

Network Techniques, PERT, CPM & GRANT Charts, Use of Project management Softwares, Crashing of a Project, Physical Assets Control, Human Resource Control, Financial Control.

Marketing Management

Selling versus Marketing, Role of a company: Leader, Follower, Challenger, Basics of Marketing, Place, Price and Promotion. Role of a company in Market Place.

ISO 9000 and Quality Management

ISO 9000: International Quality Management, Quality Management in Pakistan, Fundamental Quality Concepts, Quality Terminology, Importance and Benefits of ISO-9000, Common Misunderstanding about ISO-9000, Classification of ISO-9000 Series, Brief Description of 20 Elements of ISO-9000, the Auditing Process.

Economics and Accounting

Budgeting Methods, Cost Estimation, Assets, Liabilities, Capital and Revenue Expenditure, Depreciation, Depletion, Amortization, Owner's Equity Debentures, Loan Financing, Accounting, Qaurds, Ledgers, Profit and loss statement.

BOOKS:

1. Meredith, J. R. and S. J. Mantel. (2000) Project Management, McGraw Hill Pub. Company.

Course: AE-303: Alternate Energy Resources

Credit Hours: 02

Contact Hours: 02

Introduction: Overview of various types of energy sources (renewable and Non-renewable) and its use in the country.

Energy reclamation from agricultural crops/wastes (Biopower): Energy from biomass production. Biogas, various types of biogas plants. Design, installation, operation and management of biogas plants.

Solar Energy: Solar system, solar radiation, basic earth-sun angles, time derived solar angles, estimation of solar radiation, radiation measurements, solar radiation collectors, various uses of solar energy in domestic/agriculture, solar energy conservation

Wind energy: Wind energy potential in the country. Application of wind energy (domestic / agriculture). Importance of vertical and horizontal axis for wind mills, wind operated pumps for water lifting.

Geothermal Energy: Basic concepts, Heat transfer, Geothermal systems and resources, Exploration techniques.

Hydropower: Principles, Assessing the resource from small installations, Measurement of head, Measurement of flow rate, Turbines, Hydroelectric systems.

BOOKS:

1. John T. and T. Weir. 2006. Renewable Energy Resources. 2nd Edition, Taylor and Francis
2. Sorensen, B. 2004. Renewable Energy. 2004. Elsevier Academic Press, UK
3. Singh, M. P. 2005. International Encyclopedia of energy. DAYA Publishing House, Dehli, India
4. Board, N. Handbook on biogas and its application. National Institute of Industrial Research, Dehli, India
5. Pimental, D. 1993. Hand Book of Energy Utilization in Agriculture. CRC Press Inc. Florida, USA.
6. Rai. G. D. 2001. Solar energy utilization. Khanna Publishers, N. Dehli, India
7. Stout, B.A., 1990. Hand Book of energy for world agriculture. Elsevier Applied Science Ltd.

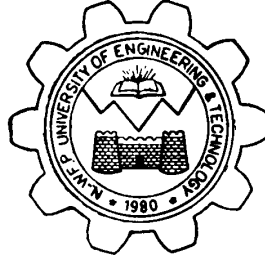
Course: AE-303L: Alternate Energy Resources (Lab)

Credit Hours: 01

Contact Hours: 03

1. Estimation of energy requirements for major crops.
2. Performance/ evaluation of biogas plants
3. Estimation of solar and wind energies
4. Study of different types of solar dryers
5. Performance/evaluation of wind mills.
6. Analysis of engine performance for energy conservation.
7. Measurement of energy contents in diesel, biomass, and vegetable oil with calorimeter.

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – VI

Course: AE-301: Ground Water Hydrology

Credit Hours: 03

Contact Hours: 03

Introduction

Basic concepts of ground water and soil water, Forms and origins of ground water, Types of subsurface water, Aquifer types, Aquifer functions: Porosity; Storage coefficient; Hydraulic conductivity; transmissivity, Water Potential

Ground Water Movement

Darcy's Law and its applications, Observation wells, Piezometers, Flow nets, Streamlines, Equipotential lines, Steady and non-steady flow.

Well Hydraulics

Steady flow in confined and un-confined aquifers, Steady flow in confined and unconfined aquifers with uniform recharge, Unsteady flow in confined and unconfined aquifers, Wells near aquifer boundaries, Multiple well system, Specific capacity, Well losses, Well efficiency and aquifer testing.

Wells

Test holes and Well logs, Methods for constructing wells, Methods for drilling wells, Well development, Design of wells and gravel packing, Tube well performance tests.

BOOKS:

1. Johnson, 1988. "Ground Water & Wells" Johnson and Co. USA
2. Ranghunath, H.M. 1987. "Ground Water" Willy Eastern Ltd. Singapur
3. Bouwer, H. 1996. "Ground water Hydrology" Mc Graw Hill Inc. New York
4. Ahmad, N. 1985. "Ground water Resources of Pakistan" Shahzad Nazir Publisher, Gulberg-III, Lahore

Course: AE-301L: Ground Water Hydrology (Lab)

Credit Hours: 01

Contact Hours: 03

1. Water level measurements by Electronic Sounding
2. Determination of Ground water flow rates and direction
3. Determination of Well losses and Well efficiency
4. Determination of Aquifer characteristics
5. Determination of an available Ground water Computer Model

Course: BSI-143: Communication and Presentation Skills

Credit Hours: 03

Contact Hours: 03

Tentative Lecture Schedule

1. The nature of communication & communication in an organization
2. Power Point Presentations
3. Oral presentations
4. Persuasive presentations
5. Resumes and Covering letters
6. Interview taking
7. Meetings
8. Negotiation Skills
9. Team Communication
10. Debate
11. Persuasive Presentations on Research Report
12. Listening (audio aids TOEFL & IELTS Practice Tests)
13. Business letters, memos and minutes
14. Writing and Presenting Proposals
15. Class Presentations
16. Class Presentations

Assignments to be given during the course

1. Letter writing
2. Resume and Covering Letter
3. Proposal
4. Team Writing
5. Sales brochure
6. Collecting ads

Books:

1. Writing. Intermediate by Marie-Christine Boulton, Suzane Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0194354057 Pages 45-53.
2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0194354065.
3. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0194534030

Course: AE-305: Farm Irrigation Systems

Credit Hours: 03

Contact Hours: 03

Farm Irrigation Systems and Systems Design Fundamentals

Functions of farm irrigation systems, Types of farm irrigation systems such as diversion methods, conveyance methods, and application methods, Design of farm irrigation systems, Data for design, Water source evaluation and determination of daily design requirements.

Crop Water Requirements

Plant soil relationship, Evapotranspiration, Determination of evapotranspiration and irrigation scheduling.

Surface Irrigation

Different methods of surface irrigation, furrow irrigation, border irrigation and basin irrigation, Surface irrigation process, Effectiveness of surface irrigation i.e. uniformity, application efficiency etc. Design of surface irrigation system, Infiltration data for surface irrigation, Design of furrow, border and basin irrigation systems.

Sprinkle Irrigation System

Advantages and disadvantages of the system, Types of sprinkle system, Components of sprinkle system, Design of set-move including its layout, number of lateral operated per irrigation set and sprinkle selection.

Trickle Irrigation

Advantages and disadvantages of trickle irrigation, Problems associated with trickle irrigation, Trickle irrigation methods, Trickle irrigation system components, Trickle irrigation laterals, Mainlines and manifolds, Control heads and control of trickle irrigation clogging.

BOOKS:

1. James, L. G. (1988). Principles of Farm Irrigation System Design. John Wiley and Sons, New York.

REFERENCE BOOKS

1. Walker, W. R. and G. V. Skoegerboe, (1987). Surface Irrigation Theory and Practices. Prentice-Hall Inc., Englewood Cliffs, New Jersey, USA.
2. Ahmad, N. (1987) Irrigated Agriculture. MirajDin Press, Urdu Bazar, Lahore, Pakistan.
3. Crop Water requirement by F.A.O

Course: AE-306: Farm Machinery & Earth Moving Equipment

Credit Hours: 03

Contact Hours: 03

Field Capacities and Cost Analysis

Implements Types, Factors affecting field capacity, Cost analysis

Hydraulics Controls and Power Take Off (PTO) Drives

Components of a hydraulic system, Types of hydraulic system, Single, Parallel & Series cylinder systems, Limit control, Automatic position and Draft control, Hydrostatic Propulsion drives, PTO drives using two universal joints, Three-joints PTO drives, Loads imposed on P.T.O. shafts, Recommended PTO load limits.

Tillage Force Analysis and Hitching

Forces acting upon a tillage implement, Mechanics of tillage, Tillage tool design factors, Measuring & evaluating performance, Measuring draft of implements, Vertical and horizontal hitching of trailed implement, Hitches for mounted implements, Depth and draft control on hitches.

Tillage Implements

(a). Primary tillage implements

Function & Types of Mold board plows, Components of a mold board plow, Reaction of soils to mold boards, Pulverizing action, Turning & inversion, Scouring, Forces acting upon a plow bottom, Effects of soil types, depth of plowing shape & design, attachments & rear furrow wheel and speed on draft & performance. Functions, components & types of Disk plows, Rotary plows, Chisel & subsurface plows.

(b). Secondary tillage implements

Functions, components & types of Harrows, Cultivators. Land rollers and Pulverizers, Subsurface tillage tools & field cultivators.

Equipment for Sowing and Planting

Functions, components & types of planting equipments, Seed metering devices, Maize drills, Calibration of seed drill. Broadcasting machines, Fertilizer and insecticide placement. Transplanting machines, Spraying systems.

Grain and Seed Harvesting

Harvesting and threshing methods, Types and development of Combines, functional elements of a combine, Flow path of material, Types and sources of seed loss, Types of threshing cylinders, Threshing effectiveness, Cylinder adjustment, Testing of Combines and its power requirements, Windrowing.

Earth Moving Equipments

Principles and working of Bulldozers, Soil scrapers and ditchers, Crawler, Parts of Crawler, Comparison of wheel type and Crawler tractors.

BOOKS:

1. Kepner, R. A, R. Bainer and E. L. Barger (1978). Principles of Farm Machinery, AVI Publishing company, Inc. Westport, Connecticut.
2. Smith H. P. and L. H. Wilkes. (1976). Farm Machinery and Equipment, 6th Ed. McGraw-Hill, Inc. USA

Course: AE-306L: Farm Machinery & Earth Moving Equipment (Lab)

Credit Hours: 01

Contact Hours: 03

1. Identification of Primary Tillage Implements.
2. Identification of Secondary Tillage Implements.
3. Determination of Field Capacity of Agricultural Field Implements under actual field condition.
4. Determination of Field Efficiency of Agricultural Field Implements.
5. Determination of tractor Wheel Slip.
6. Calibration of grain drills in Laboratory.
7. Calibration of grain drills in Field.
8. Study and operation of Tractor Hydraulic System.
9. Mini Project.

Course: CE-408: Environmental Engineering-II

Credit Hours: 03

Contact Hours: 03

Environmental Legislation and Regulation:

Environmental Impact Assessment:

Estimation of Sewage Quantities:

Rainfall intensity formulas, Hydrograph and weather Flow, Sewage Quantities, Variations and rates of Flows, Velocity gradient & limiting velocities

Characteristics of Sewage:

Sampling and Testing Techniques:

Sampling techniques and Examination of waste water (Physical, Chemical and Microbiological Parameters), Design, construction and maintenance of sewage system, Separate and combined Systems, Types, Shapes, Size and materials of Sewers, Sewer appurtenances, Pipe Strengths and Tests, Construction and Maintenance of Sewer System and Analysis, diameter and Gradient, Sewer joints, Grading, Laying, Jointing and Testing of Sewers

Municipal and Industrial Wastes, water Pollution, Causes and Control Parameter, Effluent disposal guidelines and Standards, Pakistan National Environmental Quality Standards (NEQS)

Sewage Treatment and Disposal:

Primary, secondary & tertiary treatment; Screening grit chamber, skimming tanks & sedimentation tanks; Activated sludge treatment, tricking filters, oxidation ponds, etc. Receiving body, assimilation capacity; Stream pollution and self recovery, sludge handling & disposal; Effluent re-use, Control and management of industrial waste waters.

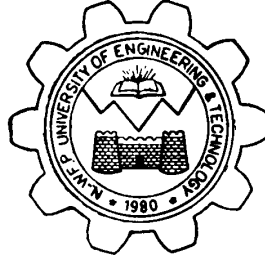
Solid Waste Management:

Types, characteristics, sources and quantities of solid waste; Collection disposal and recycling.

BOOKS:

1. Gerard Kiely. (1997). Environmental Engineering. McGraw Hill International Edition.
2. Metcalf and Eddy. Waste Water Engineering. 3rd edition, McGraw Hill

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – VII

Course: AE-404: Drainage Engineering

Credit Hours: 03

Contact Hours: 03

Introduction

Definition of agricultural drainage. Drainage system terms. Scope and benefits. Elements of drainage design. Types of drainage problems. Differences in drainage in humid and arid areas. Crop requirements. Surface and Subsurface drainage principles, Theories of buried drain and open ditch subsurface drainage, Design criteria, Pumped-well drainage.

Drainage Investigations

Reconnaissance. Preliminary survey. Design survey. Investigations for surface and subsurface drainage. Auger hole test, Piezometer test. Single well draw down test. Shallow well pump test. Ring permeameter test. Test pit method. Test for determining infiltration rate.

Drainage Requirements

Plant processes. Raw materials, Plant structure, Factors controlling production. The soil environment and aeration requirement. Diagnosis and improvement of salt affected soils, Plant response to salinity, Soil response to excess water and salinity, Situation in which drainage problems exist.

Drainage System

Investigation procedure, Moisture holding capacity in the root zone, annual irrigation schedule, deep percolation from irrigation, sources causing high water table conditions, determination of barrier zone and drain locations.

Surface Drainage

Surface drainage system, type and functions of surface drainage ditches, land forming, joint surface and subsurface drainage system.

Sub-Surface Drainage

Planning subsurface drainage system, Use of vertical drainage system. Design, installation, and construction of subsurface drains, Maintenance of buried drains. Open ditches for drainage. Interceptor and mole drains; Design and construction.

Operation and Maintenance of Drainage System

Buried Pipe drainage system, open drainage system, drainage water disposal ponds, drainage observation well, policy and basic requirements, weed control and embankment stability.

BOOKS:

1. Luthins, J. N. (1978). Drainage Engineering, Robert E. Krieger Publishing Company Huntington, New York.
2. Drainage Manual. (1978). First Edition. A Water Resource Technical Publication U.S. Deptt. of Interior, Bureau of Reclamation, Washington.
3. Ahmad, N. (1993). Drainage of Irrigated Lands of Pakistan, Miraj Din Press, Urdu Bazar, Lahore, Pakistan.

Course: AE-404L: Drainage Engineering (Lab)

Credit Hours: 01

Contact Hours: 03

1. Verification of Darcy's Law by laboratory methods
2. Measurement of seepage losses.
3. Determination of water table,
4. Saturated hydraulic conductivity by piezometers,
5. Auger hole, planning of a subsurface drainage system and outlet with design of a sump;
6. Visit of Drainage Projects.
7. Computation of leaching requirement and drainage coefficient of a drainage basin.

Course: AE-401: Farm Power

Credit Hours: 03

Contact Hours: 03

Power and Power Measurement

Brake, Belt, Indicated and Draw bar power, Belt or Brake and Drawbar dynamometers, Strain Gauges.

Thermodynamic Principles of Internal Combustion Engine

Boyle's law, Charles law, Energy equation and Constant volumes and constant-pressure changes, Adiabatic changes, Equations for non-flow processes, Air standard Otto and Diesel cycles, Actual cycles

Valve and Valve Timing

Firing orders of four and six cylinder engines and Valve function, construction and its design

Fuel Testing

Different fuel Tests and Octane and Cetane numbers, Knocking and detonation

Carburetion and Fuel Induction

Fuel-Air ratio requirements, Fuel and Air Flow in a carburetor, Simple carburetor, Starting, idling and compensation, Carburetor adjustment, Intake Manifolds

Ignition Systems

Operation, maintenance and repair principles of battery, Spark and Compression ignition, Spark plugs, Condenser, Distributors, Induction Coils, Magnets and Electric Starters

Diesel Engine

Principles of operation, Fuel injection for single unit injection system, Fuel injection for multiple unit injection system, Fuel filters. Diesel engine starting methods

Engine Cooling and Cooling System

Cooling load, Heat transfer, Air and water cooling systems, Construction of radiators, Fans, pumps, Antifreeze and corrosion inhibitors.

Lubrication and Lubrication System

Lubrication and Lubrication systems of engines, Types and properties of lubricating oils, oil additives, greases and oil filters

Engine Accessories

Throttle governors, Principles of centrifugal governor action, Hydraulic governors, Spark Arresters, Mufflers, Air inlet location and pre-cleaners, Oil bath and dry type air cleaners, Power losses from engine accessories

Mechanics of the Farm Tractor Chassis

Force Analysis, Soil reaction, Draw bar pull, Stability of tractors, Tipping and lateral stability

Clutch and Brakes

Transmission, Differentials, Power take-off, Pulley drives, Power lift and hydraulic controls. Tractors tests and performance

Farm Management

Farm planning for efficient use of resources and attainment of business goals and farm accounting.

BOOKS:

1. Liljedahl, J. B., P. K. Turnquist, D. W. Smith and M. Hoki. (1989). Tractors and their Power Units, 4th edition. Van Nostrand Reinhold, New York.

Course: AE-401L: Farm Power (Lab)

Credit Hours: 01

Contact Hours: 03

1. To study electrical ignition system and electrical system of tractor.
2. A study of the tractor cooling system.
3. A study of the tractor transmission system and differential system.
4. Determination of specific gravity of lead acid battery solution, voltage measurement per cell and the current produced by the battery.
5. Determination of indicated and brake horse Power of a Diesel engine by means of a prony brake and hydraulic dynamometers.
6. To find PTO horsepower of the tractor at different speeds by means of hydraulic dynamometer (absorption).
7. To study the working model of carburetor and fuel system of petrol engine.
8. To study diesel injection pump model.
9. To simulate the automatic hydraulic clutch operation
10. To study steering system and braking systems of automobile.
11. To study turbocharger.

Course: AE-304L: GIS & Remote Sensing

Credit Hours: 01

Contact Hours: 03

Displaying Data

Creating map, Adding tabular data to a map, Symbolizing data. Labeling, Charting and Map projection. Layout.

Querying Data

Getting attributes of features, Attribute of particular feature, Feature near other, Fall inside polygon, Intersect other feature. Aggregation of data.

Data Creation

Creating and editing spatial data. Registration and digitization. Working with images and aerial photographs. Working with CAD in GIS environment.

Analyzing Data for Specific Purposes

Creating suitability map for various purposes. Soil, rainfall and water pollution map for various parameters. Use of GRID data for groundwater sources.

Creation of Surface Model

Creating 3D shapes. Advanced visualization. Representing surfaces with TINs. Creation of TINs. Creation of Slope and Aspect theme. Making contours lines. Analyzing surface runoff patterns. Measuring areas and volumes.

RECOMMENDED SOFTWARES AND GPS

1. Arc View 3.x, Arc GIS 9.0 and Map Info
2. ERDAS Imagine 8.7 and Differential GPS set.

Course: CE-402: Irrigation Engineering

Credit Hours: 03

Contact Hours: 03

Introduction

Definition, Necessity of Irrigation, Water Resource and Irrigation System of Pakistan, Indus Basin Treaty, Water Budget of Pakistan

Water Requirement of Crops

Functions of Irrigation, Preparation land for Irrigation, Crop Base Period, Duty and Delta, Relationship between duty and delta, Factors affecting duty, Depth and Frequencies of Irrigation, Kharif-Rabi Ratio, Optimization of Irrigation Water, Irrigation Efficiency, Uniformity Coefficient, Consumptive Use of Water, Effective Rainfall, Net Irrigation Requirements, Gross Irrigation Requirement, Estimation of Consumption Use, Blaney Criddle, Hargreaves Methods, Assessment of Irrigation Water Charges

Methods of Irrigation

Classification of Irrigation Methods, Factors affecting the choice of Irrigation Methods, Surface Methods, Sub-surface Irrigation methods

Well Irrigation

Well Hydraulics, Methods of Drilling Wells and Well Development, Yield of Open Wells, Types of Strainers, Design of Tube Wells, Pumping Machinery, Quality of Ground Water for Irrigation

Water logging & Salinity

Causes and effects of Water logging, Measures to Control Water logging, Drains, and Tube Wells, Reclamation of Saline Soils

Canal Irrigation

Alignment of canal, Distribution System of Canal Irrigation, Basic definitions, determination of required Canal Capacity, Canal Losses, Empirical formula for Channel Losses, Channel Section for Minimum Seepage Loss

Design of Irrigation Channel

Design of Stable Channel, Regime Channels, Kennedy's Theory, Lacey's Theory, Estimation of Transported Sediment, Bed Load Equations, Design Procedure for Lined/Non- erodible Irrigation Channel, Maintenance of Irrigation Channels

Dams:

Introduction, Classification, Gravity dams, Forces acting on a gravity dam, Modes of failure, Principal and shear stresses, Stability analysis, Elementary profile of a gravity dam, Practical

profile of a gravity dam, Limiting height of a gravity dam, Profile of high masonry gravity dam.

BOOKS:

1. Irrigation Engineering & Hydraulic Structures by Santosh Kumar, Garg, 10th revised Edition, 1993
2. Irrigation & Water Power Engineering by Dr. B.C. Punmia, Dr. Pande B.B. Lal

Course: AE-403: Landscape Engineering

Credit Hours: 02

Contact Hours: 02

Introduction, importance of landscaping, gardening and its design, principles and elements of landscape design, landscape design materials, types of designs; formal and informal garden designs, Chinese and Japanese gardening, rockeries, terrace, roof and water gardens, plants suitable for various designs, landscape designs for public and private buildings, parks and playgrounds etc., highway and roadside plantations, developmental cost estimates for landscape.

BOOKS:

1. Arora, J.S. 1992. Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi.
2. Booth, N.K. and W.H. Elsevier. 1983. Basic elements in Landscape Architecture Design. Science Publishing Co., New York.
3. Khan, M.A. and T.A. Bader. 1992. Landscape Designs, Student Manual. University Printing Press, University of Agriculture, Faisalabad.
4. McDaniel, G.L. 1982. Ornamental Horticulture. The Reston Publishing Company; Prentice Hall Co., Reston, Virginia.
5. Raj, D. 2002. Floriculture and Landscaping. Kalyani Publisher, New Delhi.

Course: AE-411: Project

Credit Hours: 03

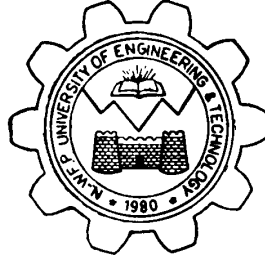
Contact Hours: 09

Introduction to technical report writing, important components of technical writing, selection/preparation of research topic, objectives, review of literature, methodology, data processing, results, conclusions, summary, abstract, presentation of (data collected in the field/laboratory) results in the form of graphs, tables, figures, and photographs, references and appendices, report writing, presentation methods and skills.

BOOKS:

1. Awan, J. A. 2004. Technical writing. University of Agriculture press, Faisalabad.

Department of Agricultural Engineering
University of Engineering & Technology Peshawar



SEMESTER – VIII

Course: AE-406: Design of Agricultural Machinery

Credit Hours: 03

Contact Hours: 03

Philosophy of Design

Formulating of procedure, importance of machine design in Agricultural Machinery, Reliability, Engineering Standards, User economics.

Statistics Tolerance Design

Tolerance and allowances, application of statistics to manufacturing.

Stresses

Stress failure theory, Designing for deflection, Strain determinations, Stresses caused by impact.

Power Transmissions

V-Belt forces, kinematics and design procedure, Chain drive, Forces, selection and design procedure. Universal Joints, description and functioning in Agricultural Machinery.

Linkages in Farm Machinery

Velocity and acceleration determination, Four bar mechanism, Machinery mechanism, Forces on plows and discs.

Hydraulic Power System

Hydrostatic drives and hydraulic pumps, Pump performance and rating, Hydraulic motors performance and rating, Control valves, Hoses and fitting, Cylinders.

Design of Surfaces of Plow Bottoms

Design of moldboard plow and disk plow.

Stability of Plows

Force equilibrium and stability, Supporting elements, Plow stability in horizontal plane, Procedure for measuring the quality and testing plows.

BOOKS:

1. Krutz, G., L. Thompson and P. Claar. (1984). Design of Agricultural Machinery. John Wiley and Sons Inc. USA.
2. Bernacki, H. J. Haman, C. Kanafowski, Agricultural Machines, Theory and Construction, Vol. I, U.S. Department of Commerce.
3. Shigley, J.E. and C. R. Mischke, (2000). Mechanical Engineering Design. Fifth Edition. McGraw Hill Publications Inc. USA.

Course: AE-402: Open Channel Hydraulics

Credit Hours: 03

Contact Hours: 03

Basic Concepts of Fluid Flow

Types, state and regimes of flow, channel flow types, channel geometry, measurement of velocity in channel, velocity distribution in channel and its coefficients, pressure distribution in channel, effect of slope on pressure distribution.

Energy and Momentum Principle

Basic equations, Specific energy, Specific energy and alternate depths, E-Y relationship, Criteria for a critical state of flow, computation of critical flow, control of flow, application

of flow control in rectangular channel, momentum in open channel flow, specific momentum, hydraulic jump, M-Y relationship.

Uniform Flow

Establishment of uniform flow, The Chezy's and Manning's equations, resistance coefficient estimation, normal depth and velocity, normal and critical slopes, free board, best hydraulic section, determination of section dimensions.

Rapidly Varied Flow

Characteristics of varied flow, sharp crested weir, aeration of the nappe crest shape and discharge over spillway, type and characteristics of the jump, jump as energy dissipater, flow through sudden transitions.

BOOKS:

1. Chow, V.T. (1990). Open Channel Hydraulics. McGraw Hill International Book Company.
2. French, R. H. (1996). Open Channel Hydraulics, McGraw Hill International Book Company.
3. Henderson, F.M. (1990). Open Channel Flow. McMillan Publishing Co.

Course: AE-407: Farm Structures and Landscape Engineering

Credit Hours: 03

Contact Hours: 03

Heat flow through Walls Insulation:

Rate of heat transmission through building materials, conductance, combined conductance coefficient, Equation for heat flow through non-homogenous walls, combined ceiling and roof coefficient.

Ventilation:

Air flow and quantity of moisture, Air flow required in heat transfer, Estimating Air flow required to prevent condensation, Air flow required to maintain prescribed chemical

composition, Heat balance equation, Exposure ratio, Ventilating systems, Ventilation by Wind forces, Stack ventilation Systems, Construction practices, Forced draft systems.

Dairy Building:

Functional planning, Environment, Sanitation, Space requirements for animals and traffic, arrangement of space, Other considerations, Milking Parlors, Pen vs Stall Barns, Storage or feed, Milk and manure etc, Insulation and ventilation.

Poultry Housing:

Functional planning, Production practices, Environment, Space requirements, Arrangement or space, Insulation and ventilation, other considerations.

Storage of Fruits and Vegetable Crops:

Condition for storage, Refrigerated vs Common Storage, Economic aspects of storage, Characteristics of Common storage, Refrigerated storage, Refrigerating Load, Modified Atmosphere Storage, Types of Evaporators, Coil Temperature vs Relative Humidity and Equipment capacity, Air movement, Storage management.

Storage of Grains:

Destructive agents, Respiration of grains, Indices of quality, Moisture and Temperature changes in stored grains, Moisture properties of grains, Functional requirements, Conditioning moist grains, Storage structure, Equipment for grain handling and processing.

BOOKS:

1. Barre, H. J., and Sommet, L. L. Farm Structure. John Wiley and Sons., Inc, New York, USA.

LANDSCAPE ENGINEERING

Introduction, importance of landscaping, gardening and its design, principles and elements of landscape design, landscape design materials, types of designs; formal and informal garden designs, Chinese and Japanese gardening, rockeries, terrace, roof and water gardens, plants suitable for various designs, landscape designs for public and private buildings, parks and playgrounds etc., highway and roadside plantations, developmental cost estimates for landscape.

Books Recommended:

1. Arora, J.S. 1992. Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi.
2. Booth, N.K. and W.H. Elsevier. 1983. Basic elements in Landscape Architecture Design. Science Publishing Co., New York.
3. Khan, M.A. and T.A. Bader. 1992. Landscape Designs, Student Manual. University Printing Press, University of Agriculture, Faisalabad.
4. McDaniel, G.L. 1982. Ornamental Horticulture. The Reston Publishing Company; Prentice Hall Co., Reston, Virginia.
5. Raj, D. 2002. Floriculture and Landscaping. Kalyani Publisher, New Delhi.

Course: AE-408: Water Management Engineering

Credit Hours: 03

Contact Hours: 03

Water Course Design and Improvement

Introduction, Planning for watercourse improvement. Design criteria. Hydraulics of watercourse design, Different cross sections of watercourse, Water course design. Materials and procedures, Moghas, Construction of unlined and lined watercourses, OFWM structures (conveyance, control).

Precision Land Leveling

Precision land leveling, Objective, Advantages and disadvantages of land leveling, Farm assessment and layout, Traditional survey layout procedure. Adjustment of borrow and fill, procedure for sloping fields, Land leveling maintenance.

Water Storage Tanks

Sizing a water storage tanks, Considerations in sizing water storage tanks, General criteria, Design of storage tanks, construction of water storage tank, Preparatory works, Materials and procedures, Concrete base, Brick or stone walls, Concrete walls, Back filling. Stone pitching, Quantities.

Water Harvesting

Introduction, Goals and objectives, Site selection, Area appraisals, Topographical surveys, Land use plane and work plane, Land development and conservation structures, Leveling, terracing, improved bunds, improved tillage, field spillways, water ways, diversion ditches, Storage structures, Water balance, Site investigation, Water retention dams/ponds.

Agronomy Practices for Water Management

Development of Crops and Cropping Systems, Principles of Crop Management, Management of land and Soil, Seed and Sowing, Fertilizers and Nutrients, Crop protection, Harvest and Post-harvest Technology Centers, Objectives, Selection, and conduction of Farm Demonstration Centers, Extension Methods.

Conjunctive Use of Water

Conjunctive use of saline groundwater. Effects of sediment and salinity on conjunctive use of water.

BOOKS:

1. On Farm Water Management Field Manuals, (Revised 1996-97)
 - a. Vol. IV Watercourse Design and Improvement.
 - b. Vol.V Land Development Precision Land Leveling and level Border Design.
 - c. Vol.VI Irrigation Agronomy.
 - d. Vol.VII Water Storage Tanks.
 - e. Vol. X Water Harvesting and Spate Irrigation
Ministry of Food, Agriculture and Livestock (Federal Water Management cell)
Government of Pakistan, Islamabad.
2. Hoffman, G. J, T.A. Howell and K.H. Solomon, (1992). Management of Farm Irrigation Systems. ASAE.

Course: AE-408L: Water Management Engineering (Lab)

Credit Hours: 01

Contact Hours: 03

1. Determination of field capacity and wilting points of a soil sample.
2. Land leveling of a given field and cost estimate.
3. Field visits of earthen and lined water courses.
4. Flow measurement in a watercourse and interpretation of data.