

# **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>First Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	Engineering Mathematics-I	BT-114			
<b>2</b>	Engineering Physics	BT-115			
<b>3</b>	Principles of Soil Science	BT-116			
<b>4</b>	Workshop Technology and Practices	BT-117			
<b>5</b>	Environmental Science and Disaster Management	BT-118			
<b>6</b>	Communication Skills and Personality Development	BT-119			

## **ENGG. MATHEMATICS-I**

### **UNIT-1**

#### **Differential calculus**

Asymptotes- curves and curvature, partial differentiation - Euler's theorem, total differential coefficient.

### **UNIT-II**

Taylor's theorem for two variables, maxima and minima, Lagrange's multiplier.

### **UNIT-III**

#### **Integral calculus**

Application of integral calculus, area enclosed by curves, length of arc. Volume and surface of solids of revolution, Evaluation of double and tripple integrals,

### **UNIT-IV**

Gamma and Beta functions- Dirichlet's integral. Simple tests of convergence of integrals.

### **UNIT-V**

#### **Infinite series**

Convergence and divergence of series, tests of convergence, Alternating series, Absolutely and conditionally convergent series, uniform convergence.

## ENGINEERING PHYSICS

### UNIT-1

Surface tension- angle of contact, excess of pressure inside a spherical surface, capillary rise, determination of surface tension by Jaegers' method. Viscosity- Streamline and turbulent motion, coefficient of viscosity, critical velocity, Poiseuille's equation for flow of liquid through a tubes, viscometer.

### UNIT-II

**Interference**-thin films- testing of the optical planeness of surfaces, Youngs' double slit experiment- coherent sources- lasers, intensity in youngs' experiment, interference in thin films, Newton's ring and Michelson interferometer.

**Diffraction**- Fraunhofer- diffraction at single slit, diffraction at a circular aperture, diffraction at double slit, diffraction gratings, resolving and dispersive power of a grating.

### UNIT-III

**Polarisation**- Production and detection of circularly and elliptically polarised light. Quarter and half wave plates, optical activity, specific rotation, Loney's half shade polarimeter. Determination of specific rotation and strength of sugar solution.

**Lasers**- Coherence temporal and spatial, Einstein's coefficient, spontaneous and stimulated emission, population inversion, laser gain, (pumping), spectral narrowing in lasers, coherence length, different types of laser source and their applications.

### UNIT-IV

Crystal structure - Seven systems of crystals. Bravais space, lattice, crystal structure (bcc, fcc and sc), lattice dimensions, lattice planes, miller indices and their significance, x-ray absorption of X-rays diffraction- Bragg's law, Bragg's X-ray spectrometer. Nuclear radiations - Interaction of nuclear radiation with matter, scattering of charged particles from nucleus. Detection of radiation using G.M. counter and scintillation counter, radiation hazards, dosimetry.

## **UNIT-V**

Quantum theory - Wave particle duality uncertainty principle, Schrodinger equation and its application to particle in box and harmonic oscillator. Ultrasonics- production, application in ranging, cleaning and drilling. Production and measurement of vacuum- Mechanical pumps (rotary vacuum pump), diffusion and condensation pumps, Gettestand measurement; Manometer, mecleod gauge, piram gauge. Measurement of temperature- Thermo e.m.f, measurement of thermo e.m.f. by potentiometer, higher temperature measurement by using pyrometers and resistance thermometer.

## **SOIL SCIENCE**

### **UNIT-1**

Definition of soil, Rocks and minerals. Soil formation and classification. Soil survey methods. Land use capability and mapping. Major soil types of India,

### **UNIT-1I**

soil texture, classification of soil particles and their determination, bulk density, particle density and porosity, soil structure, types of soil structure and management,

### **UNIT-1II**

forms of soil water, retention and movement, saturated and unsaturated flow. Soil moisture contents, soil temperature and soil air.

### **UNIT-1V**

Soil colloids, cation and anion exchange in soils, soil reactions and buffering capacity. Soil humus and its formation, C:N ratio. Saline and alkali soils and their reclamations. Significance of macro and Micro nutrients, Soil and water testing, Soil fertility management. Important fertilizers.

## **WORKSHOP TECHNOLOGY AND PRACTICES**

### **UNIT-I**

Carpentry shop- Seasoning and preservations of timber, glues, paints, varnishes and polish.

### **UNIT-II**

Foundry- Nature of work done in foundry shop, preparation of sands like - Green, dry sand, molasses sand, hand tools and equipments used in a foundry shop, moulding, casting, patterns types, materials and allowances, moulding sands and moulding methods, casting practices, casting defects,

### **UNIT-III**

Welding shop- Submerged arc welding, plasma welding, TIG and MIG welding, tools and equipments welding faults. Precaution taken while welding

### **UNIT-IV**

Machine shop- Introduction of computer in machine shop, necessity of numerical controlled machines, parts of NC machines, features of NC machines, advantage of NC machine over conventional milling machines, NC programming, computer numerical control machines, its advantage over NC machines, difference between CNC and DNC machines and its features,

# **Environmental Science and Disaster Management**

## **UNIT-I**

*Environmental Studies:* Scope and importance. Natural Resources: Renewable and nonrenewable resources Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e)

## **UNIT-II**

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems: Concept, Structure, function, Producers, consumers, decomposers, Energy flow, ecological succession, food chains, food webs, ecological pyramids. Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

## **Unit-III**

Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental Pollution: definition, cause, effects and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Social Issues and the Environment from Unsustainable to Sustainable development, Urban problems related to energy. Water

conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

#### **UNIT-IV**

*Disaster Management:* Natural Disasters and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.



## **COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT**

Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Second Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	Engineering Chemistry	BT-214			
<b>2</b>	Engineering Mechanics	BT-215			
<b>3</b>	Engineering Mathematics – II	BT-216			
<b>4</b>	Surveying & Leveling	BT-217			
<b>5</b>	Thermodynamics, Refrigeration & Air-Conditioning	BT-218			
<b>6</b>	Introduction to Agronomy & Horticulture	BT-219			

## **ENGG. CHEMISTRY**

### **UNIT-I**

Water- Hardness, determination of hardness by compleximetric (EDTA) method, degree of hardness, Chloride dissolved oxygen, dissolved carbondioxide and sulphate, calorimetric methods for the determination of pH, control of pH of water used in industry Chemical

### **UNIT-II**

Fuels- Classification of fuels, solid fuels, coal- origin and its classification, proximate and ultimate analysis of coal. Significance of constituents, Gross and net calorific values, Determination of Calorific value by Bomb Calorimeter. Liquid Fuels- Advantages, Petroleum- origin, classification, refining of Petrol, Gasoline, knocking- octane number, chemical structure and knocking- Anti-knock agents, cracking. Gaseous Fuels- Advantages, manufacture, composition and calorific value of Coal gas and oil gas. Determination of Calorific value of gas by Junker's Calorimeter. Fuel gas analysis by Orsat apparatus. Calculations based on combustion.

### **UNIT-III**

Corrosion- Defnition and its significance, theories of corrosion, Galvanic cell and concentration cell. Pitting and stress corrosion, Protection of corrosion. Use of inhibitors and passivation. Alloying, protective coatings - Metallic, inorganic anil Organic. Cement- Manufacture of Portland cement, vertical shaft kiln technology, Chemistry of setting and hardening. Refractories- Definition, Properties, Classification, Properties of Silica and Fireclays refractories. Glass- preparation, varieties and uses.

### **UNIT-IV**

#### **Polymers:**

Plastics- Types of Plastics, Compounding of plastics and their fabrication. Rubber- Natural rubber, vulcanisation, elastomers and their uses. Fibers- Natural and synthetic fibers and use of Nylon, Terylene and Rayon. Lubricants- Classification, types of lubrication, properties and tests. (Viscosity and viscosity index. Flash and Fire point, cloud and pour point Emulsification)

### **UNIT-V**

Chemical Kinetics- Order and molecularity of reaction, first and second order reaction. Derivation of equations for first order and second order reactions. Determination of order of reaction. Energy of activation and Arrhenus equation. Numericals of first and second order reactions.

## **ENGINEERING MECHANICS**

### **UNIT-I**

Fundamentals of engineering mechanics, vector and scalar quantity. Conditions of equilibrium, Applications of principle of moments and couples. Study of coplaner and non coplaner force systems using analytical, vector and graphical approach.

### **UNIT-II**

Internal forces in frames and trusses. Reactions of supports of frame. Free body diagram related problem. Analysis of frame, method of sections. Principle of virtual work.

### **UNIT-III**

Application of laws of friction, wedge and block, screw jacks and brakes. Machines, reversible machine and non-reversible machine. Law of machine. Velocity ratio, mechanical advantage and efficiency of simple lifting machines.

### **UNIT-IV**

Linear motion, velocity, acceleration. Projectile. Angular and curvi-linear motion. Laws of motion, relative velocity, rotational and translation motion. Centre of gravity, centroid, Moment of Inertia, radius of gyration, Newton's laws of motion. Work, power and Energy.

### **UNIT-V**

Laws of conservation of energy and momentum. Collision of elastic bodies. Loss of kinetic energy on impact. Centrifugal and centripetal forces, super elevation, Governors, Simple harmonic motion, rope and belt drive, transmission of power by belts.

## **ENGG. MATHEMATICS –II**

### **UNIT-I**

#### **Vector calculus**

Differentiation of vectors- directional derivatives, line, surface and volume integrals statement of Gauss, Green's and Stake's theorems and their application.

### **UNIT-II**

#### **Differential equations**

Differential equations of first order first degree- Linear differential equations with constant coefficients- Homogeneous equations with variable coefficients.

### **UNIT-III**

Application to practical problems, BesseFs and Legendres differential eqns, partial differential equations.

### **UNIT-IV**

#### **Matrices**

Basic properties transpose, adjoints inverse and rank of a matrix. Solution of evaluation. Elementary transformation-characteristic equation, Cayley-Hamilton theorem.

## **SURVEYING AND LEVELLING**

### **UNIT-I (*Surveying*)**

Principle and basic concepts of surveying Plans and maps• Classification of surveying• Basic measurements• Units of measurement• Types of Scales• Recording the measurement• Principal of chain surveying• Types of Chains• Types of Ranging and Chaining• Chain and tape errors• & corrections Selection of survey station and lines• Offset measurement• Cross Staff Optical Square-Prism Square• Obstacles in chaining and ranging•

### **UNIT-II (*Traversing*)**

Methods of traversing• Prismatic compass• Surveyors compass• Angle and bearing• Quadrantal system• Local attraction• Dip of angle• magnetic declination• Plotting a traverse survey• Errors In compass survey• Bow ditch's rule• Transit rule•

### **UNIT-III (*Plane Tabling*)**

Plane tabling instruments and accessories• Methods and principal• Two points problem• Three points problem• Errors in plane tabling• Planimeter Sextant Band level, Abney level• Clinometer, Pentameter• Computation of areas methods•

### **UNIT-IV (*Leveling*)**

Definition , Basic principal of levelling• Benchmark• Types of levels optical• Principal causes telescopes sensitivity of bubble tubes• Leveling staff• Temporary adjustment, Permanent adjustment of levels• Field book entries• Reduction of levels missing entries ,• Types of levelling• Simple and differential levelling• Check leveling• & reciprocal leveling Precise levelling• profile leveling•

### **UNIT-V**

Theodolite traversing • Theodolite Surveying • Ranging by theodolite •  
Temporary • & Permanent adjustment of theodolite.

## **THERMODYNAMICS AND HEAT ENGINE**

### **UNIT-I**

Systems and properties; concepts of energy, temperature and heat

### **UNIT-II**

First law for closed and open systems; pure substance and properties;  
second law of thermodynamics and entropy;

### **UNIT-III**

Boiler, mountings and accessories, boiler efficiency

### **UNIT-IV**

Steam engines; rankine cycle, indicator diagrams; steam turbines; I.C.  
engines; Air standard Otto, diesel and joule cycles

## **INTRODUCTION TO AGRONOMY AND HORTICULTURE**

Agronomy, scope and its role in crop production-Major Field crops of India – classification, area, distribution and productivity of major Field crops. Farming and cropping systems –mono, sole and multiple cropping, relay, sequential and inter cropping. Tillage- definition objectives– types of tillage- tillage implements – tillage - characteristics of good tillage - Soil productivity and fertility- Crop nutrition – nutrients –classification – Nutrient sources organic manures –fertilizers – biofertilizers- Integrated Nutrient Management-Importance of water in plant growth- Soil properties influencing moisture availability – texture, structure and organic matter status-Irrigation and drainage. Weed control – definition and characteristics of weeds, classification of weeds – damages due to weeds - benefits of weeds. -Control vs prevention of weeds – methods of weed control-Classification of herbicides-Integrated weed management. Soil and its management-Definitions and importance of horticulture Economic importance and classification of horticultural crops and their culture and nutritive value- area and production- exports and imports- fruit, vegetables, plantation and spice crops-soil and climate–principles-planning and layout- management of orchards- planting systems and planting densities- Principles and methods of pruning and training of fruit, plantation crops use of growth regulators in horticulture crops-Horticultural zones of state and country.



## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Third Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	Strength of Materials	BT-327	150	100	50
<b>2</b>	Heat & Mass Transfer	BT-328	75	50	25
<b>3</b>	Engineering Mathematics – III	BT-329	150	100	50
<b>4</b>	Computer Science	BT-330	75	50	25
<b>5</b>	Electrical Engineering	BT-331	150	100	50
<b>6</b>	Horticultural	BT-332	75	50	25
<b>7</b>	Food Science	BT-333	75	50	25

## **STRENGTH OF MATERIALS**

### **UNIT-I**

Elasticity- stress and strain- elastic limit- Hooke's law- Young's modulus- stresses in bar due to its own weight, varying sections and uniformly tapering circular bars- primary and secondary strain- bulk and shear modulus and their relationship- volumetric strain in a body, Principle stresses and strains, Mohr's circle.

### **UNIT-II**

Temperature stresses, Resilience. Shear force and bending moment diagram for simply supported beams and cantilever beams- centroid of different cross sectional laminae, moment of inertia, parallel axis theorem and perpendicular axis theorem- moment of inertia of different cross sectional laminae-.

### **UNIT-III**

Stresses in thin cylinder and spherical shells- derivation of equations for circumferential and longitudinal stresses in shells and their applications- combined bending and direct thrust- middle third rule- eccentricity of load- stability of dam profile,

### **UNIT-IV**

columns and struts assumptions made in Euler's theory- derivation of buckling load equation for both the ends hinged, one end fixed and the other end free- empirical formulae for columns,

### **UNIT-V**

Derivation of torsional equation- bending stress in beams- derivation of bending equation- shearing stresses in beams-derivation of shearing stresses equation- deflection- derivation of double order differential equation- Macanlay's method

## **HEAT AND MASS TRANSFER**

### **Unit-1**

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

### **Unit-2**

Introduction to Fins, Free and forced convection, Heat transfer coefficient in convection. Newton's law of cooling. Dimensional analysis of free and forced convection. Equation of laminar boundary layer on flat plate and in a tube, Laminar forced convection on a flat plate and in a tube, combined free and forced convection.

### **Unit.3**

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

### **Unit 4**

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

## **ENGINEERING MATHEMATICS –III**

### **UNIT-I**

#### **Laplace transforms**

Standard unit step functions, periodic functions - convolution theorem, application of ordinary differential equations with constant coefficients.

### **UNIT-II**

#### **Complex variables**

Analytic functions - Cauchy Riemann equations- complex integration. Cauchy fundamental theorem - residues - residue theorem- Cauchy Lemma and Jordenslemma contour integration,

### **UNIT-III**

Fourier series- Dirichlet's condition, Errors and approximation in numerical computations.

### **UNIT-IV**

Method of finite differences- finite difference operators- integration - first and second order linear finite difference equations with constant coefficients. Interpolation methods for solving simultaneous linear algebraic equations.

# **COMPUTER SCIENCE**

## **UNIT-I**

Details of computer organisation and peripherals, types of computers. Hardware, software.

## **UNIT-II**

Working in DOS and window environment, Networkings; Algorithms and flow charts; programme development.

## **UNIT-III**

Arithmetic expressions, Programme completion, debugging and testing. Concept of structured programming. Subroutines and functions. Computer viruses.

## **UNIT-IV**

Solution of engineering problems using BASIC/FORTRAN

## **ELECTRICAL ENGINEERING**

### **UNIT-I**

Kirchhoff's laws, delta star and star delta transformation, Thevenin's and super position theorem, A.C. fundamentals,

### **UNIT-II**

Average and effective values of signals, Transient and steady state response of circuits. Active and reactive power. Resonance in circuits. Filters. Analysis of three phase circuits.

### **UNIT-III**

Characteristics of magnetic and dielectric materials. Magnetic circuits; Hysteresis and eddy current losses, two port network parameters. Force acting on current carrying conductor in magnetic field. Magnetic force due to electric current, statically and dynamically induced emf. Stored energy, force between parallel conductors.

### **UNIT-IV**

Single phase transformer, construction principle, e.m.f. equation. Transformer efficiency.

## **HORTICULTURE**

### **UNIT-I**

Scope of horticultural and vegetable crops. Soil and climatic requirements for fruits, vegetables and floriculture crops, improved varieties.

### **UNIT-II**

Criteria for site selection. Layout and planting methods. Nursery raising, macro and micro propagation methods. Plant growing structures, pruning and training, fertilizers application, fertigation.

### **UNIT-III**

Irrigation methods, traditional and modern methods. Harvesting, grading and packaging, post harvest practices. Garden tools. Management of orchard.

### **UNIT-IV**

Construction and management of green house. Extraction and storage of vegetable seeds. Layout of lawns and kitchen gardens. Preparation of different fruits and vegetable products.

## **FOOD SCIENCE**

### **UNIT-I**

Major nutrients serving as food for living cells, brief study of carbohydrates, lipids, proteins, enzymes, nucleic acid, vitamins, essential oils

### **UNIT-II**

Biochemical separation methods, Enzymes and co-enzymes, Major anabolic and catabolic pathways and their regulations,

### **UNIT-III**

Biochemical changes during ripening and storage of fruits, storage of grains, milk and milk products.

### **UNIT-IV**

Types of micro-organisms, Algae, fungi, bacteria and viruses. Multiplication of bacteria, Control of bacterial growth, pathogenic bacteria, food contamination, Industrial bacteriology.



## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Fourth Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	Statistics	BT-427	150	100	50
<b>2</b>	Fluid Mechanics	BT-428	150	100	50
<b>3</b>	Electronics & Instrumentation	BT-429	150	100	50
<b>4</b>	Computer Application	BT-430	75	50	25
<b>5</b>	Soil Mechanics	BT-431	75	50	25
<b>6</b>	Agricultural Economics & Farm Management	BT-432	75	50	25
<b>7</b>	Kinematics of Machines	BT-433	75	50	25

## **STATISTICS**

### **UNIT-I**

Statistics- Statistic- population parameter, Arithmetic, weighted, Geometric and Harmonic means, mode and median for ungrouped and grouped data. Frequency distribution, Standard deviation, mean deviation and coeff. of variation.

### **UNIT-II**

Simple and multiple correlation coefficients. Frequency polygon histograms and bar chart.

### **UNIT-III**

Fitting equations to data. Normal equation- regression coefficients. Curvilinear regression.

### **UNIT-IV**

Tests of significance 't' test, 'F' test and X test. Distribution- types, normal poisson and binomial distribution. Confidence levels.

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## **FLUID MECHANICS**

### **UNIT-I**

Ideal and real fluids - properties of fluids- pressure and its measurement Pascals law pressure forces on plane and curved surfaces- centre of pressure- buoyancy- metacentre-

### **UNIT-II**

Kinematics of fluid flow- liquids in relative equilibrium- laminar and turbulent flows velocity distribution - mean velocity- continuity equation- stream line, equipotential line-flow- net

### **UNIT-III**

Dynamics of fluid flow- Bernoulli's theorem- pipe flow- hydraulic gradient and energy gradient- fluid friction- Darcy and Weisbach equation-minor and major hydraulic losses,

### **UNIT-IV**

Flow through orifice, notches and open channel- syphon- power transmission through pipes- Vortex motion- water hammer- venturimeter, orifice meter

## **UNIT-V**

Simulations and model studies- Reynold's Number- Froude Number- Introduction to fluid machinery.

# **ELECTRONICS AND INSTRUMENTATION**

## **UNIT-I**

Electronic devices and their characteristics. Study of rectifiers, amplifiers, oscillators, operational amplifiers, multivibrators

## **UNIT-II**

Digital circuits; sequential and combinational systems. A/D and D/A conversion Thyristors and their applications.

## **UNIT-III**

Introduction to microprocessors. Programming of microprocessors using assembly language. Applications of microprocessors in data acquisition and control of agricultural engineering processes.

## **UNIT-IV**

Introduction to generalised instrumentation system. Absolute and secondary measurements. Accuracy, precision, sensitivity and errors in measurements. Primary sensors and transducers, measuring instruments for current, voltage, electrical power, flow, pressure, temperature, humidity, strain, force, torque and energy.

## **COMPUTER APPLICATION**

### **UNIT-I**

Introduction to computer application packages,

### **UNIT-II**

Use of computer application software packages like word processing, RDBMS, FOXPRO, LOTUS,

### **UNIT-III**

Harvard Graphics, XL, MS OFFICE, etc.,

### **UNIT-IV**

Introduction to UNIX and C.

### **UNIT-V**

Information management such as data storage/ retrieval, validation, security. Manipulation, presentation and report generation.

## **SOIL MECHANICS**

### **UNIT-I**

Engineering properties of soils,

### **UNIT-II**

Soil hydraulics; stress distribution; compressibility.

### **UNIT-III**

Pressure-void relationship; consolidation: shear strength, mohr's circle of stresses; active and passive earth pressures

### **UNIT-IV**

Stability analysis of earthen slopes: bearing capacity of soils, foundations.

## **AGRICULTURAL ECONOMICS AND FARM MANAGEMENT**

### **UNIT-I**

Basic terms and concepts in economics. Scope of economics. Laws of demand and market supply, factors governing supply, market and price determination under different market situation, farm produce marketing systems in India.

### **UNIT-II**

Place of agriculture in Indian economy. Depreciation and methods of calculating depreciation cost of cultivation per hectare, cost of production per quintal, economic size of holding. Government policies regarding economic incentives for enhancing productivity and production.

### **UNIT-III**

Benefit cost ratio, internal rate of return, payback period, net present value. Farm management- meaning, scope and importance of farm management.

### **UNIT-IV**

Farm planning and budgeting. Sources of farm finance. Problems relating to mechanization, management of land, labour, capital and farm machinery, irrigation systems, etc. Measures of farm efficiencies, viz., production efficiency, crop yield index, cropping intensity.

## **KINEMATICS OF MACHINES**

### **UNIT-I**

Elements, link, pairs, kinematic chain and mechanism, classification of pairs, lower and higher pairs, four bar chain, slider crank chain and inversions, Degree of Freedom, Determination of velocity and acceleration using graphical ( relative velocity and acceleration) method.

### **UNIT-II**

Introduction to belt drive, types of belt material, belt materials, length of belt, power transmitted, velocity ratio, Effects of centrifugal tension, Creep and slip of power transmission.

### **UNIT-III**

Cam, Types of Cam, Terminology used in cam and follower, Cam profile, Toothed gear.

### **UNIT-IV**

Gear train, Simple, compound, reverted and epicyclic gear trains, Determination of velocity ratio and train value by tabular method. Introduction to governor, Types of Governor.



## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Fifth Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	Irrigation & Drainage Engineering	BT-528	150	100	50
<b>2</b>	PHE of Cereals, Pulses & Oil seed	BT-529	150	100	50
<b>3</b>	Farm Machinery	BT-530	150	100	50
<b>4</b>	Hydrology	BT-531	75	50	25
<b>5</b>	Agricultural Business Management	BT-532	75	50	25
<b>6</b>	System Engineering	BT-533	150	100	50

## **IRRIGATION AND DRAINAGE ENGINEERING**

### **Unit I**

Definition, need of irrigation, Purpose of irrigation, importance of irrigation, sources of irrigation water, present status of development and utilization of different water resources of the country; common irrigation terminology.

### **Unit II**

Soil-water- plant-relationship, soil properties influencing irrigation management, soil water movement, concept of evapo-transpiration, soil moisture constants, measurement of soil moisture, depth of irrigation, frequency of irrigation, irrigation scheduling.

### **Unit III**

Water and irrigation requirement of crops, measurement of irrigation water, weir, notches, flumes and orifices and other methods; water conveyance, irrigation efficiencies.

### **Unit IV**

Irrigation methods of water application, border, check basin, furrow and contour irrigation; sprinkler and drip irrigation method, merits, demerits, selection and layout.

## **Unit V**

Water logging- causes and impacts; drainage, need of drainage, Purpose of drainage, importance of drainage objectives of drainage, types of surface drainage, design of surface drains; sub-surface drainage: purpose and benefits, conjunctive use of fresh and saline water.

# **POST-HARVEST ENGINEERING OF CEREALS, PULSES AND OIL SEEDS**

## **UNIT-I**

Unit operation in processing of cereals, oilseeds and pulses.

## **UNIT-II**

Working principles of equipment for milling, mixing; cleaning; grading

## **UNIT-III**

Drying; and storage for cereals, pulses and oilseeds.

## **UNIT-IV**

Moisture content determination; physical properties

## **UNIT-V**

Psychrometry; Energy and material balance; Solvent extraction; Process flow charts

## **FARM MACHINERY**

### **UNIT-I**

Status and scope of farm mechanization; principles of construction, operation and selection of farm machinery used for crop production,

### **UNIT-II**

Primary and secondary tillage equipment,

### **UNIT-III**

Sowing and planting equipment, inter-cultivation tools, plant protection equipment,

### **UNIT-IV**

Crop harvesting and threshing equipment; chaff cutters and silage filling equipment,

### **UNIT-V**

Land development machinery; performance and cost analysis; special farm machines for sugarcane, cotton, potato, and horticultural crops operation; human engineering and safety in farm machinery.

## **HYDROLOGY**

### **UNIT-I**

Hydrologic cycle and its comport; meteorological parameters and their measurement,

### **UNIT-II**

Interpretation of precipitation data; runoff- factors affecting rainfall-runoff relationship, runoff measurement computation and analysis.

### **UNIT-III**

Hydrograph analysis, unit hydrograph and synthetic hydrograph

### **UNIT-IV**

Stream flow measurement, flood routing, probability analysis of hydrological data; ground-water in hydrologic cycle; occurrence, distribution and movement of groundwater.

## **AGRI-BUSINESS MANAGEMENT**

### **UNIT-I**

Basics of agri-business management; Planning; Organising, Controlling.

### **UNIT-II**

Leading; Forecasting for Agri-Business; Location and layout of Facilities.

### **UNIT-III**

Work force management, Quality Management; Maintenance Management

### **UNIT-IV**

Financial Analysis of Agri-Business, Process Strategy; Inventory Management

## **SYSTEM ENGINEERING**

### **UNIT-I**

System concepts, System approach to Agricultural Engg., Linear programming problems, Mathematical formulation, Graphical solution; Simplex method;

### **UNIT-II**

Degeneracy and Duality in linear programming; transportation problems; Assignment problems; Decision analysis; Waiting line problems.

### **UNIT-III**

Project Management by PERT/CPM; Inventory control. Mathematical models of physical systems

### **UNIT-IV**

Modelling of agriculture systems and operations. Response of systems. Simulation.

### **UNIT-V**

Computer as a tool in system analysis.

## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Sixth Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	Building Materials & Structural Design	BT-630(N)	150	100	50
<b>2</b>	Farm Power	BT-631(N)	150	100	50
<b>3</b>	PHE of Horticultural Crops	BT-632(N)	150	100	50
<b>4</b>	Soil and Water Conservation Engineering	BT-633(N)	150	100	50
<b>5</b>	Refrigeration & Air- Conditioning	BT-634(N)	75	50	25
<b>6</b>	Machine Design	BT-635(N)	75	50	25



## **BUILDING MATERIAL AND STRUCTURAL DESIGN**

### **UNIT-I**

Bricks and tiles, stones

### **UNIT-II**

Pozzolanas, mortars, cement concrete

### **UNIT-III**

Timber and plywood, asbestos and A.C. sheets; metallic products

### **UNIT-IV**

Foundations; stone and brick masonry; D. P. C.; floors and roofs; windows

### **UNIT-V**

Plasting and pointing; ventilation; plumbing and drainage

## **FARM POWER**

### **UNIT-I**

Power availability on the farms from animate and inanimate sources of energy, their capacities and efficiencies

### **UNIT-II**

Tractor engine components and their construction

### **UNIT-III**

Operating principles and function of engine systems, valve and valve mechanism, fuel and air supply, cooling, lubrication, ignition, starting and electrical systems

### **UNIT-IV**

Engine governing; transmission systems of wheel and track type tractors, clutch and brake, gearbox, differential, PTO, belt pulley and draw-bars and final drive mechanisms

### **UNIT-V**

Power tillers and small engines for farm operations; performance and cost analysis of farm tractors and power tillers.

## **POST HARVEST ENGINEERING OF HORTICULTURAL CROPS**

### **UNIT-I**

Properties of fruits and vegetables; Food texture and rheology.

### **UNIT-II**

Process, parameters and equipment for sorting, washing, handling, peeling, slicing, blanching, mixing and handling, chilling.

### **UNIT-III**

Packaging, transportation, storage and preservation technology.

### **UNIT-IV**

Flow charts for manufacture of Fruits juice, fruits jam & jelley and Mango pickle with oil.

### **UNIT-V**

Application of quality control techniques.

## **SOIL AND WATER CONSERVATION ENGINEERING**

### **UNIT-I**

Soil erosion- types, water erosion, factors affecting erosion, mechanics of erosion classification of water erosion- splash, sheet, rill, gully and stream bank erosion.

### **UNIT-II**

Wind erosion and its control, windbreak and shelter belts

### **UNIT-III**

Contour farming, strip cropping, contour bunds, graded bunds and terraces.

### **UNIT-IV**

Design of vegetative and grassed waterways; gully control structures.

### **UNIT-V**

Watershed characteristics, watershed management.

## **REFRIGERATION AND AIR-CONDITIONING**

### **UNIT-I**

Principles- refrigeration effect - Carnot cycle, Bell coleman cycle- vapour compression cycle, temperature-entropy diagram, pressure-enthalpy charts, effect of dry compression wet compression- under cooling- superheating- actual vapour compression cycle.

### **UNIT-II**

Electrolux refrigerator. Centrifugal and steam jet refrigeration systems. Thermoelectric refrigeration systems. Vortex tube and other refrigeration systems. Ultra low temperature refrigeration.

**UNIT-III** Introduction and study of psychrometric chart and with process, comfort conditioning.

**UNIT-IV** Types and functions of air conditioning Physiological principles in air-conditioning, humidification and dehumidification- room dehumidifiers.

## **MACHINE DESIGN**

### **UNIT-I**

Basic principles; materials and manufacturing considerations in designing, fatigue and endurance limit; ISI and ISO codes

### **UNIT-II**

Design of basic machine parts like shafts, keys, spring, couplings design.

### **UNIT-III**

Design of joints, design and selection of machine components like gears, bearings;

### **UNIT-IV**

Design and drawing of simple machine units.

## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Seventh Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	FARM MACHINERY DESIGN		150	100	50
<b>2</b>	DAIRY AND FOOD ENGINEERING		150	100	50
<b>3</b>	GWWPE		150	100	50
<b>4</b>	RENEWABLE ENERGY		75	50	25
<b>5</b>	SOIL & WATER CONSERVATION STRUCTURES		150	100	50

## **FARM MACHINERY DESIGN**

### **UNIT-I**

Materials of construction of farm machinery and their properties.

### **UNIT-II**

design of power transmission components and systems in agricultural machines; fits and tolerances.

### **UNIT-III**

Design parameters of agricultural implements; force analysis of primary tillage tools and their hitching

systems.

### **UNIT-IV**

Design considerations of reapers, mowers, harvesters and threshing equipment.

### **UNIT-V**



application of design methods to the systems of selected farm machinery;  
bill of materials and construction cost in project design.

## **DAIRY AND FOOD ENGINEERING**

### **UNIT-I**

Properties of dairy food products.

### **UNIT-II**

Unit operation of various dairy and food processing Systems.

### **UNIT-III**

Process flow charts for product manufacture.

### **UNIT-IV**

Working principles of equipment for receiving, pasteurisation, sterilisation, homogenisation,

### **UNIT-V**

Filling and packaging, butter manufacture, evaporation, drying, freezing, juice extraction, filtration, membrane separation, thermal processing, plant utilities requirement.

**SUBJECT NAME: GROUND WATER WELL AND PUMP ENGINEERING**

**Unit I**

Occurrence and movement of ground water, aquifer and its types, classification of wells, familiarization of various types of bore wells common in the state, design of open well, groundwater exploration techniques, methods of drilling of wells.

**Unit II**

Design of assembly and gravel pack, installation of well screen, completion and development of well, groundwater hydraulics-determination of aquifer parameters by different method such as Theis, Jacob and Chow's etc.

**Unit III**

Theis recovery method, well interference, multiple well systems, surface and subsurface exploitation and estimation of ground water potential, quality of ground water, artificial groundwater recharge planning, modeling, ground water project formulation.

**Unit IV**

Pumping Systems: Water lifting devices; different types of pumping machinery, classification of pumps, component parts of centrifugal pumps; pump selection, installation and trouble shooting; design of centrifugal pumps,

**Unit V**

Performance curves, effect of speed on head capacity, power capacity and efficiency curves, effect of change of impeller dimensions on performance characteristics; hydraulic ram, propeller pumps, mixed flow pumps and their performance characteristics; priming, self priming devices, rotodynamic pumps for special purposes such as deep well turbine pump and submersible pump.

## **RENEWABLE ENERGY**

### **UNIT-I**

Introduction to conventional and non-conventional energy sources, Patterns of fuel consumption, potential of solar, wind, biogas, biomass, geothermal and other renewable energy sources.

### **UNIT-II**

Characteristics of the sun, the solar constant. Heat transfer for solar energy utilization, solar refrigeration, Heat conduction through plate, typical fin problem. Radiative heat transfer coefficient, beam and diffuse radiation, Determination of solar time and problems related to it. Introduction to solar energy measuring instruments. Introduction to solar gadgets viz., Solar Cooker, Water Heater, Drier, Still, PV system.

### **UNIT-III**

Aerobic and anaerobic bio-conversion process, principles and raw materials, properties of biogas, Benefits of biogas viz., Manure, domestic fuel, sanitation and health, motive power, numerical problems on selection of size of biogas plants. Biogas appliances

### **UNIT-IV**

Production of Biomass, broad classification, conversion of solid, liquid and gaseous fuels. Pyrolysis, gasification and their economics. Wind energy potential, study of various types of wind machines

## **SOIL & WATER CONSERVATION STRUCTURES**

### **UNIT-I**

Introduction, Classification of structure & their functional requirements, types of open channel flow, energy equation, momentum principles, specific energy, specific force.

### **UNIT-II**

Hydraulic jump, its types and applications, energy dissipation, jump efficiency, relative loss of energy, runoff measuring structure, H – Flume, Parshall Flume, weirs.

### **UNIT-III**

Drop spillway-its functional use etc. drop spillway - hydrologic design, drop spillway - hydraulic design, drop spillway - structural design, free board & wave freeboard.

### **UNIT-IV**

Chute spillway, drop inlet spillway Farm ponds.

## **DEPARTMENT OF AGRICULTURAL ENGINEERING**

<b>TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2018-19</b>					
<b>Eighth Semester</b>					
<b>THEORY</b>					
<b>S. No.</b>	<b>Subjects</b>	<b>Code No.</b>	<b>Max. Marks</b>	<b>External</b>	<b>Internal</b>
<b>1</b>	ADVANCED FARM POWER		150	100	50
<b>2</b>	PROCESS EQUIPMENT DESIGN		150	100	50
<b>3</b>	IRRIGATION AND DRAINAGE EQUIPMENT DESIGN		150	100	50
<b>4</b>	MINOR IRRIGATION AND COMMAND AREA DEVELOPMENT		75	50	25

## **ADVANCED FARM POWER**

### **UNIT-I**

Tractor performance characteristics; torque, speed, power and specific fuel consumption;

### **UNIT-II**

Traction theory; chassis mechanics stability; steering and turning, Ackerman's steering geometry.

### **UNIT-III**

Tractor hitches and hydraulic systems; tractor testing and controls.

### **UNIT-IV**

Human factors in tractor design and operational safety.

## **PROCESS EQUIPMENT DESIGN**

### **UNIT-I**

Application of design engineering for processing equipments

### **UNIT-II**

Design parameters, codes and materials selection.

### **UNIT-III**

Design of handling and milling equipments, dryers.

### **UNIT-IV**

Heat exchangers, Pressure vessels, Optimisation of design with respect to process efficiency, energy and cost; Application of computer techniques in design optimization.

## **IRRIGATION AND DRAINAGE EQUIPMENT DESIGN**

### **UNIT-I**

Design of irrigation wells - open well and tube wells - well diameter , thickness of casing, pipe and screens, openings of well screen, gravel packing design;

### **UNIT-II**

Centrifugal pumps - design of components, power requirement, pump characteristics, pump selection

### **UNIT-III**

Design of sprinkler irrigation - components, size of pipes, nozzles and matching pumping system.

### **UNIT-IV**

Design of drip irrigation - components, size of pipes, emitters.

### **UNIT-V**

Design of sub surface drainage system - tube diameter and perforation, filter design, outlet design.



## **MINOR IRRIGATION AND COMMAND AREA DEVELOPMENT**

### **UNIT-I**

Minor irrigation - definition, necessity, advantages and disadvantages, storage and diversion works, duty of water requirement of various crops, computation, conveyance, storage and application efficiencies.

### **UNIT-II**

Design of border strip and furrows and other irrigation methods- design and layout of sprinkler irrigation – Design and layout of drip irrigation- Evapotranspiration irrigation scheduling.

### **UNIT-III**

Command area development – components of CADA, various CADA programmers in India- Land consolidation- infrastructure development, organization and maintenance, on farm development works.

### **UNIT-IV**

Development- organization and application losses- remedial measures, farmer's role in system in system operation – farmer's committee for water distribution, strategic outlet command- stream size for efficiency, rotational irrigation system.