

Faculty of Engineering and Technology



AGRICULTURAL ENGINEERING

MAHATMA GANDHI CHITRAKOOT GRAMODAYA VISHWAVIDYALAYA CHITRAKOOT, SATNA (M.P.) - 485 331

> MAHATMA GANDHI CHITRAKOOT GRAMODAYA VISHWAVIDYALAYA

> > **ORDINANCE FOR B.TECH.**

Programme Offered		B.Tech. (Agricultural Engineering)	
	:	B.Tech. (Food Technology)	
	:	B.Tech. (Agricultural Engineering)	
Intake	:	30 Students in each course, can be increased with permission of AICTE.	
System of Education	:	Credit System on semester basis.	
Eligibility for Admission	:	10+2 With Physics, Chemistry and Mathematics or Equivalent.	
Mode of Admission	:	Entrance examination conducted by VYAPAM, Bhopal	
Duration of Course	:	8 Semesters	
Examination and Evaluation	:	Internal (20%) + External (80%)	
Grading	:	10-point scale	

Evaluation of the programme will be referred to as grading and shall be measured by the quality of performance in that course by assigning course grade as indicated below :

Comulative Grade Point Average	: Description of Performance		
8.5 to 10.0	: First Class with distinction		
6.5 to 8.4	: First Class		
5.0 to 6.4	: Second Class		
Below 5.0	: Fail		

Student obtaining Grading point of less than 5.0 will be declared as Fail (F). The course with grade point of 5.0 or more will be treated as cleared.

Minimum OGPA required for degree : To qualify for a degree the student shall complete all the prescribed courses with CGPA of not less than 5.0

Grade : It is a measure of quantity of the performance of a student work done in a course at the end of a semester. It is computed by dividing the percentage of marks obtained in a course by ten. It shall be expressed on a 10-point scale upto first decimal place.

Grade-Point : A grade point is product of course credit and grade secured by a student in a course. It shall be expressed upto first decimal place.

Grade-Point Average : It is a measure of Quantity of work done in a semester. It is a quotient of the total grade point secured by a student in various courses registered in a semester divided by the total course credit during that semester. It shall be expressed upto first decimal Place.

Cumulative Overall Grade-Point Average (CGPA) : It is a measure of overall cumulative performance of a student on completion of two or more semesters. It is computed by dividing total member of course grade points earned by a student over the semesters by the total number of credits. It shall be expressed up to first decimal place.

Attendance : Normally the attendance should be 100%. The Minimum required by a student is 80%. The attendance can be condoned by Dean /Director/CSSC upto 10% on justifiable grounds.

Maximum number of semesters permitted to complete the course : 12 semesters

Make-up examination : The students of final year shall be allowed for make-up examination on one or more grounds such as hospitalisation; death of parents; own marriage; attending interview and attending court case (s) etc.

Procedure for awarding sessional marks : For theory subjects one midterm exam of 10 marks will be conducted, 5 marks for assignments and five marks for quizzes are given by the subject teacher .

Procedure for evaluation of practicals/extension etc. : The internal assessment will be based on practicals, extension work, the submitted report, test conducted if any and attendance (attendance valuation not more than 20%). End semester evaluation will normally involve external examinar.

Fee : As prescribed by the VYAPAM/University from time to time.

Matters not provided for in this ordinance shall be governed by the orders of the Chairman Academic Council.

B.Tech. (Agricultural Engineering) I Sem Sub: Engineering Mathematics I (3+1+0)

UNIT- I

Maclaurin's and Taylor's theorem. Partial differentiation. Euler's theorem and its application in approximation and error. Maximum and minimum of one and two variables. Tangents and Normal. Curvature, Indeterminate forms.

UNIT- II

Definite Integral as limit of a sum, Application in summation of series. Beta and Gamma functions. Double and triple integral. Length of the curves, Volumes and surfaces.

UNIT-III

Ordinary differential equations of first order. Linear higher order differential equation with constant coefficients. Homogeneous linear differential equation. Simultaneous differential equations.

UNIT - IV

Rank, Solution of simultaneous equation by elementary transformation, Consistency of equation. Eigen Value and Eigen Vectors. Calley-Hamilton theorem. Algebra of Logic, Fuzzy Logic.

UNIT- V

Boolean Algebra Principle of Duality Basic theorems, Boolean expressions and functions. Graph Theory, Graphs Sub graphs, degree and distance, Tree, Cycles and Network

References:

- 1. Differential Calculus- By Gorakhprasad
- 2. Higher Engg. Mathematics- By B.S. Grawal.
- 3. Integral Calculus- By A.R. Vashishta & H.K. Sharma.
- 4. Statistics- By Ray and Sharma
- 5. Boolean Algeba By Thakur & Shrivastava
- 6. Higher Engg Mathematics- H.K.Dass

B.Tech. (Agricultural Engineering) I Sem Sub: Communication Skill (3+0+0)

UNIT-I

LANGUAGE AND SKILL OF COMMUNICATION

Linguistic Techniques, Modern usage and style – comprehension skills, English Phonetic symbols/signs, Oral Presentation- Audition.

UNIT-II

APPLICATION OF LINGUISTIC ABILITY

Writing of definitions of engineering terms, Objects, processes and principles (Listening). Topics of General Interest, Reproduction from business, daily life, travel, health, buying & selling, company structure, systems etc

UNIT -III

LETTER WRITING

Applications, Enquiry, Calling quotation, Tenders. Order and complaint.

UNIT-IV

Precise Writing, Noting and drafting, Technical Descriptions of simple engineering objects and processes (Writing) Report writing, Précis writing, note writing, slogan writing comment, speech advertising.

UNIT -V

Writing technical reports of the type of observation report, Survey report, Report of trouble, Laboratory Report and Project Report on the subjects of engineering. (Speaking) Vocabulary, Presentations, Demonstrations, Conversation- Telephone media, socializing, cultural events, debates, speech.

REFERENCES

Business Correspondence and Report Writing – By Krishna Mohan, Prentice Hall India Living English Structure – By W. Stannard Allen, Longmans. Student's Grammar- By Dev Willys Collins (Harper) Spoken English for India – By R.K. Bansal & IB Garrioson (Orient Longman) New International Business English – By Joans and Alexander (OUP) Testing English as a Second Language – By David P. Harris (McGraw Hill Pub.)

B.Tech. (Agricultural Engineering) I Sem Basic Electrical Engineering (3+1+2)

UNIT -I

AC CIRCUITS

Review of I-phase as circuits under sinusoidal steady state. Active, reactive and apparent power, power factor. 3- Phase AC circuits, star and delta connections. 3- Phase source and load. Analysis of balanced and unbalanced systems. Power in 3 phase circuits and their measurements.

UNIT -II

MAGNETIC CIRCUITS

Review of laws of electromagnetism. Flux, e.m.f and their relation. Analysis of magnetic and electric circuits. Saturation, B-H curves, fringing and leakage. AC excitation in magnetic circuits. Induced voltage, Hysteresis effect and eddy currents.

UNIT -III

TRANSFORMERS

Single-phase transformer, Basic concepts and construction features. Types of transformers, Voltage, current and impedance transformation. Equivalent circuits. Per unit system, voltage regulation, losses and efficiency. Testing of transformers. Auto transformers.

UNIT -IV

ELECTRO MECHANICAL ENERGY CONVERSION

Principles of energy conversion. Production of force and e.m.f. Singly and multiply excited magnetic field system. Torque production and torque balance. General analysis of electromechanical System.

UNIT -V

ROTATING ELECTRIC MACHINES

General construction. Definitions and terminologies, generation of e.m.f in rotating machines. Voltage in DC and AC machines. Air gap e.m.f in DC and AC machines. Rotating magnetic field. Torque production. Principle of operation and application of DC, 3- phase synchronous and induction machines. Single phase induction motors. Insulating materials, name plate rating, frame size, duty cycles, cooling, enclosures materials and standards.

PRACTICAL

Measurement of impedance of RL, RC and RLC circuits. Study of Resonance phenomenon Measurement of active and reactive powers in I – phase and 3-phase Study of no load current waveform in a single phase transformer using CRO

- Study of transformer name plate rating, determination of ratio and polarity Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions. Verification by load test
- Study of constructional features of DC machines. Magnetization and load characteristics of DC generator

Characteristics of DC motors. Study of 3 and 4 point starters for DC shunt motors

- Speed control of DC motor by armature resistance control and field resistance control and armature voltage control
- Study of constructional features of K3- phase induction motors. No load, blocked rotor and load tests on 3 phase Induction motors

Starting methods and construction of Single phase Induction motors.

REFERENCES

Electrical Machinery, A.E. Fitzgerald, C. Kingsley and Umans, Mc Graw Hill, 5th Edition, 1992 Principles of Electrical Engineering, Vincent Del Toro, Prentice Hall, 1987

Basic Electrical Engineering, A.E. fitzgerald, Higginbotham and Grabel, Mc Graw Hill

Basic Electrical Engineering, I.J. Nagrath, Tata Mc Graw Hill, 1991

Electrical Machinery, P.S. Bimbhara

Basic Electrical Engineering, V.N. Mittle

B.Tech. (Agricultural Engineering) I Sem Engineering Physics (3+1+2)

UNIT -I

QUANTUM PHYSICS

Matter waves & its experimental verification. Wave. Group and particle velocity & their relation. Uncertainty principle with elementary proof & application to Microscope & Single slit. Characteristics and continuous X-rays. Duan Huntt limits. Moseley's law. ?Bragg's equation, Laws of diffraction Bragg's spectrometer. Compton Effect. Electron reflection. Bethe's Law. Electron gun. Working and application of CRT & CRD viz measurement of voltage, frequency and phase etc. Bainbridge mass spectrograph & Electron Microscope.

UNIT-II

RAY & WAVE OPTICS

Cardinal points of a co-axial lens system Nodal slide experiment. Idea of Spherical & Chromatic aberration, coma, astigmatism and distortion Ramsden & Huygens's eye pieces and their cardinal points, Fresnel's biprism. Newton's rings and Michelson's Interferometer experiments. Diffraction at single slit, double slit and diffraction grating. Rayleigh criterion, resolving power of a telescope, microscope, grating and prism. Concept of polarized light, Brewster's laws, Double reflection, Nicol prism, quarter & mission Nuclear reactors, its sight selection and working Giger-Muller Counter, Mass spectrographs, Idea of cosmic rays.

UNIT -III

NUCLEAR PHYSICS

Static properties and applications of nuclear model: Gammow, liquid drop and shell models, Linear Particle accelerator, Cyclotron, Synchroutron, Synchrocyclotron, and Betatron, differential cross section, chain reacting, critical size. Nuclear fusion &n mission Nuclear reactors, its sight selection and working. Giger-Muller Counter, Mass pectrographs, Idea of cosmic rays.

UNIT -IV

DIGITAL ELECTRONICS

Sumber system used in digital electronics: decimal, binary, octa, hexadecimal. Conversion of decimal to binary octal & hexadecimal & vice versa. Addition, subtraction, multiplication, division flotation point numbers. Signed & unsigned numbers 2, 3 compliment Boolean algebra. AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates & their representation & truth table, laws of Boolean algebra, Dc Morgan theorem & Demorganization conversion of logic circuit from one type to Universal logic gates circuits.

UNIT -V

DIELECTRICS

Dielectric constant, moment of charge distribution, potential field due to dipole Torque & force on a dipole in an external field. Work done in rotating a dipole. Dielectrics polarization, polar and non –polar dielectrics. Gauss's law, B.P and D vectors, Different type of polarization. Concept of internal fieldsClausius- Mossotti relationship. Langevin theory of dipolar orientation. Ideal and loss dielectrics. Loss tangent and ixea of complex permittivity.

LASER & FIBEROPTICS

Stimulated and spontaneous emission, active medium, population inversion, pumping Optical resonators, properties of Laser beam. Principles of Ruby, Nd YAG, He-Ne & Carbon dioxide Lasers and their engineering uses & applications.

Practical:

To determination moment of inertia of a Fly wheel about its own axis of rotation.

- To determination of value of modulus of rigidity of the material of a given wire by a dynamical method using Maxwell Needle.
- To determination the restoring force per unit extension of a spiral spring by statically and dynamically method.

To determination the frequency of an electrically maintained tuning fork by meld's method.

To determination the value of "g "by kater's reversible pendulum bar pendulum.

To determination the moment of inertia by inertia table.

To determination the value of specific resistance of wire by post office box.

References:

1. A.T.B. of Optics by Brijlal and Subraminyan

2. Feynman Lectures on physics by R.P. Feynman R.B. Leighton, A- W Publications Massachusetts U.S.A.

3.Concepts of modern physics – A. Beiser- Mc Graw Hills, New York

4. Engineering Physics By M.N. Avadhanulu and P.G. Kshirsagar.

5. Engineering Physics By Gaur and Gupta

6. Atomic and Nuclear Physics by Brijlal and Subrammyam

7. Electricity and Electronics by D.C. Tayal

8. Introduction of Atomic and Nuclear Physics- Harvey. E. White-east west press New Delhi

9. Elements of Modern Physics- S.H. Patel – Tata Mc Graw Hill New Delhi

B.Tech. (Agricultural Engineering) I Sem Engineering Graphics (0+0+4)

UNIT -I

SCALES: Representative fraction, lain scales, diagonal scales, scales of chords. Conic sections. Construct ruction of ellipse, parabola and hyperbola by different methods. Normal and Tangent. **SPECIAL CURVES:** Cycloidal, Epi-cycloid, Hypo-cycloid. Involutes. Archimedean medium and logarithmic spirals.

UNIT -II

Projection points and lines, True inclinations and true length of straight lines, fraces of straight lines. Auxiliary planes.

UNIT -III

Projection of plains and solids: Projection of plains, Projection of polyhedral Pyramids. Cylinder Cone and Spinier.

UNIT -IV

Section of solids: Section of right solids by normal and inclined planes.

Development of Surfaces: Parallel line and radial – line method for right solids. Method of triangulation for oblique pyramids. Cones and transition pieces.

UNIT -V

Intersection of Surfaces: Intersection of prisms. Pyramids, cylinder, cone, line method, cutting plane method.

Isometric Projection: Isometric scale, isometric axes, isometric projections of planes and solids.

References:

- 1. Engineering drawing By N.D. Bhatt
- 2. Engineering drawing By Venugopal
- 3. Engineering drawing By Gufral & Shende
- 4. Engineering drawing By Laxminarain & Vaishwakar

B.Tech. (Agricultural Engineering) I Sem Fundamental of Computers (2+0+0)

UNIT -I

History and Organization of computers, Data representation-Binary, Octal and Hexadecimal representation, Conversion do Decimal Binary, Octal and Hexadecimal and viveversa.Binary addition and subtraction by complementary method.

UNIT -II

Introduction to various types of input/output devices of a computer, Computer Memory: Introduction to RAM, ROM, PROM, EPROM, magnetic hard disk, floopy disk and magnetic tape drives.

UNIT -III

Computer languages: Need of a programming language, low level and high level language, introduction to compiler and interpreters.

Operating System: Need of an operating System, Types-Batch O.S., Multiprogramming O.S., Time Sharing O.S., Online and real time O.S.

UNIT -IV

Problems solving on computer, Algorithms and flow charts, Elements of BASIC, Control and Input-Output statement, subscripted variables.

UNIT -V

Functions and subroutines, writing a simple computer programs in BASIC, Introduction to Disk Operating System-Its Internal and External Commands, Application packages-Wordstar, Lotus-123, Introduction to dBase III Plus (Assist mode)

References:

Fundamental of Computer by P. K. Sinha Fundamental of computer by V. Rajaraman

B.Tech. (Agricultural Engineering) I Sem Workshop Practice (0+0+4)

UNIT -I

BLACKSMITHY SHOP

Smithy forges, maintenance and control of fire and fuel used in smithy shop. Use of various smithy tools such as swage block. Anvil, Different types of Hammers, Tongs, Flatters, Cold set, Hot set, Hydraulic swates, fullers, set hammers punches, Drifts and rivet headers)rivet snaps) etc. Use of measuring rule. Callipers (outside and inside), Templates and gauges used in forging.

Introduction to forging and forging cethods heating metals for forging.Forging operations: Upsetting, Drawing down, Fullering. Swaging, Platening, Cutting down, forge welding Punching and drafting Three jobs to cover above course such as Forging of chisel Forging of C-Ring. Forging of Pan Hook (S-shaped) Forging of screw driver Forging of hexagonal nut etc.

UNIT -II

CARPENTRY SHOP

TIMBER:Type, Qualities of timber, disease, Timber grains, Structure of timber. Timber seasoning. Timber preservation, approximate conversion & Market forms of timber Wood Working tools:

TIMBER Wood working machinery, joints & joinery.Various operations of planning using various carpentry planes swaing and marking of various carpentry joints.Two jobs to cover above courses such as: Carpentry joints such as cross halving joint, mortise and tennon joint, Dovetail joint etc. Develiling plates. Wall bracket.

UNIT -III

FITTING SHOP

METAL BENCH WORK: Measuring instruments. Engineer steel rule. Surface gauges calliper. Hermaphrodite calliper (Jenny calliper). Height gauges. feeler gauges. Try square and micrometer. Use. Care and maintenance of hand tools such as hammer. Cold chisel of different type. Center punch Hack-saw. Dot punch. Drift. Different types of files. File cuts. File grades. Use of surface plate. Surface gauges type of drills. Taps and dies for drilling tapping and screw threads.

FITTING OPERATIONS: Chipping filling. Drilling and tapping. Two joints to cover above course such as: Preparation of job piece by making use of filling. Sawing and chipping operation. Job having combined practice for drilling and tapping. Job having combined practice for drilling and reaming

UNIT -IV

FOUNDRY

PATTERN MAKING: Students are required to prepare four jobs related to pattern making and moulding and know about:Pattern materials, pattern allowances and types of patterns,Core box and core print. Colour codes,Use and care of tools used for making wooden patterns

MOULDING: Properties of good moulding and core sand. Composition of green sand. Dry sand and loam sand. Methods used to prepare simple green and bench and pit mould, dry sand bench mould using single piece and split patterns. Care and use of moulding tools.

UNIT -V

WELDING:

Students are required to make three jobs related to Brazing. Soldering and welding and to know about: Equipment used for Branzing. Solering and gas arc welding. Selection of material and flux and pipe for gas welding. Selection of welding machine, Electrodes and current for Arc welding.Use of tools and equipments. Safety precautions.

UNIT -VI

ADVANCE FITTING

One composite job related to advance fitting covering knowledge about allowances and limits, Fits and tolerances. Use and care of important precision tools used in fitting.

References

- 1. Manufacturing Processes chapman Vol & II
- 2. Production Technology P.N. Raw.
- 3. Workshop Technology Raghuwanshi Vol & II
- 4. Workshop Practices Hazara Choudhary. Vol. I & II
- 5. Production Technology R.K. Jain.

B.Tech. (Agricultural Engineering) I Sem Computer Programming I (0+0+3)

UNIT -I

PRINCIPLES OF OBJECT - ORIENTED PROGRAMMING

Procedure – Oriented Programming vs. Object-Oriented Programming. Basic concepts of OOps, Advantages of OOPs. Object Oriented Languages. Beginning with C++, What C++, Structure of C++ program, is creating. Compiling, Linking. And Executing a C++ program.

UNIT -II

Token. Expressions and Control Structures.

Tokens. Keywords. Identifiers. Basic Data Types, User- Defined Data Types Derived

Data Types, Symbolic Constants. Type Compatibility. Variable Declaration. Dynamic Initialization of Variables. Reference Variables. Operators in C++ . Scope Resolution Operator. Memory. Management Operators, Manipulators, Type Cast Operators. Operator Overloading. Operator Precedence. Control Structures.

UNIT -III

FUNCTIONS IN C++

Main function. Function Prototyping. Call by Reference vs. Call by Value. Inline Functions. Default Arguments. Const Arguments. Function Overloading. Friend and Virtual Functions.

References

B.Tech. (Agricultural Engineering) II Sem Engineering Mathematics II 4 (3+1+0)

UNIT -I

Fourier series and half range Fourier series. Fourier Integral.

Laplace transforms and their basic properties, Application on solution of ordinary differential equation.

UNIT -II

Second order differential equation with variables Coefficient, Solution by series method with emphasis on Legendre's and Bessel's aquatic. Analytic function and conformal Transformation.

UNIT -III

Linear and Non-Linear Partial differential equation of first and second order with constant coefficients, Separation of variable method. Application in solution of wave and heat conduction equation.

UNIT -IV

Vector calculus, Vector Differentiation Divergence, Gradient and Curl, Vector Integration, gauss divergence and stoke's theorem.

UNIT -V

Binomial, Normal and Poisson's distribution, Curve fitting Index number, Reliability or casting and decision theory.

References:

- 1. Integral transform By Vashishta & Gupta.
- 2. Laplace transform By Spicel (Schaum's Series)
- 3. Vector Calculus By A.R. Vashishta
- 4. Higher Engg. Maths By B.S. Grawal.

B.Tech. (Agricultural Engineering) II Sem Material Science and Technology 4 (3+1+0)

UNIT -I

ALLOYS AND HEATTREATMENT:

Alloys- Introduction, purpose of making alloys, Types-Ferrous alloys- stainless steel. Nickel steel, Vanadium steel, Non ferrous alloys - Aluminium, Copper, Nickel alloys, Heat treatment Introduction, Heat treatment processes, Annealing, Normalising, Hardening, Tempering, Case hardening, Surface hardening, Heat treatment furnaces, Heat treatment furnace atmosphere control, Pyrometry, Defects in the heat treatment of steel.

UNIT -II

PHASE RULE AND PHASE TRANSFORMATION:

Introduction, definition of terms involved in phase rule, Thermodynamic derivation of phase rule. One component system, water system, General study of Eutectic system. Peritectic system, Ternary equilibrium Diagram, Allotropy of Iron, Iron carbon equilibrium Diagram.

UNIT -III

POWDER METALLURGY AND COMPOSITE MATERIALS:

Powder Metallurgy, Introduction, Application, Advantages and Disadvantages, various steps involved in powder metallurgy. Tungsten wires, cemented carbides and metal bonded ceramics. Composites, materials- Laminates, Reinforced composites floor materials- Linoleum. Tiles and seamless floor finishes. Applications of Plastics in Engineering and Industry.

UNIT -IV

CORROSION & PROTECTIVE COATINGS:

Corrosion – Introduction. Factors, types of corrosion. Dry and Electrochemical corrosion & its mechanism.Galvanic corrosion, specific types – Pitting, waterline, Intergranular, stress. Microbiological corrosion, corrosion Fatigue, Erosion corrosion Control and prevention of corrosion – Metallic and non – metallic coatings, Paints, Varnishes and Lacquers, cathode protection.

UNIT -V

ELECTRON THEORY OF METALS, SUPERCONDUCTIVITY:

Metallic Bonding, Drude and Lorentz theory, Sommerfield freee electron theory, Electron energies in metal Brillions. Zone theory, Factors affecting electrical resistance of materials. Outline of BCC Theory. Suprconductivity and superfludity, General features of cuprate super conductors. Electron super conductors, copper-free oxide super conductros preparation of cuprate materials. Applications of superconductors.Structure of Metals – Bonds in Solids, space lattices, symmetries space points and space groups, crystal systems and crystal structure of metals. Miller

indices, Miller Bravis indices, Crystallization of metals, grains and Grain boundaries, Crystal defects.

References:

- 1. Materials Science Narula & Gupta, Tata Mc Graw Hill
- 2. Super conductivity today Rama Krishnan & CNR Rao, Universities Press
- 3. Chemistry of Engineering Materials- C. V. Agrawal, Tara Book agency
- 4. Silid State Physics Kittle
- 5. Solid State Physics Seitz

B.Tech. (Agricultural Enginnering) II Sem Sub: Basic Mechanical Engineering 6 (3+1+2)

UNIT -I

WORKSHOP TECHNOLOGY:

Materials of Construction.Classification of Engineering materials, Composition, Mechanical properties and uses of cast iron, mild steel, high carbon steel and high speed steel. Foundry Practice: Introduction, Pattern, Pattern materials like wood, metals, plastics etc. Types of pattern like solid, split, match plate, gated and sweep, pattern allowances, Mould materials, Properties of a good molding sand. Composition of green sand, dry sand, loam sand. Types of mould gating system.Core, Core materials, properties of good core materials, core preparation.

UNIT -II

WELDING PRACTICE:

Gas Welding Method of preparation and accumulation of oxygen and acetylene. Equipment's used in high pressure and low pressure gas welding plant. Function of flux. Types of gas flames Arc welding various methods of producing are Ate welding equipment's comparison between AC and DC welding ARC welding electrodes. Flux coating on welding electrodes.

UNIT -III

MEASUREMENT, MEASURING TOOLS AND MACHINE TOOLS:

Construction, care & uses of surface plate, Straight edge, Vernier calliper, Micrometer, Dial gauge, Slip gauge, Sine bar and Combination set. Description, definition, specification of machine tools, working, classification and specification of Lathe and drilling machine.

UNIT -IV

HEAT ENGINES:

Boilers

Names and functions of principle parts, classification, Boiler mountings and accessories, Draught-natural and artificial, Height of chimney, Equivalent evaporation and boiler performance. Steam Sensible heat, latent heat, super heat, internal energy, enthalpy, dryness fraction and its determination, steam processes at constant pressure, constant volume, and constant enthalpy.

UNIT -V

STEAM ENGINES

Description and working, hypothetical and actual indicator diagram, diagram factor, H.P. developed and efficiencies e.g. mechanical efficiency, brake thermal efficiency and indicated Thermal efficiency, governing, cut off and throttles compound engines (Description and working only).

I.C. ENGINES

Description and working of four stroke petrol engines, two stroke petrol engines, four stroke diesel engines and two stroke diesel engines, relative merits and demerits

Practical:

- To study foundry shop
- To study dial gauge
- To study Combination set
- To study gas welding
- To study lathe machine
- To study drilling machine
- To study boiler and its mountings and accessories
- To study IC engines and its system
- To perform spark test
- To perform sieve analysis

References:

- 1.Workshop practice Raghuvanshi
- 2. Workshop practice Hazra & chaudhary
- 3 Foundary Technology Sinha & Goel (Rastogi Publication)
- 4. Heat engines P.L. Sallaney
- 5. Heat engineering Kumar & Vasandani (Metropolitan Book Company)

B.Tech. (Agricultural Engineering) II Sem Engineering Chemistry 6 (3+1+2)

UNIT -I

WATER ANALYSIS & TREATMENT:

Sources, Impurities, Hardness & its units. Industrial water requirement & characteristics, softening of water by various methods (L.S. Zeolite, ion exchange resin) boiler trouble (carry over, scale and sludge, caustic embitterment) Boiler corrosion causes, effect & remedies, internal treatment to boiler feed water, Characteristics of municipal water & its treatment, water analysis (determination of alkalinity, temporary and permanent hardness by complexometry, D.O, B.O.D, C.O.D, Chlorides, Sulphates, dissolved CO2 & residual chlorine. T.D.S) Numerical problems based on water analysis and water softening processes.

UNIT -II

FUELS & COMBUSTON:

Fossil fuels & classification. Calorific value & its determination by Bomb Calorimeter & its numerical. Proximate and Ultimate analysis of coal and their significance, calorific value Computation based on utilization analysis data. Ranking of solid fuel. Carbonization. Manufacturing of coke & recovery of by products petrochemicals derived from alkenes, alkenes, alkenes, benzene & its homologues. Cracking of higher Hydrocarbons & mechanism of cracking. Knocking, relationship between knocking & structure of hydrocarbon, improvement of anti knocking characteristics of IC engine fuels. Diesel engine fuels. Cetane number, flue gas analysis, combustion and it related numerical problems.

UNIT -III

LUBRICANTS:

Introduction, Mechanism of lubrication, Classification of lubricant, Lubricating oils, grease & semisolid lubricant, solid lubricant, synthetic lubricant, properties and Testing of lubricating oils (Viscosity & Viscosity index, flash and fire points, cloud and pour point, Anline value, Steam Emulsion Number, Neutralization no, Saponification Value. Iodine. Iodine value, carbon residue) Numerical problems based on Viscosity Index.

UNIT -IV

POLYMER:

(Fibers, Rubbers & Elastomers, Plastics). Introduction. Classification. Types of Polymerization, reaction mechanism. Fibers-Cellulose & synthetic Nylon Decoran, polyvinyl, Polyacrylates their manufacture & flow sheet diagram. Rubber-Natural rubber, Isolation from latex. Vulcanization & its mechanism cis-trans rubbers.

Elastomers: Styrene rubber (GR-S) and Vitrile rubber (GR-A), Neoprene, Buty I rubber, thiocols, Ployurethanes, Plastic- Plastic- Classification. Thermoplastic & Thermosetting plastics, manufacturing of Polythene, PVC, PVA, polyacrylates, Acrylonitrils, phenol formaldehyde resins, urea formaldehyde resin & glyptals, silicone resin & its flow sheet diagrams

UNIT -V

CEMENT AND REFRACTORIES:

Classification of Cements, 1.5.1. Specifications, Composition & Manufacture of portland Cements. Setting & Harding of lime mortar, plaster of paris, Magnesium oxy chloride. Decay of Cements. Refractrries. Refractories- Definition, classification. Properties & uses of silica bricks, Fire clay, Dolomite, Magnesite, Carborundum, Chromite bricks.

UNIT -VI

INSTRUMENTAL TECHNIQUES IN CHEMICALANALYSIS:

Introduction, Infra red. Ultraviolet, Nuclear Magnetic Resonance spectrophotometry, Chromatography – Gas chromatography, Colorimetry, Lambert's and Beer's Law.

Practical:

NOTE: At least 10 of the following experiments be performed during the session.

- Water Testing
 - (i) Determination of Total hardness by Complexometric, titration Method.
 - (ii) Determination of mixed aldalinity (a) OH & Co3 _ (b) CO3 _& HCO3
 - (iii) Chloride ion estimation by Argentometric method.

Fuels & lubricant testing

(i) Flash & fire point's determination by

- (a) Pensky Martin Apparatus (b) Abel's Apparatus
- (c) Cleveland's open cup Apparatus

(ii) Miscosity and Visocosity index Determination by

- (a) Redwood viscometer No. 1
- (b) Redwood viscometer No. 2
- (iii) Preximate analysis of coal
 - (a) Mosture content (b) Volatile matter content
 - (c) Ash content (d) Carbon residue
- (iv) Stem emulsificaton No & Anline point determination
- (v) Cloud's and power point determination of lubricating oil

Alloy Analysis

- (iv) Determination of percentage of fe in an iron alloy by redox titration using N Phenyl anthranilic acid as internal indicator.
- (v) Determination of Cu and or Cr in alloys by iodometric Titration

References:

- 1. Chemistry in Engineering & Technology Vol II Kuriacose & Rajaram Tata Mc. Graw.
- 2. A Text Book of Engineering Chemistry S.S. Dara.

- 3. Chemistry for Environmental Engineering Sawyer, Mc Carty and Parkin- Mc Graw Hill International
- 4. Engineering Chemistry Gopalan Venkappayya.
- 5. Applied Chemistry N.Krishnamurthy. jayasubramanium.
- 6. Engineering Chemistry B.K. Sharma
- 7. Applied Chemistry Theory and Practice, O.P. Viramani. A.D. Narula

B.Tech. (Agricultural Engineering) II Sem Engineering Mechanics 6 (3+1+2)

UNIT -I

STATICS

Concurrent, Non concurrent and parallel forces in a plane, Composition, resolution of forces, Free body diagrams, Moment of a force and Varigonon's theorem, Conditions of Equilibrium, Polygon of Forces and Funicular Polygon of Forces, Principle of Virtual work, Equivalent Force System. TRUSSES

Analysis of forces in the members of a truss. Method of joints, Method of sections. Graphical Method for Perfect Trusses.

UNIT -II

CENTROID & MOMENT OF INERTIA

Location of centroid and Moment of Inertia of plane areas, Perpendicular Axis and Parallel Axis theorems. Product of Inertia, Principal Axes and Principal Moment of solid bodies.

FRICTION

Coloumb's law of friction. Friction on inclined plains. Screw and Nut friction. Ladder and wedge friction, Friction in journal collar bearings. Uniform pressure and uniform wear, Lifting machines.

UNIT -III

TRANSMISSION OF POWER

Transmission of power through Belt, Rope and Gears, Ratio and tension on tight side and slack sides. Centrifugal tension, Spur, Bevel .Worm gearing. Rack and Pinion gear, Gear Trains. Epicyclic Gear Train.

UNIT -IV

KINEMATICS

Kinematics in cartesian and polar coordinates,Particle under uniform and non-uniform acceleration.Tangential and normal acceleration,Radial and Transverse velocity and acceleration,motion under gravity.

UNIT -V

KINETICS

Kinetics of particle, motion under constant force, momentum and energy principle, Impulses and angular momentum, D' Alemberts principle, Motion under constant forque. Flywheel, Collistion of Elastic Bodies, Shear force, and Bending moment Diagram in Cantilever and Simply Supported beam with concentrated, Distributed load, and couple, Overhanging beams, Point of Cotraflexure, Relationship between bending moment and shear force pure bending.

Practical:

To determine moment of inertia of a flywheel about its own axis of rotation.

- To study the variation of time period (T) with length (l) for a compound pendulum and then to determinate
 - 1. The value of acceleration due to gravity.
 - 2. The position of center of gravity of the bar.
 - 3. The radius of gyration (k) of the bar about an axis passing through C.G. and perpendicular to its length.
- To determinate value of modulus of rigidity of the material by dynamical method using Maxwell's needle
- To determinate the movement of an irregular body about an axis passing through its center of gravity and perpendicular to its plane by dynamical method of inertia table.

References:

- 1. Engineering Mechanics by R. S. Khurmi S. Chand Pubication
- 2. Engineering Mechanics by S. B. Junarkar
- 3. Strength of Material and Engineering Mechanics by S. B. Prasad

B.Tech. (Agricultural Engineering) II Sem Computer Programming -II 4 (0+0+4)

UNIT -I

INTRODUCTION

How Windows Works:

MS Windows: Various features, Advantages, How Windows program works, The Structure of Windows Program, Code and Resources, Program Instances, Compiling a Windows Program, Windows Memory Management – Memory options, stacks and heaps.

Setting up Your System: Hardware and Software Requirement. Installation and setup options. First Programming Experiments:

Hungarian Notation. A Minimal Windows Program Structure, the Windows. H file, Win Main O function, creating a new Windows class, Message Loop.

UNIT -II

MENUS:

Operating Menus, Menus Defined as Resource Data, Popup Menu, creating a Menu as program operates, Menu Functions, The System Menu.

Mouse Handling:

Mouse Shape. The Caret

UNIT -III

TEXT AND GRAPHICS OUTPUT

Character Mode versus Graphics Mode, The Device Context, Windows GDI, Text Output, The WM_PAINT Message, Changing the Device Context, Graphics Output, Animated Graphics using Peek Message 0 Loop, Graphics Objects like Pen, Brush. Character Sets, Fonts, and the Keyboard. The ANSI Character Set, Keyboard Message Processing, System Key Messages and Dead. Characters, Selecting a Stock Font, Keyboard Accelerators.

UNIT -IV

WINDOWS CONTROLS:

Types of Windows Controls Static, Button, List Boxes, Combo Boxes, Scroll Bars, Edit Controls and their use in windows programs.

UNIT -V

CHILD AND POPUP WINDOWS:

Creating a Child Window, Sending Messages to Child Windows. Fixed Child windows, Popup Windows.

Dialog Boxes:

How Dialog Boxes work, Designing a Dialog Box, Using a Dialog Box, Exchanging Data with a Dialog Box, Modal, Modeless, and System Modal Dialog Boxes.

UNIT -VI

OTHER RESOURCES: String Tables, User-Defined Resources Managing Memory: Local vs. Global Memory. Using Fixed and Discard able Memory Blocks. Global Memory Allocation.

UNIT -VII

PRINTING:

How Windows Support Printers. Printer Device Context Sending Special Commands to a Printer, Scaling the Printer Output. Allowing Interruption of a Print Job, Getting Information. About A Device, Calling functions in the Printer Driver. Dist File Access: How Windows Access Disk Files, Various Operations like Create, Open, Read, Write, Close etc.

UNIT -VIII

BITMAPS:

How Bitmaps Store Images, Loading and Displaying a Bitmap, BITMAP Data Format, DIB Format. Dynamic Link Librarics: Compiler Runtime Libraries. Dynamic Link Libraries, Writing a DLL, Using DLL, Alternate Ways to Reference DLL Functions

Practical:

Windows API programs based on course contents.At least two program from each unit).

References:

Windows programming Printer Plus – By Jim Conger 1999, Galgotia Pub.

B.Tech. (Agril. Engg.) I Semester Engineering Physics 6 (4+2)

UNIT I

QUANTUM PHYSICS: Matter waves & its experimental verification . Wave. group and particle velocity & their relation. Uncertainty principle with elementary proof & application to Microscope & Single slit. Characteristics and continuous X-rays. Duan Huntt limits. Moseley's law. ?Bragg's equation, Laws of diffraction Bragg's spectrometer. Compton effect. Electron reflection. Bethe's Law. Electron gun. working and application of CRT & CRD viz measurement of voltage, frequency and phase etc. Bainbridge mass spectrograph & Electron Microscope.

UNIT II

RAY & WAVE OPTICS: Cardinal points of a co-axial lens system Nodal slide experiment. Idea of Spherical & Chromatic aberration, coma, astigmatism and distortion Ramsden & Huygen's eye pieces and their cardinal points, Fresnel's biprism. Newton's rings and Michelson's Interferometer experiments. Diffraction at single slit, double slit and diffraction grating. Rayleigh criterion, resolving power of a telescope, microscope, grating and prism. Concept of polarized light, Brewster's laws, Double reflection, Nicol prism, quarter & mission Nuclear reactors, its sight selection and working Giger-Muller Counter, Mass spectrographs, Idea of cosmic rays.

UNIT III

NUCLEAR PHYSICS: Static properties and applications of nuclear model: Gammow, liquid drop and shell models, Linear Particle accelerator, Cyclotron, Synchroutron, Synchrocyclotron, and Betatron, differential cross section, chain reacting, critical size. Nuclear fusion &n mission Nuclear reactors, its sight selection and working. Giger-Muller Counter, Mass pectrographs, Idea of cosmic rays.

UNIT IV

DIGITALEL ECTRONICS: Sumber system used in digital electronics: decimal, binary, octa, hexadecimal. conversion of decimal to binary octal & hexadecimal & vice versa. Addition, subtraction, multiplication, division floation point numbers. signed & unsigned numbers 2,3 compliment boolean algebra. AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates & their representation & truth table, laws of Boolean algebra, Dc Morgan theorem & Demorganization conversion of logic circuit from one type to Universal logic gates circuits.

UNIT V

DIELECTRICS: Dielectric constant, moment of charge distribution, potential field due to dipole Torque & force on a dipole in an external field. Work done in rotating a dipole. Dirlectris polarization, polar and non –polar dielectrics. Gauss's law, B.P and D vectors, Different type of polarization. Concept of internal fieldsClausius- Mossotti relationship. Langevin theory of dipolar orientation. Ideal and loss dielectrics. Loss tangent and ixea of complex permitivity.

LASER & FIBEROPTICS:

Stimulated and spontaneous emission, active medium, population inversion, pumping Optical resonators, properties of Laser beam. Principles of Ruby, Nd YAG, He-Ne & Carbon dioxide Lasers and their engineering uses & applications.'

Reference References:

- 1. A.T.B. of Optics by Brijlal and Subraminyan
- 2. Feynman Lectures on physics by R.P. Feynman R.B. Leighton, A- W Publications Massachusetts U.S.A.

- 3. Concepts of modern physics A. Beiser- Mc Graw Hills, New York
- 4. Engineering Physics By M.N. Avadhanulu and P.G. Kshirsagar.
- 5. Engineering Physics By Gaur and Gupta
- 6. Atomic and Nuclear Physics by Brijlal and Subrammnyam
- 7. Electricity and Electronics by D.C. Tayal
- 8. Introduction of Atomic and Nuclear Physics- Harvey. E. White-east west press New Delhi
- 9. Elements of Modern Physics- S.H. Patel Tata Mc Graw Hill New Delhi

B.Tech. (Agril. Engg.) I Semester Basic electrical Engineering 6 (4+2)

UNIT – I

AC CIRCUITS : Review of I-phase as circuits under sinusoidal steady state. Active, reactive and apparent power, power factor. 3- phase accircmis, star and delta commections. 3- phase source and load. Analysis of balanced and unbalanced systems. Power in 3 –phase circuits and their measurements.

UNIT – II

MAGNETIC CIRCUITS : Review of lawa of electromagnetism. Flux, mmf and their relation. Analysis of magnetic and electric circuits. Saturation, B-H curves, fringing and leakage. AC excitation in magnetic circuits. Induced voltage, Hysteresis effect and eddy currents.

UNIT-III

TRANSFORMERS : Single-phase transformer, Basic concepts and construction features. Types of transformers, Voltage, current and impedance transformation Equivalent circuits. Per unit system, voltage regulation, losses and efficiency. Testing of transformers. Auto transformers **UNIT – IV**

ELECTRO MECHANICAL ENERGY CONVERSION

principles of energy conversion. production of force and emf. Singly and multiply excited magnetic field system. Torque production and torque balance. General analysis of electromechanical System.

UNIT – V

ROTATING ELECTRIC MACHINES

General construction. Definitions and terminologies, generation of emf in rotaing machines. Voltage in dc and ac machines. Airgap mmf in dc and ac machines. Rotaing magnetic field. Torque production. Principle of operation and application of dc, 3- phase synchronous and induction machines. I- phase induction motors. Insulating materials, name plate rating, frame size, duty cycles, cooling, enclosures materials and standards.

Reference References:

- 1. A.E. Fitzgerald, C. Kingsley and Umans " Electrical Machinery" Mc Graw Hill, 5th Edition, 1992
- 2. Vincent Del Toro, "Principles of Electrical Engineering" Prentice Hall, 1987
- 3. A.E. fitzgerald, Higginbotham and Grabel" Basic Electrical Engineering" Mc Graw Hill
- 4. I.J. Nagrath, "Basic Electrical Engineering" Tata Mc Graw Hill, 1991
- 5. P.S. Bimbhara "Electrical Machinery
- 6. V.N. Mittle " Basic Electrical Engineering"

Laboratory Experiments:

- 1. Measurement of impedance of RL, RC And RLC circuits. Study of Resonance phenomenon
- 2. Measurement of active and reactive powers in I phase and 3-phase

- 3. Study of no load current waveform in a single phase transformer using CRO
- 4. Study of transformer name plate rating, determination of ratio and polarity Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions. Verification by load test
- **5.** Study of constructional features of dc machines. Magnetisation and load characteristics of dc generator
- 6. Characteristics of dc motors. Study of 3 and 4 point starters for dc shunt motors
- 7. Speed control of d.c motor by armature resistance control and field resistance control and armature voltage control
- **8.** Study of constructional features of K3- phase induction motors. No load, blocked rotor and load tests on 3 phase Induction motors
- 9. Starting methods and construction of I –phase Induction motors.

B.Tech. (Agril. Engg.) I Semester Engineering Mathematics -I (4+0)

UNIT –I

Maclaurin's and Taylor's theorem. Partial differentiation. Euler's theorem and its application in approximation and error. Maximum and minimum of one and two variables. Tangents and Normals. Curvature, Indeterminate forms.

UNIT – II

Definite Integral as limit of a sum, Application in summation of series. Beta and Gamma functions. Double of triple integral. Length of the curves, Volumes and surfaces.

UNIT – III

Ordinary differential equations of first order. Linear higher order differential equation with constant coefficients. Homogeneous linear differential equation. Simultaneous differential equations.

UNIT – IV

Rank, Solution of simultaneous equation by elementary transformation , Consistency of equation. Eigen Value and Eigen Vectors. Calley-Hamilton theorem. Algebra of Logic, Fuzzy Logic. **UNIT –V**

Boolean Algebra Principle of Duality Basic theorems, Boolean expressions and function. Graph Theory, Graphs Sub graphs, degree and distance, Tree, Cycles and Network

Reference References:

- 1. Differential Calculus- By Gorakhprasad
- 2. Gigher Engg. Mathematics- By B.S. Grawal.
- 3. Integral Calculus- By A.R. Vashishta & H.K. Sharma.
- 4. Statistics- By Ray and Sharma
- 5. Boolean Algeba By Thakur & Shrivastava

B.Tech. (Agril. Engg.) I Semester Communication Skill 3 (3+0)

UNIT – I

LANGUAGE ASSKILL OF COMMUNICATION: Linguistic Techniques, Modem usage and style – comprehension skills, English Phonetic symbols/signs, Oral Presentation- Audition. UNIT –II

APPLICATION OF LINGISTICABILITY: Writing of definitions of engineering terms, Objects, processes and principles (Listening) Topics of General Interest, Reproduction from business, daily life, travel, health buying & selling, company structure, systems etc.

UNIT – III

LETTERWRITING: Applications, Enquiry, Calling quotation, Tenders. Order and complaint. **UNIT- IV**

Precise Writing, Noting and drafting, Techical Descriptions of simple engineering objects and processes (Writing) Report writing, Precis writing, note writing, slogan writing coment, speech advertising.

UNIT – V

Writing technical reports of the type of observation report, Suvey report, Report of trouble, Laboratory Report and Project Report on the subjects of engineering. (Speaking) Vocabulary, Presentations, Demonstrations, Conversation- Telephone media, socialising, cultural events, debates, speech.

Reference References:

- 1. Business Correspondence and Report Writing By Krishna Mohan, Prentice Hall India
- 2. Living English Structure By W. Stannard Allen, Longmans.
- 3. Student's Grammr- By Dev Willys Collins (Harper)
- 4. Spoken English for India By R.K. Bansal & IB Garrioson (Orient Longman)
- 5. New International Business English By Joans and Alexander (OUP)
- 6. Testing English as a Scond Language By David P. Harris (McGraw Hill Pub.)

B.Tech. (Agril. Engg.) I Semester Fundamentals Of Computer (2+0)

Unit-I

History and Organisation of computers, Data representation-Binary, Octal and Hexadecimal representation, Conversion od Decimal Binary, Octal and Hexadecimal and viveversa. Binary addition and subtraction by complementary method.

Unit-II

Introduction to various types of input/output devices of a computer, Computer Memory: Introduction to RAM, ROM, PROM, EPROM, magnetic hard disk, floopy disk and magnetic tape drives.

Unit-III

Computer languages:Need of a programming language,low level and high level language,introduction to compiler and interpreters.

Operating System:Need of an operating System, Types-Batch O.S., Multiprogramming O.S., Time Sharing O.S., Online and real time O.S.

Unit-IV

Problems solving on computer, Algorithms and flow charts, Elements of BASIC, Control and Input-Output statement, Subscripted variables.

Unit-V

Functions and subroutines, writing a simple computer programs in BASIC, Introduction to Disk Operating System-Its Internal and External Commands, Application packages-Wordstar, Lotus-123, Introduction to dBASE III Plus (Assist mode)

B.Tech. (Agril. Engg.) I Semester Engineering Graphics- I 4 (0+4)

UNIT- I

Scales: Representative fraction, lain scales, diagonal scales, scale of chords. Conic sections. Constructruction of ellipse, parabola and hyperbola by different methods. Normal and Tangent. **Special Curves**: Cycloidal, Epi-cycloid, Hypo-cycloid. Involutes. Archemedian medium and logarithmic spirals.

UNIT- II

Projection points and lines, True inclinations and true length of straight lines, fraces of straight lines. Auxiliary planes.

UNIT-III

Projection of plains and solids: Projection of plains, Projection of polyhedra Pyramids. Cylinder Cone and Spinier.

UNIT-IV

Section of solids: Section of right solids by normal and inclined planes.

Development of Surfaces: Parallel line and radial – line method for right solids. Method of triangulation for oblique pyramids. Cones and transition pieces.

UNIT – V

intersection of Surfaces: Intersection of prisms. pyramids, cylinder, cone, line method, cutting plane method.

Isometric Projection : Isometric scale, isometric axes, isometric projections of planes and solids. **Reference References:**

- 5. Engineering drawing By N.D. Bhat
- 6. Engineering drawing By Venugopal
- 7. Engineering drawing By Gufral & Shende
- 8. Engineering drawing By Laxminarain & Vaishwakar

B.Tech. (Agril. Engg.) I Semester Workshop Practice 4 (0+4)

UNIT- I

BLACKSMITHY SHOP: Smithy forges, maintenance and control of fire and fuel used in smithy shop. Use of various smithy tools such as sewage block. Anvil, different types of Hammers, Tongs, Flatters, Cold set, Hot set, Hydraulic swates, fullers, set hammers punches, Drifts and rivet headers)rivet snaps) etc.

Use of measuring or rule. Callipers (outside and inside), Templates and gauges used in forging. Introduction to forging and forging cethods Heating metals for forging.

forging oprations:

Upsetting, Drawing down, Fullering. Swaging, Platening, Cutting down, Forgewelding Punching and drafting

Three jobs to cover above course such as

forging of chisel

forging of C-Ring.

forging of Pan Hook (S-shaped)

forging of screw driver

forging of hexagonal nut etc.

UNIT – II

CARPENTRY SHOP:

Timber:

Wood Working tools:

Tyre, Qualities of timber disease, Timber grains, Structure of timber. Timber seasoning. Timber preservation, Approximate conversion & Market forms of timber

Wood working machinery, joints & joinery.

Various operations of planning using various carpentry planes swaing and marking of various operations of planning using various carpentry planes swaing and marking of various carpentry joints.

Two jobs to cover above coureses such as:

Carpentry joints such as cross halvingjoint mortise and tennon joint, Dovertail joint etc.

Develiling plates.Wall bracket.

Unit III

FITTINGSHOP:

Metal Bench Work

Measuring instruments. Engineer steel rule. Surface gauges calliper. Hermaphrodite calliper (Jenny calliper). Height gauges. feeler gauges. Try square and micrometer. Use. Care and maintenance of hand tools such as hammer. Cold chisel of different type. Center punch Hack-saw. Dot punch. Drift. Different types of files. File cuts. File grades. Use of surface plate. Surface gauges type of drills. Taps and dies for drilling tapping and screw threads.

Fitting operations: Chipping filling. Drilling and tapping

Two joints to cover above course such as:

Preparation of job piece by making use of filling. sawing and chipping operation.

Job having combined practice for drilling and tapping

Job having combined practice for drilling and reaning

UNIT- IV

FOUNDRY: Pattern Making: Students are required to prepare four jobs related to pattern making and moulding and know about:

Pattern materials, pattern allowances and types of patterns

Core box and core print. Colour codes

Use and care of tools used for making wooden patterns

Moulding:

Properties of good moulding and core sand. Composition of green sand. Dry sand and loam sand. Methods used to prepare simple green and bench and pit mould dry san bench mould using single piece and split patterns.

Care and use of moulding tools.

UNIT –V

WELDING:

Students are required to make three jobs related to Brazing. soldering and welding and to know about:

Equipment used for Branzing. Solering and gas arc welding

Selection of material and flux and pipe for gas welding

Selection of welding machine, Electrodes an current for Arc welding.

Use of tools and equipments. Safety precautions.

UNIT -VI

ADVANCEFITTING:

One composite job related to advace fitting covering knowledge about allowances and limits, Fits and tolerances.

Use and care of important precision tools used in fitting.

References:

Manufacturing Processes – chapman Vol & II Production Technology – P.N. Raw. Workshop Technology – Raghuwanshi Vol & II Workshop Practices – Hazara Choudhary. Vol. I & II Production Technology – R.K. Jain.

B.Tech. (Agril. Engg.) I Semester Computer Programming –I3 (0+3)

UNIT – I

Principles of object – Oriented Programming

Procedure – Oriented Programming vs. Object-Oriented Programming . Basic concepts of OOps, Advantages of OOPs. Object Oriented Languages.

Beginning with C++

What C++, Structure of C++ program, Creating. Compiling, Linking. And Executing a C++ program.

UNIT – II

Token. Expressions and Control Structures.

Tokens. Keywords. Identifiers. Basic Data Types, User- Defined Data Types Derived

Data Types, Symbolic Constants. Type Compatibility. Variable Declaration. Dynamic Iniitalization of Variables. Reference Variables. Operators in C++ . Scope Resolution Operator. Memory. Management Operators, Manipulators, Type Cast Operators. Operator Overloading. Operator Precedence. Control Structures.

UNIT – III

Functions in C++

Main function. function Prototyping. Call by Reference vs. Call by Value. Inline Functions. Default Arguments. Const Arguments. Function Overloading. Friend and Virtual Functions.

UNIT – IV Classes and Objects

Specifying a Class. Defining Member Functions. Making a Outside Function Inline, Nesting of Member Functions. Private Member Functions. Arrays within a Class. Memory Allocation for Objects, Static Data Members. Static Member Functions. Array of Objects. Objects as Function Arguments. Returning Objects. Pointers to Members.

UNIT – V

Constructors and Destructors

Constructors, Parametric constructors, Multiple Constructors in a Class. Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor.

Dyanmic Constructor. Destructors. Operator overloading and type conversion

Definition, Overloading Unary Operators, Binary Operators, Binary Operators using Friends, Rules for Overloading Operators.

UNIT – VI

Pointers, Virtual Functions and Polymorphism

Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT – VII

Managing Console I/O Operations

C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Consoie I/O Operations, Managing Output with Manipulators.

Working with Files

Classes for File Stream Operations, Opening and Closing a File, Detecting EOF, File Pointers, Updating a File, Error Handling During File Operations.

Suggested List Experiments:

C++ programs based on curse contents.

(Atleast two program from each unit.)

Reference References:

- 1. Object Oriented Programming with C++ By E. Balagurusamy 1995 . Tata Mc Graw-Hill pub.
- 2. Programming in C++ By Robert Lafore
- 3. Mastering C++ By Venugopalam, TMH pub

B.Tech. (Agril. Engg.) II Sem Engineering Chemistry 6 (4+2)

UNIT – I

WATERANALYSIS & TREATMENT:

Sources, Impurities, Hardness & its units. Industrial water requirement & characteristics, softening of water by various methods (L.S. Zeolite, ion exchange resin) boiler trouble (carry over, scale and sludge, caustic embitterment) Boiler corrosion causes, effect & remedies, internal treatment to boiler feed water, Characteristics of municipal water & its treatment, water analysis (determination of alkalinity, temporary and permanent hardness by complexometry,

D.O,B.O.D,C.O.D, Chlorides, Sulphates, dissolved CO2 & residual chlorine. T.D.S) Numerical problems based on water analysis and water softening processes.

UNIT – II

FUELS & COMBUSTON:

Fossil fuels & classification. Calorific value & its determination by Bomb Calorimeter & its numerical. Proximate and Ultimate analysis of coal and their significance, calorific value Computation based on utilisation analysis data. Ranking of solid fuel. Carbonization. Manufacturing of coke & recovery of by products petrochemicals derived from alkenes, alkanes, alkenes, benzene & its homologues. Cracking of higher Hydrocarbons & mechanism of cracking. Knocking, relationship between knocking & structure of hydrocarbon, improvement of anti knocking characteristics of IC engine fuels. Diesel engine fuels. Cetane number, flue gas analysis, combustion and it related numerical problems.

UNIT – III

LUBRICANTS:

Introduction, Mechanism of lubrication, Classification of lubricant, Lubricating oils, grease & semisolid lubricant, solid lubricant, synthetic lubricant, properties and Testing of lubricating oils (Viscosity & Viscosity index, flash and fire points, cloud and pour point, Anline value, Steam Emulsion Number, Neutralization no, Saponification Value. Iodine. Iodine value, carbon residue) Numerical problems based on Viscosity Index.

UNIT – IV

POSYMER:

(Fibers, Rubbers & Elastomers, Plastics). Introduction. Classification. Types of Polymerization, reaction mechanism. Fibers-Cellulose & synthetic Nylon Decoran, polyvinyl, Polyacrylates their manufacture & flow sheet diagram. Rubber-Natural rubber, Isolation from latex. Vulcanisation & its mechanism cis-trans rubbers.

Elastomers: Styrene rubber (GR-S) and Vitrile rubber (GR-A), Neoprene, Buty I rubber, thiocols, Ployurethanes, Plastic- Plastic- Classification. Thermoplastic & Thermosetting plastics, manufacturing of Polythene, PVC, PVA, polyacrylates, Acrylonitrils, phenol fomaldehyde resins, urea formaldehyde resin & glyptals, silicone resin & its flow sheet deagrams

UNIT-V

CEMENT AND REFRACTORIES:

Classification of Cements, 1.5.1. Specifications, Composition & Manufacture of portland Cements. Setting & Harding of lime mortar, plaster of paris, Magnesium oxy chloride. Decay of Cements. Refractrries. Refractories- Definition, classification. Properties & uses of silica bricks, Fire clay, Dolomite, Magnesite, Carborundum, Chromite bricks.

UNIT – VI

INSTRUMENTAL TECHNIQUES IN CHEMICALANALYSIS:

Introduction, Infra red. Ultraviolet, Nuclear Magnetic Resonance spectrophotometry, Chromatography – Gas chromatography, Colorimetry, Lambert's and Beer's Law.

Reference References:

- 8. Chemistry in Engineering & Technology Vol II Kuriacose & Rajaram Tata Mc. Graw.
- 9. A Text Book of Engineering Chemistry S.S. Dara.
- **10.** Chemistry for Environmental Engineering Sawyer, Mc Carty and Parkin- Mc Graw Hill International
- **11.** Engineering Chemistry Gopalan Venkappayya.
- **12.** Applied Chemistry N.Krishnamurthy. jayasubramanium.
- **13.** Engineering Chemistry B.K. Sharma

Applied Chemistry Theory and Practice, O.P. Viramani. A.D. Narula New

Engineering Chemistry Practical

NOTE : Atleast 10 of the following experiments be performed during the session.

2. Water Testing

- (i) Determination of Total hardness by Complexometric, titration Method.
- (ii) Determination of mixed aldalinity (a) OH & Co3 _ (b) CO3 _& HCO3
- (iii) Chloride ion estimation by Argentometric method.

3. Fuels & lubricant testing

(i) Flash & fire points determination by

(a) Pensky Martin Apparatus(b) Abel's Apparatus(c) Cleveland's open cup Apparatus

(ii) Miscosity and Visocosity index Determination by

- (a) Redwood viscometer No. 1
 - (b) Redwood viscometer No. 2
- (iii) Preximate analysis of coal
 - (a) Mosture content (b) Volatile matter content
 - (c) Ash content (d) Carbon residue
- (iv) Stem emulsificaton No & Anline point determination
- (v) Cloud's and power point determination of lubricating oil

4. Alloy Analysis

- (i) Determination of percentage of fe in an iron alloy by redox titration using N Phenyl anthranilic acid as internal indicator.
- (ii) Determination of Cu and or Cr in alloys by iodometric Titration

B.Tech. (Agril. Engg.) II Sem.

Material Science and Technology 4 (4+0)

UNIT – I:

ALLOYS AND HEATTREATMENT:

Alloys- Introduction, purpose of making alloys, Types-Ferrous alloys- stainless steel. Nickel steel, Vanadium steel, Non ferrous alloy 5-Aluminium, Copper, Nickel alloys, Heat treatment Introduction, Heat treatment processes, Annealing, Normalising, Hardening, Tempering, Case hardening, Surface hardening, Heat treatment furnaces, Heat treatment furnace atmosphere control, Pyrometry, Defects in the heat treatment of steel.

PHASE RULE AND PHASE TRANSFORMATION:

Introduction, definition of terms involved in phase rule, Thermodynamic derivation of phase rule. One component system, water system, General study of Eutectic system. Peritectic system, Ternary equilibrium Diagram, Allotropy of Iron, Iron carbon equilibrium Diagram.

UNIT – II

POWDER METALLURGY AND COMPOSIT MATERIALS:

Powder Metallurgy, Introduction, Application, Advantages and Disadvantages, various steps involved in powder metallurgy. Tungsten wires, cemented carbides and metal bounded ceramics. Composite materials- Laminates, Reinforced composites floor materials- Linoleum. Tiles and seamless floor finishes.

Applications of Plastics in Engineering and Industry.

UNIT –III

CORROSION & PROTECTIVE COATINGS:

Corrosion – Introduction. factors, types of corrosion. Dry and Electrochemical corrosion & its mechanism.

Galvanic corrosion, specific types – Pitting, waterline, Intergranular, stress.

Microbiological corrosion, corrosion – Fatigue, Erosion corrosion

Control and prevention of corrosion – Metallic and non – metallic coatings, Paints,

Varnishes and Lacquers, cathode protection.

UNIT -IV

ELECTRON THEORY OF METALS AND SUPERCONDUCTIVITY

Metallic Bonding, Drude and Lorentz theory, Sommerfield free electron theory, Electron energies in metal Brillions. Zone theory, Factors affecting electrical resistance of materials. Outline of BCC Theory.

Supronductivity and superfludity, General features of cuprate super conductors. Electron super conductors, copper-free oxide super conductros preparation of cuprate materials. Applications of superconductors.

UNIT – V

CRYSTALLOGRAPHY:

Structure of Metals – Bonds in Solids, space lattices, symmetries space points and space groups, crystal systems and crystal structure of metals. Miller indices, Miller Bravis indices, crystallization of metals, grains and grain boundaries, crystal defects.

Reference References:

- 6. Materials cience Narula & Gupta, Tata Mc Graw Hill
- 7. Super conductivity today Rama Krishnan & CNR Rao, Universities Press
- 8. Chemistry of Engineering Materials- C. V. Agrawal, Tara Book agency
- 9. Silid State Physics Kittle
- 10. Solid State Physics Seitz

B.Tech. (Agril. Engg.) II Sem Engineering Maths-II 4 (4+0)

UNIT

Fourier Series and half range Fourier series. Fourier Integral.

loplace transforms and their basic properties, Application on solution of ordinary differential equation.

UNIT – II

Second order differential equation with variables Coefficient, Solution by series method with emphasis on Legendre's and Bessel's aquatic . A nalytic function and Conformal farmstormation.

UNIT – III

Linear and Non-Linear Partial differential equation of first and second order with constant coefficeents, Separation of variable method. Application in solution of wave and heat conduction equation.

NIT- IV

Vector calculus, Vector Differentiation Divergence, Gradient and Curl, Vector Integration, gauss divergence and stoke's theorem.

UNIT-V

Binomial, Normal and Poisson's distribution, Curve fitting Index number, Reliability or casting and decision theory.

Reference References:

Integral transform – By Vashishta & Gupta. Laplace transform – By Spicel (Schaum's Series)

Vector Calculus – By A.R. Vashishta

Higher Engg. Maths – By B.S. Grawal.

B.Tech. (Agril. Engg.) II Sem

Engineering Mechanics 6 (4+2)

UNIT – I

STATICS: Concurrent, Non concurrent and parallel forces in a plane, Composition, resolution of forces, Free body diagrams, Moment of a force and Varigonon's theorem, Conditions of Equilibrium, Polygon of Forces and Funicular Polygon of Forces, Principle of Virtual work, Equivalent Force System.

TRUSSES: Analysis of forces in the members of a truss. Method of joints, Method of sections. Graphical Method for Perfect Trusses.

UNIT – II

CENTROID & MOMENT OF INERTIA : Location of centroid and Moment of Inertia plane areas, Perpendicular Axis and Parallel Axis theorems. Product of Inertia, Principal Axes and Principal Moment of solid bodies.

FRICTION: Coloumb's law of friction. Friction on inclined plains. Screw and Nut friction. Ladder & wedge friction, Friction in journal collar bearings. Uniform pressure and uniform wear, Lifting M/c.

UNIT – III

TRANSMISSION OF POWER: Transmission of power through Belt, Rope and Gears, Ratio and tension on tight side and slack sides. Centrifugal tension, Spur, Bevel .Worm gearing. Rack and Pinion gear, Gear Trains. Epicyclic Gear Train.

UNIT-IV

KINEMATICS:Kinematics in cartesian and polar coordinates,Particle under uniform and nonuniform acceleration.Tangential and normal acceleration,Radial and Transverse velocity and acceleration,motion under gravity.

UNIT – V

KINETICS:Kinetics of particle, motion under constant force, momentum and energy principle, Impulses and angular momentum, D' Alemberts principle, Motion under constant forque. Flywheel, Collistion of Elastic Bodies, Shear Force and Bending moment Diagram in Centilever and Simply Supported beam with concentrated, Distributed load, and couple, Overhanging beams, Point of Cotraflexure, Relationship between bending moment and shear force pure bending.

B.Tech. (Agril. Engg.) II Sem Basic Mechanical Engineering 6 (4+2)

UNIT – I

WORKSHOP TECHNOLOGY:

Materials of Construction: Classification of Engineering materials, Composition, Mechanical properties and uses of case iron, mild steel, high carbon steel and high speed steel.

Foundry Practice: Introduction, Pattern, Pattern materials like wood, metals, plastics etc. Types of pattern like solid, split, match plate, gated and sweep, pattern allowances, Mould materials, Properties of a good molding sand. Composition of green sand, dry sand, loam sand.Types of mould gating system.Core,Core materials, properties of good core materials, core preparation. **UNIT – II**

Measurement And Measuring Tool: Construction, care & uses of surface plate, Straight edge, Vernier calliper, Micrometer, Dial gauge, Slip gauge, Sine bar and Combination set.

Welding Practice:

(a) Gas Welding Method of preparation and accumulation of oxygen and acetylene. Equipment's used in high pressure and low pressure gas welding plant. Function of flux.Types of gas flames

(b) Arc welding Various methods of producing are Ate welding equipment's comparison between AC and DC welding ARC welding electrodes. Flux coating on welding electrodes.

UNIT – III

Machine Tools: Description, definition, specification of MIC tools, working, classification and specification of Lathe and drilling machine.

UNIT – IV

HEATENGINES:

Boilers: Names and functions of principle parts, classification, Boiler mountings and accessories, Draught-natural and artificial, Height of chimney, Equivalent evaporation and boiler performance.

Steam : Sensible heat, latent heat, super heat, internal energy,enthalpy, dryness fraction and its determination, steam processes at constant pressure, constant volume, constant enthalpy.

UNIT – V

Steam Engines: Description and working, hypothetical and actual indicator diagram, diagram factor, C.P. developed and efficiencies e.g. mechanical efficiency, brake thermal efficiency and indicated

Thermal efficiency, governing, cut off and throttle, compound engines (Description and working only).

I.C. Engines:

Description and working of four stroke petrol engines, two stroke petrol engines, four stroke diesel engines and two stroke diesel engines, relative merits and demerits

B.Tech. (Agril. Engg.) II Sem

Engg. Graphics-II 4 (0+4)

UNIT-I

Construction of isometric scales, isometric projection of simple objects and machine components.

UNIT-II

Orthographic projection of machine components and their sectional views.

UNIT-III

Projection of simple agricultural Implements and machine components.

UNIT-IV

Forms of Screw threads- BSW- square-metric, representation of threads.

UNIT-V

Special application in agricultural engineering.

B.Tech. (Agril. Engg.) II Sem

Computer Programming -II 3 (0+3)

UNIT-I.

INTRODUCTION:

How Windows Works:

MS Windows: Various features, Advantages, How Windows program works, The Structure of Windows Program, Code and Resources, Program Instances, Compiling a Windows Program, Windows Memory Management – Memory options, stacks and heaps.

Setting Up Your System: Hardware and Software Requirement. Installation and setup options. First Programming Experiments:

Hungarian Notation. AMinimal Windows Program Structure, The Windows. h file, Win MainO function, Creating a new Windows class, Message Loop.

UNIT-II

MENUS: Operating Menus, Menus Defined as Resource Data, Popup Menu, creating a Menu as program operates, Menu Functions, The System Menu.

Mouse Handling :

Mouse Shape. The Caret

UNIT-III

TEXT AND GRAPHICS OUTPUT: Character Mode versus Graphics Mode, The Device Context, Windows GDI, Text Output, The WM_PAINT Message, Changing the Device Context, Graphics Output, Animated Graphics using Peek Message 0 Loop, Graphics Objects like Pen, Brush. Character Sets, Fonts, and the Keyboard.

The ANSI Character Set, Keyboard Message Processing, System Key Messages and Dead.

Characters, Selecting a Stock Font, Keyboard Accelerators.

UNIT –IV

WINDOWS CONTROLS: Types of Windows Controls Static, Button, List Boxes, Combo Boxes, Scroll Bars, Edit

Controls and their use in windows programs.

UNIT – V

CHILD AND POPUP WINDOWS: Creating a Child Window, Sending Messages to Child Windows. Fixed Child windows, Popup Windows.

Dialog Boxes:

How Dialog Boxes work, Designing a Dialog Box, Using a Dialog Box, Exchanging Data with a Dialog Box, Modal, Modeless, and System Modal Dialog Boxes.

UNIT – VI

OTHER RESOURCES: String Tables, User-Defined Resources Managing Memory:Local vs. Global Memory. Using Fixed and Discard able Memory Blocks. Global Memory Allocation. **UNIT – VII**

PRINTING: How Windows Support Printers. Printer Device Context Sending Special Commands to a Printer, Scaling the Printer Output. Allowing Interruption of a Print Job, Getting Information. About A Device, Calling functions in the Printer Driver.

Dist File Access:How Windows Access Disk Files, Various Operations like Create, Open, Read, Write, Close etc.

UNIT – VIII

BITMAPS: How Bitmaps Store Images, Loading and Displaying a Bitmap, BITMAP Data Format, DIB Format.Dynamic Link Librarics:Compiler Runtime Libraries. Dynamic Link Libraries, Writing a DLL, Using DLL, Alternate Ways to Reference DLL Functions

Suggested List of Experiments: Windows API programs based on course contents.

(At least two program from each unit).

Text Book:

1. Windows programming Printer Plus – By Jim Conger 1999, Galgotia Pub.

Reference References:

- 1. Programming Windows 95: By Cheries Pelzoid & Padl Yao
- 2. Windows API Bible : By JamesL Conger, Galgotia

B.Tech. (Agril. Engg.) III sem. Surveying & Leveling – I 4(2+2)

UNIT-I

Measurement of distances, ranging of lines, errors of chaining, obstacles in chaining, principles of surveying.

UNIT-II

Chain surveying, cross staff survey, chain traversing.

UNIT-III

Compass surveying , compass traversing, errors in compass surveying.

UNIT-IV

Plane table surveying, plane table traverse.

UNIT-V

Principles of leveling, type of levels, bench mark, fly leveling and profile leveling , contour surveying.

Practical :

Measurement of distances by tape, pacing, aligning chain line, land distance measurement by chain. erection of perpendicular on chain line. obstacles in chaining. Fixing position of different objects with respect to chain line and recording in field book. Cross staff surveying. Bearing of line by compass. Chain and compass traversing. Study of leveling instrument, recording of staff

reading and reduction of reduced level. Fly leveling. Plotting of contour by grid method. Plane table traversing, trial and error method.

TEXT REFERENCES

Surveying & Levelling Vol. I	: By T.P. Kanetkor & Kulkarani
Surveying & Levelling	: By B.C. Punamia
Text book of Survetying	: By Hussain & Nagraj

B.Tech. (Agril. Engg.) III sem.

Agronomy 3 (2+1)

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. Soil water, plant relationship. Water requirement of crops and irrigation scheduling. Weeds and their control.

UNIT-III: crop rotation, cropping systems, mono, double and multiple cropping. Relay cropping and mixed cropping, cultivation practices of important field crops.

UUNI-4: Improved variety seed, rate, time and method of sowing. Manuring, fertilization and plant protection.

UNIT-5: concept of dry farming, rain water harvesting and insitu moisture conservation.

PRACTICAL

- 1. Identifications of crops and their varieties ,seeds and weeds.
- 2. Fertilizer application methods.
- 3. Different weed control methods.
- 4. Different seed bed preparation methods.
- 5. Different methods of sowing and transplanting.
- 6. Judging maturity time for harvesting of crop.
- 7. Acquitance with different methods of harvesting.
- 8. Preparation of charts showing major agro-climatic zones and rainfall pattern.
- 9. Study of seed viability and germination test

B.Tech. (Agril. Engg.) III sem. Theory of Machine 4(4+0)

UNIT-I

Concept of plane motion of rigid bodies, basic kinematics concept, links, kinematic pairs, degress of freedom and constrained motion, mechanisms, inversion of mechanisms, equivalent linkages.

Velocity and acceleration in mechanisms, velocity diagram, instantaneous centre of rotation, Kennedy;s theorem of three centres, acceleration diagrams, Coriolis, component acceleration. **UNIT-II**

Introduction to friction, Clutch friction, belt drives, stepped pulleys.

UNIT-III

Cams, redial cam nomenclature, type of follower motions-uniform velocity, SHM, generation of cam profile by graphical method.

UNIT-IV

Toothed gearing : Fundamental law of gearing, classification of gears and basic terminology, geometric and kinematic characteristics of involute, interference phenomenon, path of contact. **Gear trains** : Gear trains with parallel axis, planetary gear trains. **UNIT-V**

Brakes and Dynamometers : Absorption and transmission type of dynamometers Governors : Watt, Proel, Hartnell.

B.Tech. (Agril. Engg.) III sem. Strenght of Material 4(4+0)

UNIT-

Elasticity – stress and strain – elastic limit- Hookes law, Youngs 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.

UNIT-II

Principle stresses and strains, Mohr's circle, Temperature stresses, Resilience, Shear force and bending moment diagram for simply supported beams and over hanging beams, centroid of different cross sectional laminac.

UNIT-III

Moment of inertia, parallel axis theorem and perpendicular axis theorem, Moment of inertia of different cross sectional laminac, stress in beams, derivation of bending equation Deflection, derivation of double order differential equation, Moment area method.

UNIT-IV

Stresses in thin cylinder and spherical shells, derivation of equations for circumferential longitudinal stresses in shells and their applications.

UNIT-V

Combined bending and direct thrust, derivation of torsional equation, shaft coupling and key design, design of helical and laminated spring.

PRACTICAL

Coplainer force system, resultant and equivalent, SFD and BMO for different types of beams, force determination in trusses, Young's modulus of elasticity for steel and timber, angle cubes, tensile strength of sand, crushing stress for cement mortar cubes, tensile strength of cement, determination of particle size using sieve shaker.

REFERENCES

- 1. Strength of Materials
- 2. Strength of Materials
- 3. Strength of Materials
- : By R.S. Khurmi
- : By Surendra Singh
- : By Timoshenko & D.H. Young
- B.Tech. (Agril. Engg.) III sem. Maths- III 4(4+0)

UNIT - I

Laplace transforms : Standard unit step functions periodic functions convolution theorem, application of ordinary differential equations with constant coefficients, complex variables

UNIT - II

Analytic function – Cauchy Riemann equations- mapping complex integration . cauchy fundamental theorem, residues, residue theorem, cauchy Lemma and jordens, lemma-contour integration

UNIT - III

Fourier series, dirichleti's condition, Fourier theorem

UNIT - IV

Errors and approximation in numeical computations. Method of finite difference, finite difference, integration.

UNIT - V

First and second order linear finite difference equations with constant coefficients. Interpolation methods for solving simulataneous linear algebraic equations.

B.Tech. (Agril. Engg.) III sem. Energy , Environment, Ecology and Society 4(4+0)

UNIT - I

Introduction of energy scenario, Conventional and non conventional resources of energy utility and waste management of Thermal hydal energy. General idea of solar, Wind, Bio-mass, Geothermal, Tidal and Wave energy, Sources and management of nuclear power energy, Electromagnetic energy, Radio frequency and microwaves. Its biological effects.

UNIT - II

Global warning, depletion of ozone layer, human activity and meterology, genetic and plant biodiversity. EI-Nino phenomenon and its effects, solid waste, waste disposal methods recycling of solid waste and its management.

UNIT - III

Atmosphere- Introduction, Structure of the atmosphere. Chemical and photochemical reactions in the atmosphere, primary air pollutants- Sources control and harmful effects of CO, NO2, SO2, HC particulates, sampling techniques, Air pollution from automobiles, Photochemical smog, Acid rain, some case studies of air pollution.

UNIT - IV

Hydrosphere - Aquatic environment, organic and inorganic water pollutants, Domestic and Industrial waster water treatment, Aerobic and anaerobic treatment processes, sampling and preservation, some case studies of water pollution.

UNIT - V

Lithosphere and Noise Pollution- Introduction of Land and soil pollution, Control and disposal, harmful effects. General introduction of noise pollution and its effects. Sound unwated form of noise changes. Traffic noise, prediction and control.

Reference References:

- 1. Environment Engg. Howard S. Peavy, Rowe, Mc Graw Hill
- 2. Environment Protection Emit T. Chance
- 3. Environment Chemistry A.D. Dav, Wile Eastern Ltd.
- 4. Environment Science Cumingham, saigs, Mc Graw Hill
- 5. Ecology concepts and Application manuel C . Mameller, Jr. Mc Graw Hill
- 6. Environ Chemistry & Pollution Controller S.S. Dora, S. Chand & Co. Ltd.

B.Tech. (Agril. Engg.) III sem. Operational Training of Farm Machines 2(1+1)

UNIT-I

Introduction to tractor and its systems.

UNIT-

Familiarization with tractor systems, control and its operation.

UNIT-III

Driving in forward and backward gears, hitching of farm equipments and trailer .

UNIT-I

Observation of power implement system, periodic maintenanc agricultural equipment and tractors.

UNIT-V

Dismantling and reassembling of engine and its systems.

PRACTICAL

- 1. Field operation of tractor in forward and reverse gears (Three sessions).
- 2. Familiarization with different workshop tools and instruments required for engine overhauling and maintenance.
- 3. Dismantling of an I.C. Engine (Three sessions)
- 4. Identification of major engine parts and measurement of their basic dimensions
- 5. Assembling of an engine ((Two sessions)
- 6. Starting the engine and making adjustments in valve system. fuel supply systems. lubrication system etc.
- 7. Studies on engine maintenance schedule, troubles and their remedies.
- 8. Field operation with power tiller
- 9. Hitching trailers and implements.

B.Tech. (Agril. Engg.) III sem.

Statistics 3 (3+0)

UNIT-I

Statistics- Statistic population parameter. Arithmetic weighted, Geometric and Harmonic means, and median for ungrouped and grouped data.

UNIT-II

Frequency distribution. Standard deviation, mean deviation and coefficient of variation. . Distribution – types, normal Poisson and binomial distribution.

UNIT-III

Simple and multiple cumulation coefficients. Frequency polygon histograms and bar chart. **UNIT-IV**

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

Testes of significance 't' test, 'f' test and 'x2' test Confidence levels.

B.Tech. (Agril. Engg.) IV sem. Agricultural Economics & Agri. Business Management 4 (4+0)

UNIT - I

Basic terms and concepts in economics, Scope of economics, Law of demand and market supply, Factors governing supply, Market and price determination under different market situation. **UNIT - II**

Farm produce marketing system in India, Place of Agriculture in Indian economy, Depreciation and method of calculating depreciation, Cost of cultivation per hectare, Economic size of holding, Govt. policy regarding economic incentives for enhancing productivity, and production.

UNIT - III

Meaning, scope and importance of farm management, Tools of Farm management like farm records, Farm planning and budgeting, Principles of Farm Management, Sources of farm finance, Management of land. Labor, Capital, Farm machinery.

UNIT - IV

Concept of production economics, Benefit cost ratio, Measures of farm efficiencies viz. Production and crop yield efficiency, Cropping intensity, Farm profits and its measurement, Principles of credit management.

UNIT - V

Basics of agriculture business management and its education, Present-day trend in agriculture, Innovative aspects of Agri business management, scope and objective of agri business management, Forecasting for agriculture business, Meaning of agribusiness financial management.

B.Tech. (Agril. Engg.) IV Semester Soil Mechanics (3+1)

UNIT- I

1 Preliminary Definition and Relationship - Soil as a three phase system, water content Density and unit weights, Specific gravity, void ration, Porocity and degree of saturation, density index functional relationship.

2. Soil Texture, Soil Structure & Classification of Soil

UNIT- II Determination of Index Properties - Determination of water content, specific gravity, partical size distribution, consistency of soil, determination of insitu density, void ratio and density index.

UNIT- III

- **1.** Soil Water Mode of occurrence soil water, adsorbed water, capillary water, stress condition of soil, capillary siphoning
- **2. Permeability** Darcy law, Discharge and seepage velocity, validity of darcy law, Poiseulle's law of flow through capillery tube, factors affecting permeability determination of coefficient of permeability, permeability of stratified soil deposits.

UNIT- IV

Seepage Analysis - head, gradient and potential, seepage pressure, upword flow, quick condition, flow net, application of flow net. Phrieatic line of an earth dam.

UNIT- V

- 1. Introduction to Compressibility, Compaction and Consolidation
- 2. Introduction to shear strength of soil
- **3.** Introduction to earth pressure
- 4. Introduction to Stability of slope

B.Tech. (Agril. Engg.) IV sem. Surveying & Leveling- II **4** (2+2)

UNIT-1

Permanent adjustment of leveling instrument, reciprocal leveling, correction due to curvature and refraction, sensitivity of bubble tube.

UNIT-2

Type and components of Theodolite, measurement of horizontal and vertical angle.

UNIT-3

Trigonometric surveying: Single plane and double lane methods.

UNIT-4

Use and adjustment of minor instruments.

UNIT-5

Introduction to remote sensing ground and aerial photography, Satellite imaging, remote sensing applications. Introduction to GIS.

PRACTICAL

Determination f sensitivity of a bubble tube, reciprocal leveling, permanent adjustment of dumpy level by two peg method, study of theodolite, measurement of horizontal angle by theodolite repetition method setting of horizontal angle on theodolite, determinaton of height. of two objects and horizontal distance between them, double plane methods, study of planimeter, measurement of horizontal and sextant vertical angle by box – sextant, study of stereo- scope images, preparation of photo mosaic, band adjustment for land set imaginary for interpretation of topogaphy, vegetaive cover drainage area and water bodies. Introduction of Geographical Information System.

TEXT BOOK

Surveying & Leveling	By T Kanetkor & Kulkarni
Surveying & Leveling	By B.C. Punamia
Text book of Surveying	By Hussain & Nagraj

B.Tech. (Agril. Engg.) IV sem. Machine Design 4 (4+0)

UNIT-I

- 1. Introduction : Introduction to design procedure, design requirements, properties of materials and their selection, manufacturing considerations in design, concept of inter changeability and types of fit.
- 2. Stresses in machine parts : Simple stresses : stress and strain (tensile, compressive and shear), modulus of elasticity, modulus of rigidity, bearing stress, thermal stress, stresses in composite bars, linear and lateral strain, poisson ratio, volumetric strain, bulk modulus, resilience.

UNIT-II

- 1. Torsional & Bending stresses : Torsional shear stress, bending stress in straight beams, principal stress, eccentric loading direct & bending combined, introduction to theories of failure under static load.
- 2. Variable stresses : Introduction to cyclic stresses, fatique, endurance limit, stress concentration and notch Notch sensitivity.

Unit-III

Design of machine elements : Threaded fasteners : Stresses due to screwing up forces. stresses due to external forces, bolted joints under eccentric loading - acting parallel to the axis of bolt, acting perpendicular to the axis of bolt.

UNIT-IV

Keys and couplings : types of keys and couplings, force acting on sunk key, design of sunk key, sleeve (muff coupling) and flange coupling-empirical design and check for strength.

UNIT-V

- 1. Shafts : Design of shafts for strength torsional strength, bending strength, introduction to rigidity
- 2. Flat belt drives : Velocity ratio and power transmission.

B.Tech. (Agril. Engg.) IV sem. Heat and Mass Transfer 4(4+0)

UNIT-I

Conduction : Importance of heat transfer. Nodes of heat transfer 3 dimensional fourier equation of heat conduction in cartesian coordinates, Derivation of fourier equation into polar & spherical coordinates. One dimensional steady conduction through a composite wall, radial steady conduction through the wall of a tube. Heat flow through slab with heat generation when both surface are at same/different temperatures.

Heat transfer through rectangular fin effectiveness & efficiency of fin. Approximate solution of fin. Effect of fin on heat flow steady state critical thickness of insulation.

UNIT-II

Convection : Forced convection in Laminar flow past a flat plate, forced convection in fully developed Laminar flow through a tube.

Mechanism of heat flow by natural convection. Heat transfer from vertical wall by free convection. The principle of dynamic similarity applied to free convection, convection with change of phase.

UNIT-III : Radiation

The laws of black body radiation Kirchoff's law & grey body radiation. Radiation exchange between two black surfaces, radiation exchange between two grey surfaces, Radiation from gases and flames.

UNIT-IV

Analysis of heat exchanges: Mean temperature difference, Temp. distribution and heat flow in evaporators & condensors shell & two pass type heat exchanges effectiveness method (NTU method)

Unit-V

Mass transfer : Ficks law of diffusion, steady state diffusion of gasses and liquids through solids equimolar diffusion. Isothermal evaporation of water into air unsteady state 3 dimensional mass diffusion in stationary media.

B.Tech. (Agril. Engg.) IV sem. Operation and Maintenance of Tractors : 2 (2+0)

UNIT-1

Tractor industy in India. Technical specification of different make of tractors manufactured in India.

UNIT-II

Small tractors and power tiller engines .

UNIT-III

Trouble shooting - symptoms and possible causes. Trouble shooting in different assmeblies, symptoms and possible causes .

UNIT-IV

Comparison of different make of tractor relating to special feature.

UNIT-V

Safety precautions while driving a tractor/repairing a tractor and road signals.

B.Tech. (Agril. Engg.) IV sem. Bio – Chemistry and Food Technology 2(1+1)

UNIT -I

- ii. Important Components in cell structure, major nutrients saving as food for living cell
- iii. Carbohydrates- Occurrence, composition and importance of Glucose, Fructose, Sucrose, Maltose, Lactose, Starch and cellulose

UNIT -II

- i. Proteins- Essential amino acids, polypeptide linkage properties, structure and biological value of proteins.
- ii. Enzymes and coenzymes- their vole in anabolic and catabolic pathways Nucleic Acids D,N,A,R,N,A. their functions.

UNIT -III

- i. Lipids Occurrence, composition and properties of oils, fats wax and phospholipids, Iodine number saporificaton value, RN Value
- ii. Vitamins Source, composition and function of vitamins A,C, B & D. Hormones-Auxins and other plant hormones.

UNIT -IV

Food and its composition – Proximate principle, minerals and vitamins in common Indian Food. Effect of processing on nutritive value of food. Biological changer during ripening of fruits storage of grain, milk and other food product.

UNIT -V

Types of Micro organisms- Bacteria and Fungi, Allergens and virus. Multiplication and control of bacteria. Pathogenic chemicals mood for food preservation.

B.Tech. (Agril. Engg.) V sem. Hydrology 3(2+1)

UNIT - I

Hydrologic cycle and its component : meteorological parameters and their measurement : interpretation of precipitation data ,

UNIT - II

Runoff, factors affecting, rainfall-runoff relationship and 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,

UNIT - V

Ground water in hydrologic cycle: occurrence, distribution and movement of ground water.

PRACTICAL

- 1. Study and use of evaporimeters
- 2. Study and use of anemometer
- 3. Study and use of hygrometer
- 4. Study and use of sunshine recorder
- 5. Study and use of solar radiation instruments
- 6. Measurement of precipitation by rain gauges
- 7. Analysis of rainfall data and estimation of average rainfall
- 8. Study of stream gauging instrumentation sand measurement
- 9. Development of hydro graph
- 10. Run of computations
- 11. Graphical analysis of flood routing

TEXT BOOK

1. Water resources & Hydrology	:	By S.K. Garg
2. Applied Hydrology	:	By V.T. Chow
3. Hydrology	:	By U.S.D. A. Section –IV
4. Engineering Hydrology	:	By K. Subramanyam
5. Principles. of Agricultural Engineering :		By A.M. Michae and T.P. Ojha

B.Tech. (Agril. Engg.) V sem. Pulses and Oil seeds 3 (2+1)

UNIT - I

Unit operation in processing of cereals, oil seeds, and pulses. UNIT - II Working principles of equipment for milling, mixing cleaning and grading . UNIT -III Drying: and storage for cereals pulses: UNIT - IV Psychrometry: Energy and material balance UNIT - V

Solvent extraction process flow charts.

PRACTICAL

- 1. Determination of moisture content using oven method
- 2. Determination of moisture content using moisture meters
- 3. Determination of Equilibrium moisture content
- 4. Determination of drying constant
- 5. Determination of moisture and temperature profiles in thick bed drying.
- 6. Determination of milling quality of paddy as influenced by milling parameters
- 7. Determination of milling quality of pulses as influenced by milling parameters
- 8. Determination of oil expressin quality of oil seeds as influenced by different parameters
- 9. Determination of shelling index
- 10. Performance studies on cleaning equipment
- 11. Performance studies on grading equipment
- 12. Visits to flour mills
- 13. Visits to rice milling plants
- 14. Visits to solvent extraction plants

B.Tech. (Agril. Engg.) V sem. Drainage Engineering 3 (2+1)

UNIT - 1

Introduction to agricultural land drainage. Drainage problems, causes and effect of water logging prevention and control, drainage requirements of various crops:

UNIT - 1I

Drainage investigations: types of drainage systems: planning, design and layout of surface and sub surface drainage systems:

UNIT - 1II

Drainage water quality analysis, recycling of drainage water for irrigation.

UNIT - 1V

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

UNIT - V

Drainage for water table control, drainage for heavy soils, mole drains, maintenance of drainage systems, Economic analysis of drainage system.

PRACTICAL

- 1. Preparation of isobath maps
- 2. Preparation of contour maps'
- 3. Measurement and analysis of infiltration data
- 4. Design of surface drainage system
- 5. Design of surface drainage system
- 6. Determination of hydraulic resistance of different tile materials.
- 7. Measurement of drainable porosity
- 8. Field Measurement of Hydraulic Conductivity

TEXT REFERENCES

- 1. Drainage Engineering
- 2. Soil & Water Conservation Engineering
- 3. Drainage of Agricultural Lands
- 4. Drainage manual

By J.N. Luthin By Schwab et.al By V. Schifgarde By S.S.B.R.

B.Tech. (Agril. Engg.) V sem. Fluid Mechanics 6 (4+2) UNIT-I

1. Introduction : Properties of fluids- density, specific weight, specific-volume, specific gravity, surface tension, capillarity, vapour pressure, equation of state, gas constant.

2. Hydrostatics : Pressure at a point, pressure head, Pascal's law, atmospheric, absolute, gauge & vaccum pressures, vapour pressure, Measurement of pressure manometers-simple manometer.

UNIT-2

- 1. Hydraustatic pressure total pressure, centre of pressure of horigontal & vertical plane surfaces.
- 2. Buoyance : buoyancy, Buoyant force and centre of buoyancy, metacentre and metacentric height, stability of submerged & floating bodies.
- 3. Kinematics of Fluid flow : Introduction to general types of fluid flow- steady/unsteady, uniform/non-uniform, laminar/turbulant, Equation of continuity for one dimensional steady flow.

UNIT-III

Dynamics of Fluid flow : various forms of energies - elevation energy, kinetic (velocity) energy, pressure (flow) energy. Energy equation for steady flow- Bernoullis's theorem. Euler; equation of motion and derivation of Bernoulli's equation. Linear momentum equation & impulse momentum equation. Types of fluid motion - introduction to rectilinear, radial, Reynolds number.

UNIT-IV

Application of dynamic fluid flow : Venturimeter, orifice meter nozzle & pitot tube : discharge measurement through pipes - its principle, quation of discharge through venturimeter, orifice meter- description, discharge calculation introduction to nozzle & pitot tube.

UNIT-V

- 1. Orifices & Mouthpieces : Definition, classification, orifice dischargeing free, definitions of Vena-contracta, Hydraulic coefficient, coefficient of velocity, coefficient of contraction, coefficient of discharge, coefficient of resistance.
- 2. Introduction to weir and notches.

Reference:

- 1. Fluid mechanics & Hydraulics Jagdish Lal
- 2. Fluid Mechanics M.Manohar
- 3. Fluid Mechanics & Hydraulic Machine Modi & Seth.

B.Tech. (Agril. Engg.) V sem. Farm Machinery 3(2+1)

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 sugar cane cotton Potato and horticultural crops operation human engineering and safety in farm machinery.

PRACTICAL

- 1. To study different farm operations and familiarization with farm machines and equipment
- 2. Study of constructional features of m.b. and disc ploughs
- 3. Study of different seed cum fertilizer drills and planters their calibration and adjustment
- 4. Study of constructional details and adjustment of mowers and reapers
- 5. Study of cultivators and weeders
- 6. Study of constructional details and adjustment of mowers and reapers
- 7. Study of constructional details of combines, determination of combine losses.
- 8. Study of constructional details of operation and adjustments of threshers an their performance
- 9. Study of puddlers and cage wheels for rice cultivation
- 10. Study of nursery raising and paddy transplanters
- 11. Study of special machines for pota groundnut, sowing and harvesting
- 12. Study of sugar cane equipment
- 13. Calculations on field capacities, field efficiencies and application rates of seed fertilizer and chemicals
- 14. Calculation on performance and cost analysis

B.Tech. (Agril. Engg.) V sem. Agricultural structure & Rural Engineering 3 (3+0)

UNIT -I

Functional planning, layout, arrangement and construction of important building on the farm in regard to human and livestock requirement. Orientation, appearance and economic of farm building.

UNIT -II

Design, construction and remodeling of a farm house. Sewage disposal system and sanitary requirement .

UNIT -III

Layout and design of different dairy buildings. barns and milk house. layout and design of different types of poultry houses equipment used. incubator and design of different

UNIT -IV

Types of poultry houses, equipment used. incubator and brooder house. Swing houses, sheep and goat house.

UNIT -V

Types of silos and their design features. Feed storage system for a farm stead. Implement shed and workshop building. Farm roads farm fencing and gates. Special structures on the farm.

TEXT REFERENCES

- 1. Farm Building Design
- 2. Farm Building & Sons)
- 3. Farm Building Book co.)
- 4. Farm Building
- 5. Livestock health and Housing

By L.W. Beubaur, H.H.B. Walker By Foster and carter (John Viley

By Wooley (Mc. Graw Hill

By Whitekar By Devid Sainsbury

B.Tech. (Agril. Engg.) V sem.

Building Materials and Structural Design 4 (3+1) UNIT -I

1. Stones- Introduction, cost classification, properties of stone quarrying. dressing of stones

2. Bricks-Constituents of brick earth classification of bricks manufactures of bricks by different processes, properties of bricks and tests in lab and field .

UNIT -II

- 1. Lime Composition, classification, manufacture of lime
- 2. Cement Manufacture by wet and dry process, types of cement tests for cements properties **UNIT -III**
- 1. Sand Kinds, bulking of sand, tests for impurities
- 2. Timber of structure, classification, seasoning of timber
- 3. Use of materials like plywood. asbestos, plastic and PVC glass, aluminum etc. in building and sheds and use of flash and fly ash products in construction and water proofing materials for concrete.

UNIT -IV

Plain cement concept and reinforcement method of proportioning concrete mixes. Theory of single reinforced sections and design of rectangular section.

UNIT -V

Theory of a double reinforced section and its design calculation. Theory of T beam. Introduction and simple problem on shear stress and bonds, Basic rules for the design of beams. Axially loaded columns.

PRACTICAL

- 1. Mixing, test of concrete and costing cubes for quality control
- 2. Tensile strength test for cement
- 3. Compressive strength test for brick
- 4. Abrasion test for stone
- 5. Field tests for cement quality
- 6. Slump test for concrete
- 7. Determination of sand quality
- 8. Design of a Singly reinforced rectangular section of beam
- 9. Design of a double reinforced rectangular section of beam
- 10. Study of bond stress
- 11. Design of a T-Beam
- 12. Study of different types of columns.

TEXT REFERENCES:

1. Engineering Materials	By S.C. Rangwala
2. Treasure of R.C.C	By Shushil Kumar
3. Reinforced concrete	By KL Rao

B.Tech. (Agril. Engg.) V sem. Irrigation Engineering 4 (3+1)

UNIT -I

Water resource development and utilization in India, soil-water plant relationship: measurement of soil moisture, infiltration: water requirement of crops, consumptive use and evapotranspiration

UNIT -II

Land grading and land preparation for irrigation. Design of irrigation channels: water conveyance and control structures

UNIT -III

Irrigation efficiencies, irrigation scheduling: methods of irrigation: flood border, furrow, check basin, sprinkler and drip, evaluation of irrigation methods.

UNIT -IV

Pumps and types, pump characteristics, pump selection and installation:

UNIT -V

Design of sprinkler components, size of pipes, nozzeles and matching pumping design of drip components, size of pipes, emitters drippers and furtigation unit:

PRACTICAL

- 1. Determination of soil moisture by different methods (gravimetric, tensio meter, gypsum blood and neutron probe method)
- 2. Measurement of irrigation water by weirs, notches and flumes
- 3. Estimation of water requirement by different methods
- 4. Land levelling exercise by cut and fill method
- 5. Design of irrigation channel
- 6. Determination of irrigation efficiency
- 7. Performance evaluation of sprinkler irrigation components
- 8. Performance evaluation of drip irrigation system
- 9. Design of tube well
- 10. Testing of pumps
- 11. Study of turbine pump
- 12. Matching of pump for tube well using characteristic curves
- 13. Design of sprinkler system for selected crops
- 14. Design of drip system for horticultural crop

Text References

- 1. Irrigation Theory & Practices
- 2. Design & Evaluation of Irrigation Methods
- 3. Irrigation Principles & Practices
- 4. Sprinkler Irrigation
- 5. Soil & Water Conservation Engg.

B.Tech. (Agril. Engg.) V sem. Farm Power : 3 (2+1)

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. lubricating, ignition, starting and electrical systems: engine governing:

UNIT -IV

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

By A.M. Michael By A.M. Michael e.t. al. By O.V. Israelson By Sivanappan By Schwab et.al. Power tillers and small engines for farm operations: performance and cost analysis of farm tractors and power tillers.

PRACTICALS

- 1. Familiarization of tractor systems and controls: determination of tractor speed and slip
- 2. To study, working of two stroke and four stroke cycle SL & CL engines, firing interval firing order and valve timing diagram
- 3. To study cooling system of tractor engines
- 4. To study lubrication system of tractor engines
- 5. To study air cleaners and fuel systems of SL & CL engine
- 6. To study different types of governors and methods of governing
- 7. To study electrical system of tractors.
- 8. To study different types of clutches and brakes
- 9. To study different types of gear transmission systems calculation of speed ratio for different gears.
- 10. To study differential and final drives of tractors: planetary and speed ratios
- 11. To study Ackermans steering geometry: measuring and adjustment of tractor and camber toe-in and toe-out
- 12. To study hydraulic system of tractor
- 13. To study the tyres, roms and ballasting of tractors
- 14. Calculation on different horse powers and cylinder pressures
- 15. Calculation on specific fuel consumption and power requirement on full and partial load operations
- 16. Determination draft of agricultural implements

B.Tech. (Agril. Engg.) V sem. Dairy and Food Engineering 6(3+3)

UNIT -I

Properties of dairy and dairy and food products: unit operation of various dairy and food processing systems:

UNIT -II

Process flow charts for product manufacture:

UNIT -III

Working principles of equipment for receiving: pasteurization, sterilization, homogenization: filling and packaging, butter manufacture:

UNIT -IV

Evaporation, drying, freezing juice extraction filtration, membrane separation thermal processing plant utilities requirement.

PRACTICALS

- 1. Study of a composite pilot milk processing plant and equipments
- 2. Study of pasteurizes
- 3. Study of sterilizers
- 4. Study of homogenizes
- 5. Study of separators
- 6. Study of butter churners
- 7. Study of evaporators
- 8. Study of milk dryers

- 9. study of freezers
- 10. Design of food processing plants and preparation of layout
- 11. Determination of physical properties of food/dairy products
- 12. Visit to multi-product dairy plants
- 13. Determination of physical properties of food products
- 14. Estimation of steam requirements15. Estimation of refrigeration requirements in dairy and food plant

B.Tech. (Agril. Engg.) V sem. System Engineering 3 (3+0)

UNIT -I

System concepts, System Approach to Agricultural Engineering. Linear programming problems **UNIT -II**

Mathematical formulation, Graphical Solution: Simplex method Degeneracy and Duality in linear programming:

UNIT -III

Transportation problems: assignment problems : Decision analysis: Waiting Line problems:

UNIT -IV

Project Management by PERT/CPM, Inventory control.

UNIT -V

Mathematical models of physical systems, Modeling of agricultural systems and operations Response of systems, Simulation, Computer as a tool in system analysis.

B.Tech. (Agril. Engg.) 6th Semester

Ag. Engg. Extension Education 2 (2+0)

UNIT I

Definitions, philosophy and scope of agricultural extension, basic principles and their applications to agricultural engineering.

UNIT II

Role and qualities of extension worker. Various extension agencies, their functions and mode of working with reference to agricultural engineering.

UNIT III

Extension programme planning, land its importance. Extension need for farm implements and machinery, soil and water engineering, farm structures and post harvest technology.

UNIT IV

Transfer of technology, Training and visit system, monitoring of extension activities and feedback.

UNIT V

Agro-industrial extension status, need and scope.

B.Tech. (Agril. Engg.) V sem. Instrumentation : 6 (4+2)

UNIT-I

Definition of measurement. Importance of measurement requirement for static anddynamic measurement, errors. Sensitivity, accuracy, speed of response and rage in measurements, mechanical and electrical measuring systems, calibration of measuring system.

UNIT-II

Electrical circuits and terminating devices, Electronic counter and its use, cathode ray, oscilloscope and its use, galvanameter type recording techniques. Motion measurement, Electrical resistance strain gauges, wire and foil type gauge factor, gauge material and selection.

UNIT-III

Temperature measurement, types of temp. measuring instruments and their appropriate temp. range, Bimatelic thermometer, and pressure thermometer etc.

UNIT-IV

Pressure measurement, types of pressure measurement instruments, U tube monomter, pitot tube, inclind U tube Bourden tube pressure gauge and Vaccum gauge.

UNITV

Elementary knowledge of capacitance and inductance type pick us piezo electric pickups.Measurement of relative humidity, sling psychrometer and use of Hygrometers (indication and recording type)

B.Tech. (Agril. Engg.) V sem. P. H. T. of Horticultural Crops 3 (2+1)

UNIT -I

Properties of fruits and vegetables: food texture and theology :

UNIT -II

Process parameters equipment for sorting, washing handling peeling. slicing, bunching, mixing hading, chilling packaging

UNIT -III

Transportation storage and preservation technology charts for manufacture of finished products: **UNIT -IV**

Application of quality control techniques contact stresses and Mechanical Damage.

PRACTICAL

- 1. Study of physical properties of fruits and vegetables
- 2. Performance study of fruit/vegetables washer
- 3. Performance study of peeler
- 4. Performance study of a slicer
- 5. Load deformation characteristics of fruits/vegetables
- 6. Determination of firmness of fruits/vegetables
- 7. Study of chilling behavior of fruits
- 8. study of chilling behavior of vegetable
- 9. Fluidized bed drying of green peas
- 10. Study of heated air drying of mushrooms
- 11. Osmvacdrying of mushrooms
- 12. Comparative study of packaging materials

- 13. Study visit to fruit/vegetable factory
- 14. Study visit to cold storage.

B.Tech. (Agril. Engg.) VII semester

Soil and water conservation Engineering 3 (2+1)

UNIT -I

I Soil erosion and types, wind and water erosion, factors affecting erosion, classification of water erosion, splash, rill gully and stream bank erosion: Mechanics of erosio, estimation of soil loss

UNIT -II

Wind erosion control: wind break and shelter belts

UNIT -III

Vegetative and engineering measures. contour farming, strip cropping.

UNIT -IV

Mechanical measures: contour bunds, graded bunds and terraces. Design principles for buds. and terraces: Design of vegetative and grassed waterways

UNIT -V

Gully control structures temporary and permanent: design details of permanent gully control structures. drop spillway. chute spillway and drop inlet spillway. Water ha, vesting structures.

PRCTICALS

- 1. Survey of watershed area and identification of erosion pron areas based on slopes
- 2. Study and use of Coshocton's silt sampler and multi slot divisor
- 3. Computation of erosion index from rainfall chart
- 4. Design of bunds
- 5. Design of bench terraces
- 6. Design of grassed waterway
- 7. Design of temporary gully control structure
- 8. Design of drop spillway
- 9. Design of chute spillway
- 10. Design of drop inlet spillway
- 11. Design of farm pond
- 12. Design of earthen embankment

TEXT BOOK

- 1. Water resources & Hydrology
- 2. Principles of Agril. Engg. Vol-II
- 3. Soil & Water Conservation Engg.
- 4. Soil Conservation

By S.K. Garg By Michael & Ojha By Schwab et. al By Norman Hudson

B.Tech. (Agril. Engg.) VII semester Farm Machinery Design 2 (2+0)

UNIT -I

Materials of construction of farm machinery and their properties:

UNIT -II

Design of transmission of power components and system in agricultural machines: fits and tolerances: design parameters of agricultural implements:

UNIT -III

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.

B.Tech. (Agril. Engg.) VII semester

Standardization and quality Control 2 (2+0)

Familiarization with the process of formulation of Indian Standards in agricultural Engineering: **UNIT II**

Standardization Agencies in the world BIS, OECD. ISO, RNAM. US (ASAE, ASTM. NEBRASKA):

UNIT III

Testing standards of tractor machinery, equipment processes and terminologies, certification marking. Testing agencies in the count.

UNIT IV

Planning for quality, Quality control measurement, statistical methods in the quality function **UNIT V**

Computer Application in quality control.

B.Tech. (Agril. Engg.) VII semester Process Equipment Design 4 (4+0)

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, Heat exchangers, Pressure vessels. **UNIT IV** Optimisation of design with respect to process efficiency, energy and cost. Application of **UNIT V** Computer techniques in design optomization.

B.Tech. (Agril. Engg.) VII semester

Refrigeration and Air Conditioning 4 (4+0)

UNIT-I

Introduction to the first and second laws of thermodynamics.Introduction to refrigeration system, Carnot refrigeration cycle, COP, Unit of refrigeration. Refrigerants : Nomenclature, Desirable properties of refrigrants.

UNIT-II

Air Refrigeration cycle (Brayton cycle), optimum cop and pressure ratio. Air craft refrigeration system, Necessity of air craft refrigeration system, Advantages of air cycl

for aircraft refrigeration

UNIT-III

Vapour compression system, Effect of pressure change on cop. Use of PH chart, effect of subwoling of condenste on COP, Effect of super heating of vapour before compression Introduction to vapour absorption system.

UNIT-IV

Air conditioning : Introduction to air conditioning, Use of psychometric chart for air conditioning. Air conditioning process, SHF and its use, GSHF, ESHF, heating load calculation **UNIT-V**

APPLICATIONS : Food Preservation, Cold storage, Ice Cream manufacture, Water coolers.

B.Tech. (Agril. Engg.) VIII semester Watershed Management 3 (3+0)

Unit-I

Definition of watershed : Why management on watershed basis.Principles of watershed Management. Objectives of watershed Management.Components of watershed management Classification of watershed Demarcation of watershed, order of stream

Unit-II

Survey and planning for watershed Management.Repartition of master plan for watershed Management. Land capability classification on the basis of slope, soil depth, permeability soil erosion, climate etc.

Unit-III

Soil and moisture conservation measures and water harvesting. Treatment of land for watershed Management Software treatment, medium software treatment, hardware treatment. Water harvesting- minor irrigation tank farm pond, halo bundhi (check dam) and percolation tanks, Soil and moisture conservation measures terracing bunding, trenching, stop dam, gabion structure.

Unit-IV

Crop management, seeding, row spacing and plant density.Weed management Fertility management. Alternate land use systems, concept, ALUS for Arable and non- Arable land. Alley cropping agri-Silvicculture system, agri horticulture system. Horti/silvi pastoral system, horti pastoral system, pasture management, tree faming ley farming.

Unit-V

Peoples participation in watershed programme. Rainfalt- runoff analysis, Water balance methodologies. National Watershed Management. Policy. Hydrologic behaviour and monitoring of watershed Preparation of fesibility report. Planning of multi-purpose small-scale projects.Benefit cost analysis of watershed programme.

REFERENCE

- 1. Watershed management by Dhruva Narayan, ICAR Publication
- 2. Principle of Agricultural Engineering Vol. 2 By Michel & Ojha
- 3. Soil and water conservation engineering By R Suresh

ELECTIVES

1. Ergonomics principles and practices

UNIT-I

Human factors in system development, energy, liberation and mechanical efficiency of human body.

UNIT-II

Bio-mechanics of motion, Man-machine system concept. Anthropometrics and bio-mechanical requirements accounted in design of work place and mechanical devices including agricultural machines.

UNIT-III

Control and related devices and their design considerations.

UNIT- IV

Environmental factors in designing man-machine system.

UNIT- V

Ergonomics assessment of product quality. Case studies in ergonomics.

PRACTICALS

Laboratory experiments in anthropometrics measurements. Human energy requirement or control and displays. Study of human response to noise vibration illumination and space requirement.

REFFRENCES

- 1. Mc cormick, Ernest Human Factors in Engineering and design Tata-Mooaw Hill Publishing co. Ltd. New Delhi
- 2. Murre, K.F. Ergonomics, Chapman & Hall . London

2. Tillage and Traction Engineering

UNIT- I

Shear and compressive strength of soil, soil stress-strain behavior failure criteria,

UNIT-II

Assessment of dynamic properties of soil, mechanics of inclined rigid tools, mechanics of rotary and vibratory tillage tools.

UNIT-III

Design considerations of different tillage tools, performance of tillage tools. Mechanics of traction and transport devices

UNIT- IV

Performance characteristics of off-road vehicles, drawbar pull and drawbar power coefficient of traction, wheel slip, attractive efficiency, gross traction, motion resistance, fuel economy indices, weight transfer, traction tyros an drakes,

UNIT-V

Methods of improving traction, prediotion and evaluation of the traction and transport devices, modeling of traction performance.

TEXT BOOK

- 1. W.R. Gill and G.E. Vandenberg Soil Dynamics in Tillage and Traction. ARS. USDA. 1968
- 2. J.Y. Wong Theory of Gound Vehicles, John Wiley & Sons Inc. New York, 1993
- 3. E.Mckeys Soil Cutting and Tillage, Elsevier, Tokyo, 1985

PRACTICALS

Selection of tractors for farm operations in Agriculture. Selection of different sources of farm power use of tractors for various complicated field operation.

Selection of systems of farm equipments for crop production. Scheduling farm operations and machinery. Pattern of field operation for higher field efficieries. Care, maintenance and repair of farm equipment and tractor.

Familiarisation with ideal setting of farm equipment. Study of wear pattern of tillage and harvesting equipment and their repair and maintenance and troubles in : Sprayers, Dusters, Pump sets, tractors and power, tillers and their remediot, Inventory and record keeping exercises and economic decisions arcises .

TEXT REFERENCES

- 1. Farm power Mchinery Management By Donel Hunt. Iowa State Uni/Press, USA
- 2. Mechanical Cultivaton in India- By D.A. Gadkari IARI New Delhi.

3. Testing of Agricultural Machines & Tractors

UNIT I

ISI standard and test code, UNIT II Lab & Field performance evaluation of Farm Machinery.

Lab & Field performance evaluation of Farm Mach

UNIT III

Lab & Field evaluation of simple man-tools and implements.

UNIT IV

Testing of tillage and harvesting machinery and farm tractors. Data analysis and preparation of test reports.

UNIT V

Engine testing, drawber test. Sound test, feasibility test and tractor system test.

4. Farm Machinery Production

UNIT I

Review of materials, cutting tools and manufacturing processes.

UNIT II

Design of jigs and fixtures and their application in production of agricultural machines components, Surface finish and evaluation.

UNIT III

Inspection and quality control of agricultural machines.

UNIT IV

Process planning for production. Assembly of machines, assembly methods. Visit to agricultural machinery industry and preparing report of manufacturing techniques of selected components.

UNIT V

Various test codes and manufacturing codes of agricultural implements.

5. Minor Irrigation & Command Area Development

UNIT I

History of command area development in India. Identification of the problems leading to inefficient use of water

UNIT II

Use of earth moving machines for land development work. Problem soils, Lining materials, land consolidation and varioussocio-economic aspects.

UNIT III

Benefit cost ratio of command area development projects.

UNIT IV

Water delivery systems- canal capacity, water allocation and canal scheduling

UNIT V

Performance indicators of irrigation projects. Consumptive use of surface and ground water resources. Case studies.

6. Ground water Hydrology UNIT-I

Ground water resources
Aquifer type
UNIT -II
Aquite, properties
Ground water movement. Darcy's law and its limitations
UNIT - III
Ground water balances
Ground water recharge
UNIT - IV
Exploration techniques
UNIT - V
Ground water management

7. Remote Sensing and Geographic Information System

UNIIT I

Basic principles of remote sensing.

UNIIT II

Energy sources and radiation principles, energy interaction in the atmosphere and with earth surface features.

UNIIT III

Active and passive remote sensing systems plate farm and sensors photogrammetry earth resource satellite,

UNIIT IV

Digital image processing image interpretation.

UNIIT V

Basic concepts of GIS, remote sensing and GIS application for land and water resources.

8. Small Dams and Reservoirs

UNIT I

I Classification of storage reservoir, reservoir capacity,

UNIT II

Stochastic approach in determination of reservoir capacity, reservoir operation

UNIT III

Classification of small dams, selection of type of dam. Foundation and construction materials,

UNIT IV

Design of earth fill dams

UNIT V

Rock fill dams, concrete gravity dams.

9. Land and water Resources Development

UNIT I

Basic considerations in engineering. planning and development of fands for agricultural purposes. Introduction to land development machinery.

UNIT II

Land development techniques and calculations. Basic concept in water resources development and planning. Water resources inventory.

UNIT III

Development of minor irrigation resources through stream storage reservoirs

UNIT IV

Open wells and tube wells. Multipurpose resources development and planning

UNIT V

Rain water management for water resources development.

10.Tube wells & Pumps

UNIT- I

Occurrence and movement of ground water. Geological systems of M.P. In relation to availability of water, type of aquifer, aquifer characteristics and their determination.

UNIT-II

Types of aquifers. Flow of water in aquifers

UNIT-III

Well hydraulics. Design and construction of tube wells. Preparation of well logs.

UNIT-IV

Planning and development of ground water basins. Well drilling. Pumps, types of pump

UNIT- V

Principle of pumps, working of pumps. Pump testing, selection installation, operation and maintenance of pumps.

11.Bioprocess Engineering

UNIT- I

Biochemical and biological reaction systems. bioenergetics, biocalarys, enzymo kinetics, immobilized enzyme systems.

UNIT-II

Batch growth of microorganisms, growth patterns and growth kinetics in batch culture.

UNIT-III

Kinetics of product formation. Bioreactors, design of batch and continuous stirred tank fermentors, design of batch and continuous, stirred tank fermentors, multi-stage systems.

UNIT-IV

Aeration and agitation systems. Media and sir sterilisation, kinetics of thermal death, design of sterilisation equipment.

UNIT-V

Mixed culture systems, biological waste water treatment, biogas reactor and activated sludge process, downstream processing, recovery and purification of products-alcohols, acids, antibiotics and enzymes.

12. Seed Technology & Processing

UNIT-I

Seed production technology : general principles, nucleus and breeder seed, foundation and cetified seed. Hybrid seeds.

UNIT -II

Seed testing, sampling for purity, germination, viability vigour-procedure and standard techniques, Factors affecting viability and vigour of seed. Heat and moisture damage.

UNIT -III

Seed certification standards, legislation and inspection.

UNIT-IV

Basic seed processing operations – machines and plants for cleaning, separating and grading: UNIT-V

Seed treatment: seed packaging and storage: handling, marketing and distribution. Seed industry in India and their role in agricultural development.

13.Food Engineering

UNIT I

Basic process principles – Basic principles of food preservation and processing: preservation of food by removal of heat, addition of heat, removal of moisture, irradiation, addition of chemicals and fermentation :

UNIT II

CA/MA storage, water activity and food stability emerging techniques in food processing.

UNIT III

Food Products Technology - Technological process outlines for industrial manufacture of selected food commercial importance from plant and animal sources,

UNIT IV

Jam, Jelly, Marmalade pickles, carbonated beverage, Fruit juice based beverages, hydrogenated pvegetable oil.

UNIT V

Tea, coffee, cocoa, Bakery and confectionary products, breakfast cereals, butter, ice-cream, condensed milk, cheese, milk powder. malted foods and low fat spread. Food packaging, quality control and food industries.

14. Storage Engineering

UNIT- I

Storage losses and factors affecting losses,

UNIT- II

bio-engineering properties of stored products. moisture migration,

UNIT -III

bio-chemical and physio-chemical changes occurring in storage system,

UNIT-IV

functional structural and thermal design of storage structures,

UNIT-V

design of fans and aeration ducts, salient features in design of cold storage structures, economics of grain storage.

Ecology & Environmental Pollution

UNIT- I

Biosphere concept, major ecosystem and sub-systems, biodiversity,

UNIT- II

Conservation of natural resources and techniques of maintaining the balance

UNIT -III

Environmental modification and its priority, environmental stress and pollution, types and sources,

UNIT-IV

Environmental quality, standards,

UNIT-V

Measurement and monitoring, agricultural pollution and its control.

16. Marketing Management

UNIT- I

Core concepts- needs, wants, demands, value, utility, product, exchange, transaction, relationship, markets, marketers,

UNIT- II

Marketing. Agro commodity/food product markets – consumer market, industrial market, from commodity to branded product market.

UNIT- III

Marketing plan, quantitative in resource allocation.

UNIT- IV

Product life cycle-related strategies. Sales management. Export market for agro products.

UNIT- V

Elements of communication and media planning.

17. Utilization of Electrical Energy in Agriculture

UNIT I

Rural Electrification :Use of electricity of the farm. objectives and limitations of rural electrification and remedial measures.

UNIT II

Moter for Agricultural Usage Motor characteristics, standards, satings and selection of motors, duty cycles and efficiency.

UNIT III

Distribution and wiring : Load estimation, distribution systems, feeders, sub-distributors and service mains, deciding the size of feeders and distributors, distribution of electricity on farm, load centre, wiring of farm and residence, wiring accessories, wiring systems earthing of electrical installations.

ELECTRIC HEATING AND WELDING: Resistance heating dielectric heating and welding applications in agriculture.

UNIT IV

Illumination: Light sources, principles of determining/lighting installations. Alternative Electrical Energy Sources and Energy saving. Non-conventional energy sources (wind and solar) as alternative electrical energy sources, effect of power factor and its improvement on energy saving.

UNIT V

Appliances and Control: Special electrical appliances and control used for dairy, poultry, processing and irrigation systems.

TEXT REFERENCES

1. Farm Electrification	: By R.H. Brown, Mc Graw Hil			
2. Utilization of Electrical Power	Pub.Co.New DelhiBy O.P. Yaylor, Wheeler Pub.Co.New Delhi			
3. Electrical Wiring Estimating & Costing	: By S.L. Uppal. Khanna Pub. Delhi			
4. Fundamentals of Electricity for	Agriculture : By R.J. Gustafson			

18. Environmental Control Engineering

UNIT -I

Environment - Environment definition, component and important Principle of environment conservation Environmental pollution source and cause.

UNIT -II

Air pollution nature and magnitude, global warming, its effect of environment and bio reserves. Acid rain ozone layer depletion.

UNIT -III

Water pollution – sources and magnitude, control measures and management.

UNIT -IV

Poultry housing – Environmental conditions favorable for poultry rearing, control of environmental temperature, relative humidity air purity, light, air movement inside poultry, heat and moisture production inside poultry, improving sanitation for poultry ventilations system for heat and moisture removal.

UNIT -V

Dairy buildings – Physiologic reactions of animals to ambient temperature and relative humidity, environment favorable to livestock, control of atmospheric temperature, humidity, light air flow for heat and moisture removal.

UNIT -VI

Green house technology – Basic approach and scope in India, attributes of green house technology, types of green house, green house environment control.

PRACTICALS

- 1. Quality of water, collection of water samples and analysis
- 2. Biological test water treatment and process
- 3. Insect, mosquito and fly control
- 4. Rodent control
- 5. Noise abetment
- 6. Ventilation
- 7. Planning and layout of a poultry house
- 8. Planning and layout of a dairy barn
- 9. Calculation of air flow rate for dairy barn
- 10. Study of various parameter related to environmental control in a green house.

TEXT BOOK

- 1. Environmental control by Mere L Esmay for Agricultural Building
- 2. Water supply and sanitation By G.S. Birdie
- 3. Ventilation of Agricultural Structures By GHellicks
- 4. Environmental Pollution By H.M. Dixit
- 5. Environmental Pollution By C.S. Rao. Control Engg.

19. Alternative Energy Resources

UNIT -I

Introduction to conventional and non conventional energy sources, patterns of fuel consumption, Potential of solar wind, biogas, biomass energy and other new energy technologies.

UNIT -II

Solar energy – Solar Radiation and its Measurement Introduction, solar content solar radiator at the earth's surface, solar radiation measurements solar radiation data, estimation of average solar radiation solar radiation on fitted surfaces.

UNIT -III

Solar energy collectors: Introduction physical principles of the conversion of solar radiation in to heat, flat-plate collectors, energy balance equation and collector efficiency, thermal analysis of flat-plate collector and useful heat gained by the fluid.

UNIT -IV

Application of solar energy: Introduction to solar gadgets vig, solar cooker, water heater, drier, still, p.v. system and solar refrigeration.

UNIT -V

Biomass energy – Introduction, broad classification of biomass resources bas, potential of biomass energy, bio-energy conversion processes principles and raw materials, Bio gas generation, factors affecting bio digestion, classification of bio gas plants, bio gas properties, benefits of biogas viz manure, domestic fuel, sanitation and health, motive power, numerical problems on selection of size of biogas plants, biogas appliances conversion of solid, liquid and gaseous fuels, pyrolysis, gasification and their economics.

PRACTICALS

- 1. Study of solar radiation characterisation instruments and measurement of different type of radiation.
- 2. Study and performance evaluation of a box type solar cooker
- 3. Study and performance of different types of dryers
- 4. Characterisation of biomass for biogas production
- 5. Study of floationg drum and fixed dome type biogas plants and their operations.
- 6. Testing of biogas stove and calculation of its thermal efficiency
- 7. Performance study of a biogas based fuel engine and calculation of diesel replacement
- 8. Study of a carbonization of biomass system
- 9. Performance study of a gasifier and a coupled generating set
- 10. Performance study of a biomass briquetting machine
- 11. Performance study of a water pumping wind mill
- 12. Study of liquid fuel extraction from biomass
- 13. Energy integration and comparative study of various methods
- 14. Visits to sites of renewable energy.

TEXT BOOK

- 1. Solar energy utilization by G.D. Rai
- 2. Solar energy Principle of Thermal collection & Storage by S.P. Sukhatme
- 3. Bio-gas Technology By K.C. Khandelwal & S.S. Mandi
- 4. Renewable Energy Sources By J.N. Twiell & A.Weir