DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

First Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Engineering Mathematics-I	BT-114	150	100	50
2	Engineering Physics-I	BT-115	150	100	50
3	Soil Science	BT-116	75	50	25
4	Workshop Technology	BT-117	75	50	25
5	Environmental Control Engineering	BT-118	75	50	25
6	Technical Writing	BT-119	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Engineering Physics Lab	BT-165	50	30	20
2	Soil Science Lab	BT-166	50	30	20
3	Workshop Technology Lab	BT-167	50	30	20
4	Environmental Control Engg. Lab	BT-168	50	30	20
5	Technical Writing	BT-169	50	30	20
6	Engineering Graphics Lab	BT-170	100	60	40
7	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

Engineering 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-I

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-1I

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-1II

Polarisation- Production and detection of circularly and elliptically polarised light. Quarter and half wave plates, optical activity, specific rotation, Lonentz 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-1V

Crystal structure - Seven systems of crystals. Bravais space, lattice, crystal structure (bcc, fee and sc), lattice dimensions, lattice planes, miller indices and their significance, x-raysabsorption 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 thermome

Practicals

Surface tension by capillary rise and drop weight method- Viscosity by stokes and capillary flow method. Experimental confirmation of molecular speed. Young's double slit experiment- Newtons ring. Dispersive power of grating. Specific rotation and strength of sugar solution. Determination of refractive index of a prism with wavelength. Determination of wave length of light by diffraction grating. Determination of wave length of sodium light by newton ring. Determination of coefficient of viscocity by rotating cylindrical method. To determine the wavelength of laser light using Young's double slit experiment. To determine the slit width from the study of Fraun-Hoffner diffraction pattern using He-NE laser.

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

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,

TECHNICAL WRITING

UNIT-I

Reading comprehension-factual-formulating, translating, global comprehension -

UNIT-II

Language-in-use in terms of synonyms, antonyms, collection in context,

UNIT-III

Introduction to different types of writing-descriptive narrative and exposition, letter-writing-formal and

UNIT-1V

Informal-speech acts-norms of preparing introductory address, presidential address, and vote of thanks.

ENVIRONMENTAL CONTROL ENGINEERING

UNIT-I

Introduction - Water pollution and its impacts. Water quality parameters – Pollution monitoring - Importance of sampling - objectives - Types of samples -Preservation techniques - Selection of parameters - Water pollution control process – Primary and secondary treatment

UNIT-II

Air pollution and its effects - Sources - Classification - Impacts -Pollution monitoring - Air pollution control - Control at source - Dilution - Treatment control devices for gaseous Contaminants

UNIT-III

Types of solid wastes - Solid waste management - Processing - Disposal of solid waste - Hazard. Noise pollution - Decibels and levels - Sources of noise - effects - Noise attenuation - control measures.

UNIT-IV

Environmental impact - Types of impact - Quantification - impact tree – Environmental audit - Audit procedure - Post audit activities - Risk assessment - Techniques of risk assessment - Emergency control and disaster planning - Emerging trends in Biotechnologies pollution control methods - Case studies of major chemical disasters.

Engineering Graphics Lab

Construction and use of scales lettering, construction of plane geometrical figures, parabola, hyperbola and ellipse, special plane curves, cycloid, epicycloid, hypocycloid, involutes and spirals, helix and simple loci. Orthographic projection of points, lines, the rntraces and inclination, projection of solids like prism, cylinder, cone, pyramid, inter section and development of solids.

Construction of isometric scales, isometric projections of simple objects. Selection of solids and development of surfaces.

Forms of screw threads- BSW- square-metric, representations of threads, bolts, headed counter sunk-stud, screws, and set screws, nuts- hexagonal- square keys- types, taper sunk, taper- hollow, saddle- flat, saddle-round- gib head- feather and woodruff keys, spline shaft.

Bearings- types-journal- solid- bushed and plummer block- pulley assembly, drawings of tailstock-plummer block end simple agricultural implements.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Second Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Engineering Chemistry	BT-214	150	100	50
2	Engineering Mechanics	BT-215	150	100	50
3	Engineering Mathematics – II	BT-216	150	100	50
4	Surveying & Leveling	BT-217	150	100	50
5	Thermodynamics and Heat Engine	BT-218	75	50	25
6	Agronomy	BT-219	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Engineering Chemistry Lab	BT-264	50	30	20
2	Engineering Mechanics Lab	BT-265	50	30	20
3	Surveying & Leveling Lab	BT-267	50	30	20
4	Thermodynamics & Heat Engine Lab	BT-268	50	30	20
5	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

ENGINEERING 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- Defnation and its significance, theories of corrosion, Galvanic cell and concentration cell. Pitting and stress corrosion, Protection of corrosion. Use of inhibitors and passivasion. 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.

ENGINEERING 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, adjoins 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

AGRONOMY

UNIT-I

Definition and scope of Agronomy. Classification of crop. Effect of different weather parameters on crop growth and development.

UNIT-II

Principles of tillage. Tilth and its characteristics. Tillage implements.

UNIT-III

Soil-water-plant relationship, Water requirement of crops and irrigation scheduling, weeds and their control, crop rotation, cropping systems, mono, double and multiple cropping. Relay cropping and mixed cropping.

UNIT-IV

Cultivation practices of important field crops (Wheat, Maize, Sugarcane), improved varieties, seed rate, time and method of sowing, maturing. Fertilization and plant protection. Concept of dry farming, rain water harvesting and insitu moisture conservation.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Third Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Strength of Materials	BT-327	150	100	50
2	Heat & Mass Transfer	BT-328	75	50	25
3	Engineering Mathematics – III	BT-329	150	100	50
4	Computer Science	BT-330	75	50	25
5	Electrical Engineering	BT-331	150	100	50
6	Horticultural	BT-332	75	50	25
7	Food Science	BT-333	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Heat & Mass Transfer Lab	BT-378	50	30	20
2	Computer Science Lab	BT-380	50	30	20
3	Electrical Engineering Lab	BT-381	50	30	20
4	Food Science Lab	BT-383	50	30	20
5	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

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 beamscentroid 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; Hystersis and eddy current losses, two port network parameters. Force acting or 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, prunning 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, Alleger, fungi, bacteria and viruses. Multiplication of bacteria, Control of bacterial growth, pathogenic bacteria, food contamination, Industrial bacteriology.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Fourth Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Statistics	BT-427	150	100	50
2	Fluid Mechanics	BT-428	150	100	50
3	Electronics & Instrumentation	BT-429	150	100	50
4	Computer Application	BT-430	75	50	25
5	Soil Mechanics	BT-431	75	50	25
6	Agricultural Economics & Farm Management	BT-432	75	50	25
7	Kinematics of Machines	BT-433	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Fluid Mechanics	BT-478	50	30	20
2	Electronics & Instrumentation	BT-479	50	30	20
3	Computer Application	BT-480	50	30	20
4	Soil Mechanics	BT-481	50	30	20
5	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

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' lest, 'F' test and X test. Distribution- types, normal poison and binomial distribution. Confidence levels.

FLUID MECHANICS

UNIT-I

Ideal and real fluids - properties of fluids- pressure and its measurement Pascals lawpressure 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.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Fifth Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Irrigation & Drainage Engineering	BT-528	150	100	50
2	PHE of Cereals, Pulses & Oil seed	BT-529	150	100	50
3	Farm Machinery	BT-530	150	100	50
4	Hydrology	BT-531	75	50	25
5	Agricultural Business Management	BT-532	75	50	25
6	System Engineering	BT-533	150	100	50
7	Irrigation & Drainage Engineering	BT-528	150	100	50

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Irrigation & Drainage Engineering Lab	BT-578	50	30	20
2	PHE of Cereals, Pulses & Oil seed Lab	BT-579	50	30	20
3	Farm Machinery Lab	BT-580	50	30	20
4	Hydrology Lab	BT-581	50	30	20
5	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical   =   1000

Irrigation & 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 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.

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. Computer as a tool in system analysis.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Six Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Building Materials & Structural Design	BT-630(N)	150	100	50
2	Farm Power	BT-631(N)	150	100	50
3	PHE of Horticultural Crops	BT-632(N)	150	100	50
4	Soil and Water Conservation Engineering	BT-633(N)	150	100	50
5	Refrigeration & Air- Conditioning	BT-634(N)	75	50	25
6	Machine Design	BT-635(N)	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Farm Power	BT-681(N)	50	30	20
2	Refrigeration & Air- Conditioning	BT-684(N)	50	30	20
3	PHE of Horticultural Crops	BT-682(N)	50	30	20
4	Soil And Water Conservation Engineering	BT-683(N)	50	30	20
5	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

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; metalic products

UNIT-IV

Foundations; stone and brick masonary; 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. Watershed charactertistics, 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 dehumidifers.

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.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Seven Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Farm Machinery Design	BT-731(N)	150	100	50
2	Dairy And Food Engineering	BT-732(N)	150	100	50
3	Ground Water Well & pump Engineering	BT-733(N)	150	100	50
4	Renewable energy	BT-734(N)	75	50	25
5	Soil &Water Conservation Structure	BT-735(N)	75	50	25
6	Elective –I Food Engineering / Watershed Management	BT-736(N)/ BT -737(N)	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Dairy And Food Engineering Lab	BT-782(N)	50	30	20
2	Project	BT-784(N)	100	-	100
3	Training Seminar	BT-781(N)	75	-	75
4	Ground Water Well & pump Engineering Lab	BT-783(N)	50	30	20
5	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

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.

GROUND WATER, WELLS AND PUMPS

UNIT I

Occurrence and movement of ground water, aquifer and its types, classification of wells, steady and transient flow into partially, fully and non-penetrating tube wells and open wells, familiarization of various types of bore wells common in the State.

UNIT II

Design of open well, groundwater exploration techniques, methods of drilling of wells, percussion, rotary, reverse rotary, 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. Their recovery method,well interference, multiple well systems.

UNIT III

Surface and subsurface exploitation of ground water potential, quality of ground water, artificialgroundwater 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 troubleshooting.

UNIT V

Design of centrifugal pumps, performance curves, effect of speed on head capacity, power capacity and efficiency curves, effect of change of impeller dimensions on performance characteristics.

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.

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 for functional requirements, types of open channel flow, energy equation, moment 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.

FOOD ENGINEERING

UNIT-I

Heat processing methods of applying heat to food, sterilization, thermo bacteriology, evaporation, evaporator capacity, overall heat transfer – co efficient evaporator economy, capacity, Extrusion cooking.

UNIT-II

Multiple effect system dehydration and drying, free moisture, equilibrium moisture content and water activity. Estimation BET equation

UNIT-III

Classification of dryers, tray drum and spray drier for liquids and pastes, freeze drying, vacuum drying, concentration, freeze concentration, membrane concentration, freezing frozen products.

UNIT-IV

Preservation techniques, low temperature preservation, irradiation- of foods, microwave heating, dielectric heating of foods.

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2016-17

Eight Semester

THEORY

S. No.	Subject	Code No.	Max. Marks	External	Internal
1	Irrigation & Drainage Equipment Design	BT-831(N)	150	100	50
2	Process Equipment Design	BT-832(N)	150	100	50
3	Advance Farm Power	BT-833(N)	150	100	50
4	Elective-II (MICAD)/ Food Industry Management	BT-834(N)/ BT-835(N)	75	50	25

PRACTICAL

S. No	Practical	Code No.	Max. Marks	External	Internal
1	Irrigation & Drainage Equipment Design	BT-881(N)	50	30	20
2	Process Equipment Design	BT-882(N)	50	30	20
3	Project	BT-883(N)	325	225	100
4	General Proficiency	GP	50	-	50

Grand Total of Theory & Practical = 1000

Irrigation and Drainage Equipment Design

UNIT-I

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

UNIT-II

Indigenous water lifting devices and their design, reciprocating and centrifugal pumps- design of components, power requirement, pump characteristics, pump selection and installation.

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, drippers and fertigation unit.

UNIT-V

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

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.

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.

FOOD INDUSTRY MANAGEMENT

UNIT-I

Definition and classification of food industries- responsibilities qualities of management, characteristics and labor efficiency, wages and incentives decision making and production management

UNIT-II

Production planning- production control manufacturing systems ,job production ,batch ,mass production and process charts, routing and scheduling ,time and motion study, line of balance technique.

UNIT-III

Inventory control- types of inventory, economic lot size ,raw materials management- economic order quantity ,ABC Analysis ,plant location ,factors- plant layout- types ,advantages- characteristics of an efficient layout-techniques of plant layout

UNIT-IV

Product selection and development - Introduction of new product, stages of product development, specialization, diversification sales forecasting techniques, investment and replacement, concept of present value future worth and internal rate of return, quality control and inspection, acceptance sampling, control charts, variable and attributes, optimization techniques in transportation.