DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2019-20					
First Semester					
THEORY					
S. No.	**Subjects**	**Code No.**	**Max. Marks**	**External**	**Internal**
1	Engineering Mathematics-I	BT-114			
2	Engineering Physics	BT-115			
3	Principles of Soil Science	BT-116			
4	Workshop Technology and Practices	BT-117			
5	Environmental Science and Disaster Management	BT-118			
6	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-1II

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-1V

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-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-III

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-IV

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 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

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 andover-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, useof 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, structureand 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-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemicspecies 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. Waterpollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclearhazards. Solid Waste Management: causes, effects and control measures of urban and industrialwastes. Role of an individual in prevention of pollution. Pollution case studies. Social Issues andthe Environment from Unsustainable to Sustainable development, Urban problems related toenergy. 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. dies. Wasteland reclamation. Consumerism and waste products.Environment Protection Act. Air (Prevention and

Control of Pollution) Act. Water (Preventionand 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 coldwaves, 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, railaccidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disasterat national and global levels. International strategy for disaster reduction. Concept of disastermanagement, 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 nonverbalcommunication; listening and note taking, writing skills, oral presentation skills; field diaryand lab record; indexing, footnote and bibliographic procedures. Reading and comprehensionof 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

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2019-20

Second Semester

THEORY

S. No.	Subjects	Code No.	Max. Marks	External	Internal
1	Engineering Chemistry	BT-214			
2	Engineering Mechanics	BT-215			
3	Engineering Mathematics – II	BT-216			
4	Surveying & Leveling	BT-217			
5	Thermodynamics, Refrigeration & Air-Conditioning	BT-218			
6	Introduction to Agronomy & Horticulture	BT-219			

ENGG. CHEMISTRY

UNIT-I

Water- Hardness, determination of hardness by complexiметric (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.

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, 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

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 ultiplecropping,relay,sequential and inter cropping. Tillage- definitionobjectives– types oftillage- tillage implements – tilth - characteristics of good tilth - Soilproductivity and fertility- Crop nutrition – nutrients –classification – Nutrient sourcesorganicmanures –fertilizers – biofertilizers- Integrated Nutrient Management-Importance ofwater in plant growth- Soil properties influencing moisture availability – texture, structure andorganic matter status-Irrigation and drainage. Weed control – definition and characteristicsof weeds, classification of weeds – damages due to weeds - benefits of weeds. -Control vs prevention of weeds – methods ofweed control-Classification of herbicides–Integrated weedmanagement. Soil and its management-Definitions and importance of horticulture Economicimportance and classification of horticultural crops and their culture and nutritive value- areaand production- exports and imports- fruit, vegetables, plantation and spice crops-soil andclimate–principles-planning and layout- management of orchards- planting systems andplanting densities- Principles and methods of pruning and training of fruit, plantation cropsuseof growth regulators in horticulture crops-Horticultural zones of state and country.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS *YEAR :- 2019-20*					
Third Semester					
		THEORY			
S. No.	***Subjects***	***Code No.***	***Max. Marks***	***External***	***Internal***
1	*Engineering Mathematics - III*	*BT – 327*			
2	*Strength of Materials*	*BT – 328*			
3	*Principles of Horticulture Crops and Plant Protection*	*BT – 329*			
4	*Web designing and Internet Applications*	*BT – 330*			
5	*Heat & Mass Transfer*	*BT – 331*			
6	*Electrical Machines and Power Utilization*	*BT – 332*			

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.

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.

Principles of Horticultural Crops and Plant Protection

Scope of horticultural. Soil and climatic requirements for fruits, vegetables and floriculture crops, improved varieties, Criteria for site selection, layout and planting methods, nursery raising, commercial varieties/hybrids, sowing and planting times and methods, seed rate and seed treatment for vegetable crops; macro and micro propagation methods, plant growing structures, pruning and training, crop coefficients, water requirements and critical stages, fertilizer application, fertigation, irrigation methods, harvesting, grading and packaging, post harvest practices, Garden tools, management of orchard, Extraction and storage of vegetables seeds. Major pests and diseases and their management in horticulture crops.

Fluid Mechanics and Open Channel Hydraulics

Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal's law, pressure forces on plane and curved surfaces, centre of pressure, buoyancy, meta centre and meta centric height, condition of floatation and stability of submerged and floating bodies; Kinematics of fluid flow: Lagrangian and Eulerian description of fluid motion, continuity equation, path lines, streak lines and stream lines, stream function, velocity potential and flow net. Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion; Dynamics of fluid flow, Bernoulli's theorem, venturimeter, orifice meter and nozzle, siphon; Laminar flow: Stress strain relationships, flow between infinite parallel plates both plates fixed, one plate moving, discharge, average velocity; Laminar and turbulent flow in pipes, general equation for head loss Darcy, Equation, Moody's diagram, Minor and major hydraulic losses through pipes and fittings, flow through network of pipes, hydraulic gradient and energy gradient; Flow through orifices (Measurement of Discharge, Measurement of Time),Flow through Mouthpieces, Flow over Notches , Flow over weirs, Chezy's formula for loss of head in pipes, Flow through simple and compound pipes, Open channel design and hydraulics: Chezy's formula, Bazin's formula, Kutter's Manning's formula, Velocity and Pressure profiles in open channels, Hydraulic jump; Dimensional analysis and similitude: Rayleigh's method and Buckingham's `Pi' theorem, types of similarities, dimensional analysis, dimensionless numbers. Introduction to fluid machinery.

Web Designing and Internet Applications

Basic principles in developing a web designing, Planning process, Five Golden rules of web

designing, Designing navigation bar, Page design, Home Page Layout, Design Concept. Basics in Web Design, Brief History of Internet, World Wide Web , creation of a web site, Web Standards, Audience requirement. Introduction to Java Script, variables & functions, Working with alert, confirm and prompt, Connectivity of Web pages with databases; Project.

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.

Electrical Machines and Power Utilization

Electro motive force, reluctance, laws of magnetic circuits, determination of ampere-turns for

series and parallel magnetic circuits, hysteresis and eddy current losses, Transformer: principle ofworking, construction of single phase transformer, EMF equation, phasor diagram on load, leakage reactance, voltage regulation, power and energy efficiency, open circuit and short circuit tests,principles, operation and performance of DC machine (generator and motor), EMF and torque equations, armature reaction, commutation, excitation of DC generator and their characteristics,DC motor characteristics, starting of shunt and series motor, starters, speed control methods-field and armature control, polyphase induction motor: construction, operation, phasor diagram, effect of rotor resistance, torque equation, starting and speed control methods, single phase induction motor: double field revolving theory, equivalent circuit, characteristics, phase split, shaded pole motors, various methods of three phase power measurement; power factor, reactive and apparent power, Concept and analysis of balanced poly-phase circuits; Series and parallel resonance.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS
YEAR :- 2019-20

Fourth Semester

THEORY

S. No.	Subjects	Code No.	Max. Marks	External	Internal
1	Fluid Mechanics and open Channel Hydraulics	BT – 428			
2	Applied Electronics & Instrumentation	BT – 429			
3	Theory of Machines	BT – 430			
4	Soil Mechanics	BT – 431			
5	Entrepreneurship Development and Business Management	BT – 432			
6	Computer Programming and Data Structure	BT – 433			

Fluid Mechanics and Open Channel Hydraulics

Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal's law, pressure forces on plane and curved surfaces, centre of pressure, buoyancy, meta centre and meta centric height, condition of floatation and stability of submerged and floating bodies; Kinematics of fluid flow: Lagrangian and Eulerian description of fluid motion, continuity equation, path lines,

streak lines and stream lines, stream function, velocity potential and flow net. Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion; Dynamics of fluid flow, Bernoulli's theorem, venturimeter, orifice meter and nozzle, siphon; Laminar flow: Stress strain relationships, flow between infinite parallel plates both plates fixed, one plate moving, discharge, average velocity; Laminar and turbulent flow in pipes, general equation for head loss Darcy, Equation, Moody's diagram, Minor and major hydraulic losses through pipes and fittings, flow through network of pipes, hydraulic gradient and energy gradient; Flow through orifices (Measurement of Discharge, Measurement of Time),Flow through Mouthpieces, Flow over Notches , Flow over weirs, Chezy's formula for loss of head in pipes, Flow through simple and compound pipes, Open channel design and hydraulics: Chezy's formula, Bazin's formula, Kutter's Manning's formula, Velocity and Pressure profiles in open channels, Hydraulic jump; Dimensional analysis and similitude: Rayleigh's method and Buckingham's `Pi' theorem, types of similarities, dimensional analysis, dimensionless numbers. Introduction to fluid machinery.

Applied Electronics and Instrumentation

Semiconductors. p—n junction. V—I characteristics of p—n junction. diode as a circuit element. rectifier. clipper. damper, voltage multiplier, capacitive filter. diode circuits for OR &AND (both positive and negative logic), bipolar junction transistor: operating point. classification (A.B & C) of amplifier. various biasing methods (fixed. self potential divider). h-parameter model of a transistor. analysis of small signal. CE amplifier. phase shift oscillator, analysis of differential amplifier using transistor. ideal OP-AMP characteristics. linear and non-linear applications of OP-AMP (adder. subtractor. integrator, active rectifier. comparator. differentiator. differential, instrumentation amplifier and oscillator). zener diode voltage regulator. transistor series regulator. current limiting. OP-AMP voltage regulators. Basic theorem of Boolean algebra. Combinational logic circuits(basic gates. SOP rule and Kmap). binary ladder D/A converter, successive approximation A/D converter, generalized instrumentation, measurement of displacement. temperature. velocity, force and pressure using potentiometer. resistance thennometer. thermocouples. Bourclen tube. LVDT. strain gauge and tacho-generator.

Theory of Machines

Elements, links, pairs, kinematics chain, and mechanisms. Classification of pairs and mechanisms. Lower and higher pairs. Four bar chain, slider crank chain and their inversions. Determination of velocity and acceleration using graphical (relative velocity and acceleration) method. Instantaneous centers. Types of gears. Law of gearing, velocity of sliding between two teeth in mesh. Involute and cycloidal profile for gear teeth. Spur gear, nomenclature, interference and undercutting. Introduction to helical, spiral, bevel and worm gear. Simple, compound, reverted, and epicyclic trains. Determining velocity ratio by tabular method. Turning moment diagrams, coefficient of fluctuation of speed and energy, weight of flywheel, flywheel applications. Belt drives, types of drives, belt materials. Length of belt, power transmitted, velocity ratio, belt size for flat and V belts. Effect of centrifugal tension, creep and slip on power transmission, Chain drives. Types of friction, laws of dry friction. Friction of pivots and collars. Single disc, multiple disc, and cone clutches. Rolling friction, anti friction bearings. Types of governors. Constructional details and analysis of Watt, Porter, Proell governors. Effect of friction, controlling force curves. Sensitiveness, stability, hunting, iso-chronism, power and effort of a governor. Static and dynamic balancing. Balancing of rotating masses in one and different planes.

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.

Entrepreneurship Development and Business Management

Entrepreneurship, management – Management functions – planning-Organizing -Directing – motivation – ordering – leading – supervision-Communication and control – Capital – Financial management – importance of financial statements – balance sheet – profit and loss statement, Analysis of financial statements – liquidity ratios – leverage ratios, Coverage ratios – turnover ratios – profitability ratios, Agro-based industries – Project – project cycle – Project appraisal and evaluation techniques – undiscounted measures – payback period – proceeds per rupee of outlay, Discounted measures – Net Present Value (NPV) – Benefit-Cost Ratio (BCR) – Internal Rate of Return (IRR) – Net benefit investment ratio (N / K ratio) – sensitivity analysis-Importance of agribusiness in Indian economy International trade-WTO agreements – Provisions related to agreements in agricultural and food commodities. Agreements on agriculture (AOA) – Domestic supply, market access, export subsidies agreements on sanitary and phyto-sanitary (SPS) measures, Trade related intellectual property rights (TRIPS). Development (ED): Concept of entrepreneur and entrepreneurship Assessing overall business environment in Indian economy– Entrepreneurial and managerial characteristics- Entrepreneurship development Programmes (EDP)- Generation incubation and commercialization of ideas and innovations- Motivation and entrepreneurship development- Globalization and the emerging business entrepreneurial environment- Managing an enterprise: Importance of planning, budgeting, monitoring evaluation and follow-up managing competition. Role of ED in economic development of a country- Overview of Indian social, political systems and their implications for decision making by individual entrepreneurs- Economic

system and its implications for decision making by individual entrepreneurs- Social responsibility of business. Morals and ethics in enterprise management- SWOT analysis- Government schemes and incentives for promotion of entrepreneurship. Government policy on small and medium enterprises (SMEs)/SSIs/MSME sectors- Venture capital (VC), contract farming (CF) and joint ventures (JV), public-private partnerships (PPP)- Overview of agricultural engineering industry, characteristics of Indian farm machinery industry.

Computer Programming and Data Structures

Introduction and historical background: Review of computer technology; Processor, memory, secondary storage, display devices and other peripheral devices; Basic computer organization, future trends; Brief review of present-day applications, programming; Introduction to systems software, applications software and programming language; Algorithms and flow-charts: Input-processing-output model of a computer program; Role of the compiler and the integrated development environment; Introduction to C: Structure of a C program, simple data types, declarations, operators and expressions; The assignment statement; Library functions; Control Structures: Conditional and iterative execution of statements; Importance of documentation;

Nesting of control structures and the use of indentation to indicate nesting levels; Labels and the "go to" statement; Arrays; Single and multi-dimensional arrays: Character strings and string functions; Functions: Scope rules; Argument passing by reference and by value; Storage classes; Use of function prototypes; Structures, unions and user-defined types; Operations on files: Concept of standard input and output files; Formatting of data on input and output; Use of include files; Introduction to high level languages; Primary data types and user defined data types, variables, typecasting, operators, building and evaluating expressions, standard library functions, managing input and output, decision making, branching, looping, arrays, user defined functions, passing arguments and returning values, recursion, scope and visibility of a variable, string functions, structures and union, pointers, stacks, push/pop operations, queues, insertion and deletion operations, linked lists.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2019-20					
Fifth Semester					
THEORY					
S. No.	**Subjects**	**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

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 safely 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

TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2019-20					
Sixth Semester					
THEORY					
S. No.	**Subjects**	**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

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.

UNIT-V

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.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2019-20					
Seventh Semester					
THEORY					
S. No.	**Subjects**	**Code No.**	**Max. Marks**	**External**	**Internal**
1	FARM MACHINERY DESIGN		150	100	50
2	DAIRY AND FOOD ENGINEERING		150	100	50
3	GWWPE		150	100	50
4	RENEWABLE ENERGY		75	50	25
5	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 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.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TEACHING SCHEME AND EXAMINATION MARKS YEAR :- 2019-20					
Eighth Semester					
THEORY					
S. No.	**Subjects**	**Code No.**	**Max. Marks**	**External**	**Internal**
1	ADVANCED FARM POWER		150	100	50
2	PROCESS EQUIPMENT DESIGN		150	100	50
3	IRRIGATION AND DRAINAGE EQUIPMENT DESIGN		150	100	50
4	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.