SunRise University
Approved by Govt. of Rajasthan vide Sunrise University Act, 2011
Recognized by UGC Act, 1956 u/s 2 (f)

COURSE STRUCTURE AND SYLLABUS
For

Agriculture solar &Alternate energy

Semester -I

Theory

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
Theory											
1DASE01	Engineering Mathematics-I	3	3	1	0	3	10	10	60	20	100
1DTASE02	Engineering Physics	3	3	1	0	3	10	10	60	20	100
1DTASE03	Communication Skills	3	3	1	0	3	10	10	60	20	100
1DTASE04	Programming for Problem Solving	3	4	1	0	3	10	10	60	20	100
1DTASE05	Basic Civil Engineering	3	3	1	0	3	10	10	60	20	100

Practicals & Sessionals

Code	Subject	Cr	L	T	P	Exam Hrs.	IA (60%) MP1 30%	IA (60%) MP2 30%	EA (40%)	Total
1DASE06	Engineering Physics Lab	2	0	0	2	2	30	30	40	100
1DASE07	Language Lab	2	0	0	2	2	30	30	40	100
1DASE08	Computer Programming Lab	2	0	0	2	2	30	30	40	100
1DASE09	Basic Civil Engineering Lab	2	0	0	2	2	30	30	40	100
1DASE10	Computer Aided Engineering Graphics	2	0	0	2	2	30	30	40	100
	Grand Total	27	18	6	11					1000

Semester II

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
			Hrs. /Week				**Maximum Marks**				
Theory											
2DASE01	English – II	3	3	1	0	3	10	10	60	20	100
2DASE02	Mathematics – II (Mathematical Methods)	3	3	1	0	3	10	10	60	20	100
2DASE03	Mathematics – III	3	3	1	0	3	10	10	60	20	100
2DASE04	Engineering Physics	3	4	1	0	3	10	10	60	20	100
2DASE05	Elements of Mechanical Engineering	3	3	1	0	3	10	10	60	20	100

Code	Subject	Cr	L	T	P	Exam Hrs.	MP1 30%	MP2 30%	EA (40%)	Total
Practicals & Sessionals										
			Hrs. /Week				**IA (60%)**		**EA (40%)**	
2DASE06	Engineering ChemistryLab	2	0	0	2	2	30	30	40	100
2DASE07	Human Values Activities	2	0	0	2	2	30	30	40	100
2DASE08	Manufacturing Practices Workshop	2	0	0	2	2	30	30	40	100
2DASE09	Basic Electrical Engineering Lab	2	0	0	2	2	30	30	40	100
2DASE10	Computer Aided Machine Drawing	2	0	0	2	2	30	30	40	100
	Grand Total	**27**	**18**	**6**	**11**					**1000**

Semester III

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
			colspan="3" Hrs. /Week			colspan="5" Maximum Marks				

Theory

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
3DASE01	Mathematics-III	3	3	1	0	3	10	10	60	20	100
3DASE02	Strength of Materials	3	3	1	0	3	10	10	60	20	100
3DASE03	Fundamentals of Agriculture	3	3	1	0	3	10	10	60	20	100
3DASE04	Fluid Mechanics and OpenChannel Hydraulics	3	4	1	0	3	10	10	60	20	100
3DASE05	Heat Transfer, Refrigerationand Air Conditioning	3	3	1	0	3	10	10	60	20	100
3DASE06	Fundamental of RenewableEnergy Sources	3	3	1	0	3	10	10	60	20	100

Practicals & Sessionals

Code	Subject	Cr	L	T	P	Exam Hrs.	MP1 30%	MP2 30%	EA (40%)	Total
			colspan="3" Hrs. /Week			colspan="2" IA (60%)			
3DASE07	Strength of Materials Lab	2	0	0	2	2	30	30	40	100
3DASE08	Fluid Mechanics Lab	2	0	0	2	2	30	30	40	100
3DASE09	Fundamentals of Agriculture Lab	2	0	0	2	2	30	30	40	100
3DASE10	Watershed Hydrology Lab	2	0	0	2	2	30	30	40	100
	Grand Total	**27**	**18**	**6**	**11**					**1000**

Semester IV

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
			Hrs. /Week				Maximum Marks				
Theory											
4DASE01	Surveying	3	3	1	0	3	10	10	60	20	100
4DASE02	Soil Mechanics	3	3	1	0	3	10	10	60	20	100
4DASE03	Auto CAD application	3	3	1	0	3	10	10	60	20	100
4DASE04	AutomotiveEngines	3	4	1	0	3	10	10	60	20	100
4DASE05	Web Designing and Internet	3	3	1	0	3	10	10	60	20	100
4DASE06	Theory and Design of Machines	3	3	1	0	3	10	10	60	20	100

Practicals & Sessionals

Code	Subject	Cr	L	T	P	Exam Hrs.	MP1 30%	MP2 30%	EA (40%)	Total
			Hrs. /Week				IA (60%)			
4DASE07	Surveying Lab	2	0	0	2	2	30	30	40	100
4DASE08	Soil Mechanics Lab	2	0	0	2	2	30	30	40	100
4DASE09	Auto CAD application Lab	2	0	0	2	2	30	30	40	100
4DASE010	AutomotiveEngines Lab	2	0	0	2	2	30	30	40	100
	Grand Total	**27**	**18**	**6**	**11**					**1000**

Semester V

Theory

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
			Hrs. /Week				**Maximum Marks**				
5DASE01	Farm Machinery –I	3	3	1	0	3	10	10	60	20	100
5DASE02	Building Construction	3	3	1	0	3	10	10	60	20	100
5DASE03	Tractor Systems	3	3	1	0	3	10	10	60	20	100
5DASE04	Post-Harvest Engineering	3	4	1	0	3	10	10	60	20	100
5DASE05	Watershed Planning	3	3	1	0	3	10	10	60	20	100
5DASE06	Groundwater	3	3	1	0	3	10	10	60	20	100

Practicals & Sessionals

Code	Subject	Cr	L	T	P	Exam Hrs.	MP1 30%	MP2 30%	EA (40%)	Total
			Hrs. /Week				**IA (60%)**			
5DASE07	Farm Machinery -I Lab	2	0	0	2	2	30	30	40	100
5DASE08	Building Construction Lab	2	0	0	2	2	30	30	40	100
5DASE09	Tractor Systems Lab	2	0	0	2	2	30	30	40	100
5DASE10	Post-Harvest Engineering Lab	2	0	0	2	2	30	30	40	100
	Grand Total	**27**	**18**	**6**	**11**					**1000**

III Year – 6 Semester

Code	Subject	Cr	L	T	P	Exam Hrs.	MS1	MS2	END TERM	IA	Total
	Semester VI										
			Hrs. /Week				Maximum Marks				
Theory											
6DASE01	Farm Machinery –II	3	3	1	0	3	10	10	60	20	100
6DASE02	Food Packaging Technology	3	3	1	0	3	10	10	60	20	100
6DASE03	Water Harvesting and SoilConservation Structures	3	3	1	0	3	10	10	60	20	100
6DASE04	Drainage Engineering	3	4	1	0	3	10	10	60	20	100
6DASE05	Tractor and Farm MachineryOperation and Maintenance	3	3	1	0	3	10	10	60	20	100
6DASE06	Dairy and Food Engineering	3	3	1	0	3	10	10	60	20	100

Practicals & Sessionals

Code	Subject	Cr	L	T	P	Exam Hrs.	MP1 30%	MP2 30%	EA (40%)	Total
			Hrs. /Week				IA (60%)			
6DASE07	Farm Machinery –II Lab	2	0	0	2	2	30	30	40	100
6DASE08	Food Packaging Technology Lab	2	0	0	2	2	30	30	40	100
6DASE09	Seminar	2	0	0	2	2	30	30	40	100
6DASE10	Dissertation/ Project-I	2	0	0	2	2	30	30	40	100
	Grand Total	**27**	**18**	**6**	**11**					**1000**

Engineering Mathematics-I

Course Objectives:

- To familiarize the prospective engineers with techniques in calculus, multivariate analysis and differential equations.
- To equip the students with standard concepts and tools at an intermediate to advanced level
- To understand Vector Calculus with three important theorems.

Course Content:

Unit I: Differential Calculus:

Partial derivatives, directional derivatives, total derivative, Jacobians and properties. Leibnitz's Rule of differentiation under integral sign. Maxima and Minima, saddle points; Method of Lagrange multipliers,

Unit II: Integral Calculus:

Improper integrals (Beta and Gamma functions), Applications of definite integrals to evaluate surface areas and volumes of revolutions. Double integrals (Cartesian), change of order of integration Change of variables (Cartesian to), areas and volumes by double integration, Triple integrals (Cartesian), Simple applications

Unit III: Differential Equations:

First Order and First degree ordinary differential equations: Linear and Bernoulli's equations, Exact equations, Linear Differential Equations of Higher order with constant coefficients.

Unit IV: Differential equations with variable Coefficients:

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy- Euler equation; Power series solutions including Legendre differential equation and Bessel differential equations.

Unit V: Vector Calculus:

Scalar line integrals, vector line integrals, scalar surface integrals, surface integrals, Theorems of Green, Gauss and Stokes.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwinkreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006. F201
3. Veerarajan T., Engineering Mathematics for firstyear, Tata Mc Graw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata Mc Graw Hill New Delhi, 11th Reprint, 2010.
5. N.P. Baliand Manish Goyal, A text book of Engineering Mathematics, Laxmi s,

Engineering Physics

Course Objective:

- To understand the concepts of interference, Diffraction and Polarization.
- To know about wave particle duality.
- To know applications of Optical fibre.
- To know applications of Lasers in Science, engineering and medicine.
- To know classification of Solid.

Course Contents:

Unit I: Wave Optics

Newton's Rings, Michelson's Interferometer, Fraunhofer Diffraction from a Single Slit. Diffraction grating: Construction, theory and spectrum, Resolving power and Rayleigh criterion for limit of resolution, Resolving power of diffraction grating, X-Ray diffraction and Bragg's Law.

Unit II: Quantum Mechanics

Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrodinger's Wave Equation, Physical interpretation of wave function and its properties, Applications of the Schrodinger's Equation: Particle in one dimensional and three dimensional boxes.

Unit III: Coherence and Optical Fibers

Spatial and temporal coherence: Coherence length; Coherence time and 'Q' factor for light, Visibility as a measure of Coherence and spectral purity, Optical fiber as optical wave guide, Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

Unit IV: Laser

Einstein's Theory of laser action; Einstein's coefficients; Properties of Laser beam, Amplification of light by population inversion, Components of laser, Construction and working of He-Ne and semiconductor lasers, Applications of Lasers in Science, engineering and medicine.

Unit V: Material Science & Semiconductor Physics

Bonding in solids: covalent and metallic bonding, Energy bands in solids: Classification of solids as Insulators, Semiconductors and Conductors, Intrinsic and extrinsic semiconductors, Fermi dirac distribution function and Fermi energy, Conductivity in semiconductors, Hall Effect: Theory, Hall Coefficient and applications.

References:
1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptaon NPTEL

Communication Skills

Course Objectives:

- To identify common communication problems that may be holding learners back

- To identify what their non-verbal messages are communicating to others

- To understand role of communication in teaching-learning process

- To learn to communicate through the digital media

- To understand the importance of empathetic listening

Course Contents

Unit I   Listening

Techniques of effective listening, Listening and comprehension, Probing questions, Barriers to listening

Unit II Speaking and Non-verbal communication

Speaking: Pronunciation, Enunciation, Vocabulary, Fluency, Common Errors

Meaning of non-verbal communication, Introduction to modes of non-verbal communication, Breaking the misbeliefs, Open and Closed Body language, Eye Contact and Facial Expression

Hand Gestures, Do's and Don'ts, Learning from experts, Activities-Based Learning

Unit III   Reading

Techniques of effective reading, Gathering ideas and information from a given text: Identify the main claim of the text, Identify the purpose of the text, Identify the context of the text, Identify the concepts mentioned, Evaluating these ideas and information: Identify the arguments employed in the text, Identify the theories employed or assumed in the text, Interpret the text: To understand what a text says, To understand what a text does, To understand what a text means.

Unit IV   Writing and different modes of writing

Clearly state the claims, Avoid ambiguity, vagueness, unwanted generalisations and oversimplification of issues, Provide background information, Effectively argue the claim, Provide evidence for the claims, Use examples to explain concepts, Follow convention, Be properly sequenced, Use proper signposting techniques, Be well structured: Well-knit logical sequence, Narrative sequence, Category groupings, Different modes of Writing: E-mails, Proposal writing for Higher Studies, Recording the proceedings of meeting: Any other mode of writing relevant for learners

Unit V   Digital Literacy and Effective use of Social Media

Role of Digital literacy in professional life: Trends and opportunities in using digital technology in workplace, Internet Basics, Introduction to MS Office tools: Paint, Office, Excel, PowerPoint

Introduction to social media websites, Advantages of social media, Ethics and etiquettes of social media, How to use Google search better, Effective ways of using Social Media, Introduction to Digital Marketing

Text Books:

1. Sen Madhucchanda (2010), *An Introduction to Critical Thinking*, Pearson, Delhi
2. Silvia P. J. (2007), *How to Read a Lot*, American Psychological Association, Washington DC

Suggested Readings:

1. Public Speaking, Michael Osborn and Suzanne Osborn, Biztantra

2. Handbook of Practical Communication Skills-Chrissie Wrought, published by Jaico Publishing House.

Programming for Problem Solving

Course Objective:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Contents:

Unit I: Fundamentals of Computer:

Stored program architecture of computers, Storage device- Primarymemory, and Secondary storage, Random, Direct, Sequential access methods.

Unit II: Concepts of High-level, Assembly and Low-level languages, Representing algorithms through flowchart and pseudo code.

Unit III: Number system:

Data representations, Concepts of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to r2, r's and (r-1)'s complement, Binary addition, Binary subtraction, Representation of alphabets.

Unit IV: C Programming:

Problem specification, flow chart, data types, assignment statements, input output statements, developing simple C programs, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement.

Unit V: Development of C programs using

Arrays, functions, parameter passing ,recursion, Programming in C using these statements, Structures, files, pointers and multi file handling.

Text / Reference Books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Basic Civil Engineering

Course Objective:

- To inculcate the essentials of Civil Engineering field to the students of all branches of Engineering.
- To provide students the significance of the Civil Engineering Profession in satisfying societal needs.

Course Contents:
Unit I   Introduction to objective, scope and outcome the subject
Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Unit II Buildings
Selection of site for Buildings, Layout of Building Plan, Types of buildings, Plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation. Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation.

Unit III Transportation
Introduction to Transportation Engineering; Traffic and Road Safety: Types and Characteristics of Various Modes of Transportation; Various Road Traffic Signs, Causes of Accidents and Road Safety Measures

Unit IV   Surveying
Object, Principles & Types of Surveying; Site Plans, Plans& Maps; Scales & Unit of different Measurements. Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Measurements on sloping ground; Tape corrections, conventional symbols. Angular Measurements: Instruments used; Introduction to Compass Surveying, Bearings and Longitude & Latitude of a Line, Introduction to total station. Levelling: Instrument used, Object of leveling, Methods of leveling in brief, and Contour maps.

Unit V   Environment
Environmental Pollution, Environmental Acts and Regulations, Air & Noise Pollution: Primary and Secondary air pollutants, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful Effects of noise pollution, control of noise pollution, Global warming& Climate Change, Ozone depletion, Green House effect

TEXTBOOKS:
1. Gopi, S., Basic Civil Engineering, Pearson Publishers
2. Kandya, A. A., Elements of Civil Engineering, Charotar Publishing house
3. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
4. Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house

References Books:
1. Chudley, R., Construction Technology, Vol. I to IV, Longman Group, England
2. Chudley, R. and Greeno, R., Building Construction Handbook, Addison Wesley, Longman Group, England
3. McKay, W. B. and McKay, J. K., Building Construction Volumes 1 to 4, Pearson India Education Services
4. Minu, S., Basic Civil Engineering, Karunya Publications

Engineering Physics Lab

Course Objective:
- To understand the concepts of interference.
- To know about wavelength of light.
- To know about depletion layer and band gap of semiconductor.
- To know dispersion of light through prism.
- To understand the concept of magnetic field.

LIST OF EXPERIMENTS:
1. To determine the wave length of sodium light by Newton's Ring.
2. To determine the wave length of monochromatic light with the help of Fresnel's Biprism.
3. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
4. Determination of band gap using a P-N junction diode.
5. To determine the height of given object with the help of sextant.
6. To determine the dispersive power of material of a prism with the help of spectrometer.
7. To study the charge and discharge of a condenser and hence determine the time constant for which both current and voltage graphs are to be plotted.
8. To determine the coherence length and coherence time of laser using He – Ne laser.
9. To measure the numerical aperture of an optical fibre.
10. To study the variation of magnetic field at the center of coil using tangent galvanometer.

Language Lab

Course Objective:

- To understand concepts of basic English language fundamentals.
- To understand the communication skills.
- To develop Dialogue Writing and Listening comprehension.

Detailed Syllabus

1. Phonetic Symbols and Transcriptions.
2. Extempore.
3. Group Discussion.
4. Dialogue Writing.
5. Listening comprehension.

Computer Programming Lab

Course Objective(s):
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

LIST OF EXPERIMENTS:
1. To learn about the C Library, Preprocessor directive, Input-output statement.
2. Programs to learn data type, variables, If-else statement
3. Programs to understand nested if-else statement and switch statement
4. Programs to learn iterative statements like while and do-while loops
5. Programs to understand for loops for iterative statements
6. Programs to learn about array and string operations
7. Programs to understand sorting and searching using array
8. Programs to learn functions and recursive functions
9. Programs to understand Structure and Union operation
10. Programs to learn Pointer operations
11. Programs to understand File handling operations
12. Programs to input data through Command line argument

Basic Civil Engineering Lab

Course Objective(s):
- To Introduce The Various Activities Regarding Measurement And Leveling
- To Water Supply Procedure And Various Discharge And Pressure Measuring Apparatuses

LIST OF EXPERIMENTS:

1. Linear Measurement by Tape:
   a) Ranging and Fixing of Survey Station along straight line and across obstacles.
   b) Laying perpendicular offset along the survey line
2. Compass Survey: Measurement of bearing of lines using Surveyor's and Prismatic compass
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
   a) To determine the reduced levels in closed circuit.
   b) To carry out profile levelling and plot longitudinal and cross sections for road by Height of Instrument and Rise & Fall Method.
4. To study and take measurements using various electronic surveying instruments like EDM, Total Station etc.
5. To determine pH, hardness and turbidity of the given sample of water.
6. To study various water supply Fittings.
7. To determine the pH and total solids of the given sample of sewage.
8. To study various Sanitary Fittings.

<h1 style="text-align:center">Computer Aided Engineering Graphics</h1>

Course Objectives:

- To Increase ability to communicate with people
- To learn to sketch and take object dimensions.
- To learn to take data and transform it into graphic drawings.

Introduction: Principles of drawing, lines, type of lines, usage of Drawing instruments, lettering, Conic sections including parabola, hyperbola, Rectangular Hyperbola (General method only); Scales-Plain, Diagonal and Vernier Scales.

Projections of Point & Lines: Position of Point, Notation System, Systematic Approach for projections of points, front view & Top view of point, Position of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book).

Projection of Planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both the RPs, True shape of the plane, Distance of a point from plane, Angle between two planes.

Projections of Regular Solids: frustum and truncated solids, those inclined toboth the Planes-Auxiliary Views.

Section of Solids: Theory of sectioning, section of prisms and cubes, section ofpyramids and Tetrahedron section of Cylinders, section of cones, section ofspheres (One drawing sheet, one assignment in sketch book)

Overview of Computer Graphics: Covering theory of CAD software [such as: Themenu System, Toolbars (standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of lines, Planes, Simple and compound Solids.

Engineering Mathematics-II

Course Objective:

- To provide detailed of **matrices** which is applied for solving system of linear equations and useful in various fields of technology.
- To understand the course is an introduction to partial differential equations.
- To understand the various numerical methods and techniques used to find solutions to differential equations and linear programming problems.

Course Content:

Unit I: Partial Differential Equations – Linear Partial differential equations of First order, Lagrange's Form, Non Linear Partial Differential equations of first order, Charpit's method, Standard forms. Separation of variables method to solve the simple problems in Cartesian coordinates.

Unit II: Linear Algebra: Vectors and Matrices, Addition and Multiplication, Norms, Linear Independence, Linear Transformation, Bases, Dimensions, Inner Product, Rank, Inverse, Orthogonality, Matrix factorizations, Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations.

Unit III: Linear Algebra: Rank of matrix System of linear equations; Symmetric, skew symmetric and orthogonal matrices; Eigen values and Eigen vectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Unit IV: Numerical Methods: Finite differences, Relation between operators, Methods to solve algebraic and transcendental equations, numerical methods to solve ordinary differential equations, finite difference methods, Finite element method.

Unit V: Linear Programming Problems: Linear Programming Problems, Graphical Approach, simplex method, Assignment and Transportation problems

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edit ion, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Edition, 2010.

Engineering Chemistry

Course Objective:

- To acquire the knowledge about impurities in water, their determination and purification.
- To learn about different types of fuel and lubricant and their applications.
- To gain the basic knowledge, applications and control methods of corrosion.
- To get the knowledge of preparation and significance of explosives, cement, refractories and glass.
- To get the knowledge of organic reaction mechanism and their uses with different types of drugs

Course Contents:

Unit I: Water

Common impurities, hardness, determination of hardness by complexometric (EDTA method), Degree of hardness, Units of hardness Municipal water supply: Requisite of drinking water, Purification of water; sedimentation, filtration, disinfection, breakpoint chlorination. Boiler troubles: Scale and Sludge formation, Internal treatment methods, Priming and Foaming, Boiler corrosion and Caustic embrittlement Water softening; Lime-Soda process, Zeolite (Permutit) process, Demineralization process. Numerical problems based on Hardness, EDTA, Lime-Soda and Zeolite process.

Unit II: Organic Fuels

Solid fuels: Coal, Classification of Coal, Proximate and Ultimate analyses of coal and its significance, Gross and Net Calorific value, Determination of Calorific value of coal by Bomb Calorimeter. Metallurgical coke, Carbonization processes; Otto-Hoffmann byproduct oven method. Liquid fuels : Advantages of liquid fuels, Mining, Refining and Composition of petroleum, Cracking, Synthetic petrol, Reforming, Knocking, Octane number, Anti-knocking agents, Cetane number Gaseous fuels; Advantages, manufacturing, composition and Calorific value of coal gas and oil gas, Determination of calorific value of gaseous fuels by Junker's calorimeter Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.

Unit III: Corrosion and its control

Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion. Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

Unit IV: Engineering Materials

Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum. Glass: Definition, Manufacturing by tank furnace, significance of annealing, Types and properties of soft glass, hard glass, borosilicate glass, glass wool, safety glass Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.

Unit V: Organic reaction mechanism and introduction of drugs

Organic reaction mechanism: Substitution; SN1, SN2, Elecrophilic aromatic substitution in benzene, free radical halogenations of alkanes, Elimination; elimination in alkyl halides, dehydration of alcohols, Addition: electrophilic and free radical addition in alkenes, nucleophilic addition in aldehyde and ketones, Rearrangement; Carbocation and free radical rearrangements Drugs : Introduction, Synthesis, properties and uses of Aspirin, Paracetamol

Suggested Text / Reference Books

1. Morrison R.T & Boyn R. N ; Organic Chemistry; Prentice Hall of India 1999
2. Lee J. D. ; Inorganic Chemistry ;Blackwell Science
3. Gopalan R., Venkappayya D., Nagarajan S. "Engineering Chemistry" Vikas Publishing House Pvt Ltd 2000.
4. Jain & Jain " Engineering Chemistry" Dhanpat Rai publishing company
5. Dara S. S. , " A Text Book of Engineering Chemistry" S. Chand and Company Ltd, 2008
6. Keeler J and Wolhess P, Why Chemical Reaction Happen Oxford Press.

Human Values

Course Objective:

- To Know the basic guidelines, content and Process for Value Education
- To develop understanding different Harmony concept.
- To understand professional ethics and natural acceptance of human values.

Course Contents:

Unit I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, Self Exploration – its content and process; 'Natural Acceptance' and Experiential Validation, Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit II: Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha Understanding the Body as an instrument of 'I', Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Unit III: Understanding Harmony in the Family and Society- Harmony inHuman-Human Relationship

Understanding harmony in the Family, Understanding values inhuman-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) , meaning of Vishwas; Difference between intention and competence, meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, harmony in the society , Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals ,Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family.

Unit IV: Understanding Harmony in the Nature and Existence – Whole existence as Coexistence

Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting Units in allpervasive Space. Holistic perception of harmony at all levels of existence

Unit V: Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values

Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers. Case studies related to values in professional life and individual life.

Suggested Text / Reference Books

1. Gaur R.R., Sangal R. and. Bagaria, G.P: "A Foundation Course in Human Values Professional Ethics," Excel Books, 2010.
2. Sadri S & Sadri, J Business Excellence Through Ethics & Governance, 2ndedition, 2015.
3. Mathur, U C CorporateGovernance and business ethics,MacMillan India Ltd, 2009.
4. Baxi, C V: Corporate Governance, Excel Books, 2009
5. Sadri S, Sinha A K and Bonnerjee, P: Business Ethics: concepts and cases, TMH, 1998.

Basic Mechanical Engineering

Course Objectives:

- To Increase ability to understand machine working
- To Learn to understand fundamentals of mechanical systems
- To Learn to make different mechanical aspects of engineering

Course Contents:

Unit I: Fundamentals:

Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers classification and types of steam boilers and steam turbines. Introduction and Classification of power plants.

Unit II: Pumps and IC Engines:

Applications and working of Reciprocating and Centrifugal pumps. Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.

Unit III: Refrigeration and Air Conditioning:

Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.

Unit IV: Transmission of Power:

Introduction and types of Belt and Rope Drives, Gears.

Unit V: Primary Manufacturing Processes: Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing. Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.

Text Books:

- Agarwal C M, Agarwal Basant "Basic Mechanical Engineering" 2019

Reference Books

- Shanmugam G, Ravindran S "Basic Mechanical Engineering" TMH Publication , 2019
- Bansal R K "Basic Mechanical Engineering" Laxmi Publication 2019

Basic Electrical Engineering

Course Objective:

- To understand the basic concept of Electrical engineering instruments for engineering applications.
- To understand the basic electrical engineering parameters and their importance.
- To understand the concept of various laws and principles associated with electrical systems.
- To develop the knowledge to apply concepts in the field of electrical engineering, projects and research.

Course Contents:

Unit I: DC Circuits:

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Series-Parallel circuits, Node voltage method, Mesh current method, Superposition, The venin's, Norton's and Maximum power transfer theorems.

Unit II: AC Circuits:

Representation of sinusoidal waveforms, peak and r.m.s values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L,C, RL, RC and RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit III: Transformers:

Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency.

Unit IV: Electrical Machines:

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Starting and speed control of induction motor, single phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators.

Unit V: Power Converters:

Semiconductor PN junction diode and transistor (BJT).Characteristics of SCR, power transistor and IGBT. Basic circuits of single phase rectifier with R load, Single phase Inverter, DC-D Cconverter.

Suggested Text / Reference Books

1.   D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.
2.   D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3.   L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4.   Hughes, "Electrical and Electronics Technology", Pearson, 2010.

Environmental Studies

Course Objective:

- To understand the basics of ecosystem and environment
- To understand about different types of pollution.
- To learn about waste, energy sources and sustainable energy.

Course Contents:

Unit-I Basics of Environment: Components and types of ecosystem, Structure and functions of ecosystem, Energy flow in ecosystem .Type and levels of Biodiversity, Values, Causes of extension, and Conservation methods of biodiversity.

Unit-II   Pollution: Types of Pollutants, air pollution, harmful effects of air pollution, control of air pollution, water pollution, harmful effects of water pollution, control of water pollution, noise Pollution harmful effects of noise pollution, control of noise pollution, radioactive pollution, harmful effects of radioactive pollution, control of radioactive pollution.

Unit-III   Solid Waste Management: Classification of solid waste, Collection, transportation, treatment, and disposal methods of solid waste, economic recovery of solid waste.

Unit-IV Renewable Energy Sources: Introduction, renewable sources of energy: solar energy, wind energy, energy from ocean, energy from biomass, geothermal energy and nuclear Energy.

Unit-V Issues of Environment: Sustainable development, water conservation, environmental education, environmental acts. Types of disasters, their causes, impact and preventive measures.

Recommended Books:

1. A.K. De, Environmental Chemistry, Wiley Eastern Ltd.
2. D.K. Sinha, Towards Basics of Natural Disaster Reduction, Research co Book Center, Delhi.
3. M.N. Rao and H.V.N.Rao, Air Pollution, Tata McGraw-Hill, ISBN-13 978-0-07-451871-7, 2013.
4. Ranjeeta Soni, Environmental Studies and Disaster management New India Publication Agency (NIPA), New Delhi, ISBN: 978-93-91383-02-2, October 2021.
5. R.C. Gaur, Basic Environmental Engineering New Age International Publication.

Engineering Chemistry Lab

Course Objective:

- To understand the method for the determination of hardness in water and purification process.
- To understand about different types of volumetric analysis.
- To learn about properties of lubricant oil.
- To Synthesize a small drug molecule and analyse a salt sample

List of Experiments:

1. Determination the hardness of water by EDTA method
2. Determination of residual chlorine in water
3. Determination of dissolved oxygen in water
4. Determination of the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution by using diphenyl amine indicator
5. Determination of the strength of $CuSO_4$ solution iodometrically by using hypo solution
6. Determination of the strength of NaOH and Na_2CO_3 in a given alkali mixture
7. Proximate analysis of Coal
8. Determination of the flash & fire point and cloud & pour point of lubricating oil
9. Determination of the kinematic viscosity of lubricating oil by Redwood viscometer no. 1 at different temperature
10. Synthesis of Aspirin/ Paracetamol

Human Values Activities

Course Objective:

- To Understand the basic guidelines, content and process for value education.
- To develop understanding different Harmony concept.
- To understand professional ethics and natural acceptance of human values.

Course Contents:

PS 1:

Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.

PS 2:

Now-a-days, there is a lot of talk about many technogenic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion? On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of 'Natural Acceptance', based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our 'Natural Acceptance' and may a time it is also clouded by our strong per-conditioning and sensory attractions). Explore the following:
   (i) What is Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?
   (ii) What is 'naturally Acceptable' to you - to nurture or to exploit others? Is your living in accordance with your natural acceptance or different from it?
2. Out of the three basic requirements for fulfillment of your aspirations – right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

List down all your important desires. Observe whether the desire is related to Self (I) the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.

PS 5:

1. a. Observe that any physical facility you use, follows the given sequence with time: Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable
   b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!
2. List down all your important activities. Observe whether the activity is of 'I' or of Body or with the participation of both or with the participation of both 'I' and Body.
3. Observe the activities within 'i'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:

1. Chalk out some programs towards ensuring your harmony with the body – in terms of nurturing, protection and right utilization of the body.

2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS 7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

    1a. Do I want to make myself happy?

    2a. Do I want to make the other happy?

    3a. Does the other want to make himself/herself happy?

    4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

    1b. Am I able to always make myself happy?

    2b. Am I able to always make the other happy?

    3b. Is the other able to always make himself/herself happy?

What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS 8:

1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.

2. Also, observe whether your feeling of respect is based on treating the other as you would treat yourself or on differentiations based on body, physical facilities or beliefs.

PS 9:

1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.

2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.

PS 10:

List down some common Units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analysis and explain the aspect of mutual fulfillment of each Unit with other orders.

PS 11:

Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

Manufacturing Practices Workshop

Course Objectives:

- To discuss the modules include training on different trades like Fitting, Carpentry and Casting
- To learn various joints are made using wood and other metal pieces.
- To develop machining skills in students.

Carpentry Shop

1. T – Lap joint
2. Bridle joint

Foundry Shop

3. Mould of any pattern
4. Casting of any simple pattern

Welding Shop

5. Lap joint by gas welding
6. Butt joint by arc welding
7. Lap joint by arc welding
8. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice

9. Job on lathe with one step turning and chamfering operations

Fitting and Sheet Metal Shop

10. Finishing of two sides of a square piece by filing
11. Making mechanical joint and soldering of joint on sheet metal
12. To cut a square notch using hacksaw and to drill a hole and tapping

Basic Electrical Engineering Lab

Course Objectives:

- To understand training on different trades like Fitting, Carpentry and Casting
- To learn various joints are made using wood and other metal pieces.
- To develop machining skills in students.

List of Experiments

1. Basic safety precautions. Introduction and use of measuring instruments –voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

2. Transformers: Observation of the no-load current waveform on anoscilloscope. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

3. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).Phase-shifts between the primary and secondary side.

4. Demonstration of cut-out sections of machines: dc machine (commutate or brush arrangement), induction machine (squirrel cage rotor), synchronous (field winging - slip ring arrangement) and single-phase induction

5. Torque Speed Characteristic of separately excited dc motor.

6. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Computer Aided Machine Drawing

Course Objective:

- To design, develop and analyze simple linear and non linear computer based drawing.
- To identify and apply the suitable knowledge of computers to understand the shape and size of Drawing Objects.

Course Contents:

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning.

Conversion of pictorial views into orthographic views: (1 drawing sheet)Introduction to orthographic prdcojection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems covering Principles of Orthographic Projections.

Sectional views of mechanical components: (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

Fasteners and other mechanical components: (Free hand sketch) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, type of rivets, types of riveted joints etc. Bearing: Ball, roller, needle, foot step bearing. Coupling: Protected type, flange, andpin type flexible coupling. Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Overview of Computer Graphics: (2 drawing sheets) Covering theory of CAD software such as: The menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Command Line (Where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.: Isometric Views of Lines, Planes, Simple and compound Solids.

MATHEMATICS–III

Course Objective:

1. To equipped with various modern Numerical techniques and using these techniques .

2. To introduce with the Laplace , and apply them to solve differential equations.

Course Content:

Unit-I Interpolation: Finite differences, various difference operators and their relationships, factorial notation, Interpolation with equal intervals, Newton‟s forward and back ward interpolation formulae, Lagrange's interpolation formula for unequal intervals.

Unit-II Gauss forward and backward interpolation formulae, Stirling's and Bessel's central difference interpolation formulae .Numerical Differentiation: Numerical differentiation based on Newton's forward and backward, Gauss forward and backward interpolation formulae.

Unit-III Numerical Integration: Numerical integration by Trapezoidal, Simpson's rule.

Numerical Solutions of Ordinary Differential Equations: Picard's method, Taylor's series method, Euler's method, modified Euler's method, Runge-Kutta methods.

Unit-IV Laplace Transform: Laplace transforms of elementary functions, Basic properties of Laplace transform, Initial value theorem, final value theorem and convolution property of Laplace transform, Inverse Laplace transforms, Applications of Laplace transform to solve ordinary differential equations.

Unit-V Z-Transform: Definition, properties and formulae, Convolution theorem, inverse Z-transform, application of Z-transform to difference equation.

TextBook/References

1. H.C.Saxena, *TextBook of Finite Differences and Numerical Analysis*, S.Chandand Co.

2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, *Numerical Methods for Scientific and Engineering computation*, New Age International (P) Ltd.

3. N.P.Baliand Manish Goyal, *A Textbook of Engineering Mathematics*, Laxmi Publication Pvt. Ltd., New Delhi (VII Edition). S.P.Goyal and A.K.Goyal, *Integral Transforms*, Jaipur Publishing House, Jaipur.

STRENGTH OF MATERIALS

Objectives:

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams, shafts, cylinders and spheres for various types of simple loads
- To calculate the elastic deformation occurring in various simple geometries for different types of loading

Course Contents:

Unit-I Fundamentals: Stress and strain, engineering properties, Saint – Venant's Principle. Stress strain diagrams, mechanical properties of materials, elasticity and plasticity. Shear stress and strain, pureshear, complementary shear. Poison"s ratio, volumetric strain, bulk modulus of elasticity.Elastic constants and relation between elastic modulie.Linear elasticity and Hooke"s law.Temperature stresses and effects. Stress and strain in axially loaded members.

Unit-II Analysis of Stress and Strain: Stress at a point, stress components. Stresses on inclined planes. Plane stress and strain. Mohr'scirclerepresentation of plain stress and strain. Principle stresses and strains, maximum shear stresses. Hooke'slawfor plain stress.Stresses in thin cylinder and special shells subjected to internal & external pressures.

Unit-III Beam under Flexural Loads: Bending moment and shear force, relation between load,Shear force and bending moment.Bending moment and shear force diagrams for simply supported, Canti lever and over hang beams under static loading of different types viz. point loads,Uniformly distributed loads,linearly varying loads, Pure bending. Theory of simple bending of initially straight beams. Flexural stresses in beams. Built up and composite beams. Shear stresses in beams of Rectangular, Circular and I-section. Shear formula, effect of shear strain.

Unit-IV Torsion: Torsion of solidandhollowcircularshafts. Non - uniform torsion.

Columns: Buckling and stability, critical load. Euler"s theory for initially straight column with different end conditions, equivalent length, Limitation of Eulor"s formula. Rankine"s formula. Column under eccentric loading. Secant, Perry"sand Indian standard Formulae.

Practical

1. Study of Universal Testing Machine, its part and functions.
2. Operation of U.T.M, fixing of specimen for different testing.
3. Tensilete ston mild steel specimen of failure and computing, Stresses, % elongation, Contraction etc.
4. Compression test on timber.
5. Compression test on mild steel.

6.   Compression test on concrete cube.

7.   Determination of toughness test of mild steel, Brass and Aluminum by Charpy test.

8.   Determination of toughness by Izod test for wood, Aluminum & Brass.

9.   Study of torsion testing machine.

10. Performance of torsion test on circular shaft specimen.

11. Bending test on wood enbeamand determination of modulus of rupture.

12. Deflection test on wooden beam.

TextBooks/References

1.   Junarkar S.B. and Shah H.J., „Mechanics of Structures" Vol.-I Charoter Publishing, Anand.

2.   Punmia B.C. Strength of Materials and Mechanics of structures ", Vol-I, Standard Publisher distributors, New Delhi.

3.   Fedinard L. Strength of Materials", Singer & Andrew Pytel".

4.   Fenner Mechanics of Solids".

5.   Davis H.E, Trophell, G.E. & Hanck, G.F.W. The Testing of Engineering Materials ", Mc Graw Hill.

6.   Timoshenko, S.P. & Young, D.H., Strength of Materials "East West Press Limited.

FUNDAMENTALS OF AGRICULTURE

Course Objectives:

This course enables the Ag. Engg. Graduates to identify problematic soils and water and also basics of cereal and horticultural crop production.

Course Contents:

Unit-I   **Soils:** Definition of soil, importants oil physical properties and their importance, soil in organic colloids, their composition, properties and origin of charge, ion exchange in soil and nutrient availability, soil organic matter, its composition and decomposition, effect on soil fertility, soil reaction; acid, saline and sodic soils, quality of irrigation water, essential plant nutrients, their functions and deficiency symptoms in plants, important in organic fertilizers and their mode of action in soils.

Unit-II Agronomy: Definition and scope of agronomy, classification of crops, effects of different weather parameters on crop growth and development. Soil-water-plant relationship and water requirement of crops, weeds and their control, crop rotation, cropping systems mono- cropping, double cropping, relay cropping and mixed cropping.

Unit-III Study of following crops with reference to soil and climate requirements, seedbed preparation, improved varieties, seed rate, time and method of sowing, manuring, fertilisation, inter cultural operations, weed control, irrigation, crop protection and their area, production and productivity in Rajasthan: Cereals-wheat, maize and bajra, Pulses- bengal gram, kharif pulses (greengram, blackgram, and cowpea), Oilseeds- groundnut and mustard. Introduction to cash crops- cotton, sugarcane and potato and fodder crop- berseem.

Unit-IV Horticulture: Scope of horticulture and vegetable crops, soil and climatic requirements for fruits, vegetable and floriculture crops, improved varieties, criteria for site selection, layout and planting methods, nursery raising and micro propagation methods, plant growing structures, pruning and training, fertilizer application, fertigation, irrigation methods, harvesting, grading and packaging, post harvest practices, management of orchards, extraction and storage of vegetableseeds.Introduction to hi-tech horticulture.

Practicals

Soils:

1. Determination of electrical conductivity and pH of soil.
2. Estimation of organic carbon of soil.
3. Determination of bulk density.

4. Determination of particle density and computation of soil porosity.

Agronomy:

1. Identification of crops.
2. Identification of seeds of different crops.
3. Identification of weeds.
4. Fertilizer application methods.
5. Different weed control methods.
6. Judging maturity time for harvesting of kharif crops.

Horticulture:

1. Identification and description of important fruit, flower and vegetable crops.
2. Study of different vegetable cultivation tools.
3. Practices of training and pruning in some important crops.
4. Vegetative propagation methods.

TextBooks/references

1. D.K. Das. (2003). Introductory Soil Science, Kalyani Publishers, NewDelhi.
2. M.M. Rai. (1995). Principles of Soil Science, S.G. Wasani for M ac Millan IndiaLtd., New Delhi.
3. K.S. Yawalkar, J.P. Agarwal and S. Bokde. (1992). Manures andFertilizers.Mrs. KumudiniK.Yawalkar, Agri.Horti. Publishing House, 52, Bajaj Nagar -440001.
4. ArunKatyayan. (2002). Fundamentals of Agriculture, Kushal Publications and Distributors, A.3/4A, Trilochan Bazar, Varanasi-221001 (U.P.).
5. T.Y. Reddy and G.H.S. Reddi. (1992). Principles of Agronomy, Kalyani Publishers, New Delhi.
6. Chattopadhayay. (1999).Textbook of Horticulture.Vol.II.J.S.Bal.(1970).Fruit Production.Kalyani Publishers, New Delhi

FLUID MECHANICS and OPEN CHANNEL HYDRAULICS

Course Objectives:

- To learn about the application of mass and momentum conservation laws for fluid flows
- To understand the importance of dimensional analysis
- To obtain the velocity and pressure variations in various types of simple flows

Course Contents:

Unit-I Hydrostatics: Fluid Properties, Measurement of liquid pressure. Pascal"s law fluid pressure on plane and curved stationery surface, Centre of pressure, Principal applications (preliminary) in simple gales and tanks.

Unit-II Fluid motion: Type and patterns, velocity and acceleration of fluid, continuity equation, elementary concept of velocity potential. Stream function and flow nets. Euler"s equation of motion, integration of Euler"s equation to give Bernoulli"s equation for incompressible fluids. Applications of Bernoulli"s equation.

Unit-III Flow through pipes: Various types. Velocity distribution. Loss of head due to friction. Minor losses, hydraulic gradient, pipes in series and parallel.Discharge measurement in pipes Venturimeter, orificemeter.

Unit-IV   OpenChannelFlow: Steady and uniform flow in open channel, Discharge formulae of Chezy, and Manning. Most economic section for rectangular, trapezoidal and circular channels.. Specific energy of flow. Alternate depths. Critical depth in prismatic channels. Discharge measurement in open channels by notches and weirs

Practicals

1.   Study and use of pressure gauge.
2.   Study and use of manometer.
3.   Determination of CC fororifices.
4.   Determination of Cd fororifices.
5.   Calibration of aVenturimeter.
6.   Calibration of V notch.
7.   Calibration of Rectangular notch.
8.   Determination of friction for pipe.
9.   Velocity distribution in channel cross section.
10.   Field visit.
11.   Revision

Text Books / References

1. Jadish Lal, Hydraulics. (1986). Metro politan Book Co.Pvt. Ltd. ,Delhi.
2. P.N.Modi and S.M.Seth. (1995). Hydraulic and Fluid Mechanics, Standard Book House, Delhi-6.
3. R.K. Bansal. Fluid Mechanics & Machine.

HEAT TRANSFER, REFRIGERATION and AIR CONDITIONING

Course Objectives:

- To build a solid foundation in heat transfer exposing students to the three basic modes namely conduction, convection and radiation.

- To impart knowledge to develop a product with the required qualityfor air conditioning

Course Contents:

Unit I Introductory concepts, modes of heat transfer, thermal conductivity of different materials, Conduction: General differential equation of conduction. One dimensional steady state conduction through plane & composite walls, tubes and spheres with out heat generation, critical thickness of insulation. Convection: free and forced convection.newton's law of cooling. Dimensional analysis of free and forced convection.

Unit II Introduction of Radiation, Absorptivity, reflectivity and transmissivity, Black body and monochromatic radiation, Planck's law, Wien''s law, Kirchoff''s law, grey bodies and emissive power, solid angle, intensity of radiation. Radiation exchange between black surfaces, geometric configuration factor. Heat Exchangers: Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger effectiveness, and NTU method (Only for parallel and counter flow).

Unit III Second law of thermodynamics applied to refrigeration. Reversed Carnot cycle, coefficient of performance. Unit of refrigeration, vapour compression cycle and components, Compressors, expansion valves, evaporators and condensers Deviation of actual cycle from ideal cycle, Vapour absorption refrigeration system and components, Desirable properties of ideal refrigerant, Classification of refrigerants.

Unit IV Psychrometry, Thermodynamic properties of moist air, Psychrometric chartandits use, Elementary Psychrometry processes, by pass and sensible heat factor, Air washer, Design of Air Conditioning system, sensible and latent cooling load calculation.

Practicals

1. Measure thermal conductivity of insulating powders.
2. Study temperature distribution along the length of fininnatural convection.
3. Study temperature distribution along the length of finin forcedconvection.
4. Experiment on heat transfer in natural convection.
5. Determine emissivity of given surface.
6. Determinerate of heat transfer, LMTD and over all heat transfer coefficient for parallel flow heat exchanger.
7. Determinerate of heat transfer, LMTD and over all heat transfer coefficient for counter flow heat exchanger.

8. Determine COP of vapour compression refrigeration system.

9. Determine COP of heat pump.

10. Study Electro lux refrigerator.

11. Study of domestic refrigerator and

12. Study of on etonice plant.

13. Study of water cooler.

14. Study of air conditioner.

15. Study of vapour absorption system.

Texts / References

1. D.S.Kumar: Heat and MassTransfer, S K Kataria & Sons, Delhi.

2. J.P. Holman: Heat Transfer, Mc Graw Hill.

3. Y.A. Cengel,Heat teransfer,Mc Graw-Hill

4. F.P.Incropera and D.P.Dewitt: Fundamentals of Heat and Mass Transfer, Wiley.

5. S.Domkundwar: ACourse in Heat & MassTransfer, Dhanpat Rai & Sons, Delhi.

6. C.P.Arora: Refrigeration andAir-conditioning, TMH.

7. W.Stoecker: Refrigeration and Air-conditioning, Mc Graw Hill.

8. J.L.Threlkeld: Thermal Environmental Engineering, Prentice Hall.

FUNDAMENTALS OF RENEWABLE ENERGY SOURCES

Course Objectives:

- Student will get to know various of Renewable Energy Sources
- Practical exposure to analyze basic parameters energy & its generation techniques

Course Contents:

Unit I   Concept and limitation of Renewable Energy Sources (RES), Criteria for assessing the potential of RES, Classification of RES: Solar, Wind, Geothermal, Biomass, Ocean energy sources. Comparison of renewable energy sources with non renewable sources.

Unit II Solar Energy: Energy available from Sun, Solar radiation data, solar energy conversion into heat through: Flat plate and Concentrating collectors, different solar thermal devices, Principle of natural and forced convection drying system, Solar Photo voltaic: p-n junctions. Solar cells, PV systems, standal one, Grid connected solar power station, Calculation of energy through photo voltaic power generation and cost economics.

Unit III   **Wind Energy:** Energy available from wind, Lift and drag forces. Basis of Wind energy conversion, Effect of density, Frequency variances, Angle of attack, Wind speed, Types of Wind mill rotors, Determination of torque coefficient, Induction type generators, working principle of wind power plant.

Unit IV Bio-energy: Pyrolysis of Biomass to produce solid, liquid and gaseous fuels. Biomass gasification, Types of gasifier, various types of biomass cook stoves for rural energy needs. Biogas: types of bio gas plants, bio gas generation, factors affecting biogas generation and usages; advantages and disadvantages of bio gas spent slurry.

Practical

1. Study of different types of solar cookers.
2. Study of Solar water heating system.
3. Study of Solar photovoltaic system.
4. Study of Natural convection solar dryer
5. Study of Forced convection solar dryer.
6. Study of Solar desalination unit.
7. Study of fixed dome biogas plants.
8. Study of floating drum biogas plants.
9. Study of biomass gasifiers.
10. Study of biomass improved cook- stoves.

SuggestedReadings

1. Rai,G.D.2013. Non-Conventional Energy Sources, Khanna Publishers, Delhi.

2. Rai, G.D., Solar Energy Utilization, Khanna Publishers, Delhi.

3. Khandelwal, K.C .& S. S. Mahdi. 1990. Biogas Technology- A Practical Hand book.

4. Rathore N.S. ,Kurchania A.K.,Panwar N.L. 2007. Non Conventional Energy Sources, Himanshu Publications.

5. Tiwari,G.N.and Ghoshal ,M.K.2005. Renewable Energy Resources: Basic Principles and Applications .Narosa Pub. House. Delhi.

6. Rathore N.S. ,Kurchania A.K.,Panwar N.L.2007. Renewable Energy, Theory and Practice, Himanshu Publications.

WATER SHED HYDROLOGY

Course Objective:

To give an exposure to the students about the climatic parameters & their analysis to study direct & indirect effect on agriculture scenario of particular area giving main focus on water availability, distribution of circulation.

Course Contents:

Unit-I Hydrologic cycle, precipitation and its forms, rainfall measurement andestimation of mean rainfall, frequency analysis of point rainfall. Mass curve, hyetograph, depth-area-duration curves and intensity-duration-frequency relationship.

Unit-II **Hydrologic processes:** Interception, infiltration. Runoff-Factors affecting, measurement, stage - discharge rating curve, estimation of peak runoff rate and volume, Rational method, Cook"s method and SCS curve number method.

Unit-III **Geomorphology of watersheds:** Linear, aerial and relief aspects of watersheds-stream order, drainage density and stream frequency. Hydrograph-Components, base flow separation, unit hydrograph theory, S-curve, synthetic hydrograph, applications and limitations.

Unit-IV **Stream gauging:** Discharge rating curves, flood peak, design flood and computation of probable flood.

Practical

1. Visit to meteorological observatory and study of different instruments.
2. Design of raingauge network.
3. Exercise on intensity- frequency-duration curves.
4. Exercise on depth -area-duration and double mass curves.
5. Analysis of rainfall data and estimation of mean rainfall by different methods.
6. Exercise on frequency analysis of hydrologic data and destimation of missing data, test for consistency of rainfall records.
7. Exercise on computation of infiltration indices.
8. Computation of peak runoff and runoff volume by Cook "smethodandrational formula.
9. Computation of runoff volume by SCS curve number method.
10. Study of stream gauging instruments-current meter and stage level recorder.
11. Exercise on geomorphic parameters of watersheds.
12. Exercise on runoff hydrograph.
13. Exercise on unit hydrograph.
14. Exercise on synthetic hydrograph.
15. Exercise on flood routing.

Suggested Readings

1. Chow, V.T. D.R.Maidment and L.W.Mays.2010. Applied Hydrology, M c Graw Hill Publishing Co., NewYork.

2. Jaya Rami Reddy, P. 2011. A Text Book of Hydrology. University Science Press,New Delhi.

3. Linsley, R.K., M.A. Kohler, and J.L.H. Paulhus. 1984. Hydrology for Engineers. Mc Graw-Hill Publishing Co., Japan.

4. Mutreja, K.N. 1990. Applied Hydrology. Tata McGraw-Hill Publishing Co., New Delhi.

5. Raghunath, H.M. 2006. Hydrology: Principles Analysis and Design. Revised 2nd Edition, New Age International (P) Limited Publishers ,New Delhi.

6. Subramanya, K. 2008. Engineering Hydrology. 3rd Edition,Tata McGraw-Hill Publishing Co.,New Delhi.

7. Suresh, R.2005. Water shed Hydrology. Standard Publishers Distributors, Delhi.

8. Varshney, R.S.1986. Engineering Hydrology. Nem Chandand Brothers, Roorkee, U.P.

SURVEYING AND LEVELING

Course Objective:

- To Prepare the student to plan and conduct field work and application of scientific methodology in handling field samples by using machine.
- To equip the candidate with the art, science and technology of cartography and applications of GIS in Mapping Resources. .
- To develop the skills in surveying and thematic mapping .
- To know about contour & its different method
- To know about Area calculation of regular boundaries

Course Contents:

Unit-I Description, construction and use of Theodolite, Temporary adjustments of Theodolite, Fixing, Centering, leveling and elimination of parallax.Various axesand their relationship.Measurement of Horizontal angle by Repetition and reiteration method.Measurement of vertical angle. Application of the odolite infield problem.Sources of error in the the odolite work.

Unit-II Principles of Tacheometric survey and its field application.Constants of tachometer. Staff held vertical and normal. Use of anallacticlens. Calculation of R.L.use of stadiawire.

Application of laser in surveying. Electronic distance measuring equipments.Total Stations and measurements of angles and R.L.calculation. Introduction of DGPS.

Unit-III Contours, contouring and their characteristics. Methods of contour surveying by Theodolite.Methods of contour surveying by Tachometer. Contour Drawing by different methods.

Unit-IV Area calculation of regular boundaries by mathematical formulas.Use of Trapezoidal and Simpson‟s formula, their limitation.Planimeter: Its construction use and theory, Area calculations, Use of zero circle and solution of numerical Problems.

Computation of volumes, Earth work calculations. Level, Two level and Three level sections.

Practicals

1. Conducting contour survey in different area their compilation.
2. Study of the odolite, fixing on stand and temporary adjustment, Permanent adjustment of the odolite and their checking.
3. Horizontal and vertical angle measurements by the odolite.
4. Problems of height and distance.
5. Use of tacheometer with inclined sight and staff held inclined.

6. Contouring by grid method.
7. Contouring by radial line method.
8. Contouring by spot level method.
9. Practice of contour plotting by various methods.
10. Use of planimeter, finding constants and calculation of areas of irregular boundaries.
11. Introduction of total station.
12. Gyroscopeanditsuse

TextBooks/ References

1. T.P. Kanetker & S.V.Kulkarni. (1990). Surveying and Leveling Vol.I & II PuneVidyarthi Griha, Prakashan, Pune–30.
2. B.C.Punmia.(1990).Surveying and Field work Vol.I &II Laxmi Publications, New De

SOIL MECHANICS

Course Objective:

- To understand the scope and outcome of the Geotechnical Engineering.
- To solve Compressibility and Consolidation of soil.
- To analyze the Bearing Capacity of Soils.
- To study the soil and its engineering propertirs.
- To determine different tests on soil.

Course Contents:

Unit-I Introduction of Soil Mechanics, field of Soil Mechanics. Phasediagram, physical and index properties of soil.

Unit-II Stress condition in soils, effective and neutral stress.

Shear strength, Mohr-Colomb failure theory. Determination of shear parameters by direct shear, Triaxialand unconfined compression test.

Unit-III **Compaction:** Compaction of Soil, standard, modified proctor test andJodhpur mini compaction test. Field compaction method and control.

Consolidation of soil: One dimensional consolidation, springanalogy, laboratory consolidation test.

Unit-IV **Earth pressure:** Plastic equilibrium in soils, active and passive state, Rankine"s theory of earth pressure Active and passive earth pressure for cohesive soils, simple numerical exercises.

Bearing capacity: Definition, elementary concept of Rankine"s and Terzaghi"s analysis. Effect of water table.

Practicals

1. Sieve analysis of soils.
2. Hydrometer analysis for grain size distribution in soils.
3. Field density determination by sand replacement methods.
4. Field density determination by core cutter methods.
5. Determination of maximum dry density and optimum moisture content by:
   (a) Standard.
   (b) Mini compaction.
6. Determination of atterberg"s limits of soils.
7. Unconfined compression test.
8. Shear box test.
9. Triaxial test.
10. Consolidation test.
11. Study and use of sampling equipments.
12. Field Visit.

TextBooks / References

1. Alam Singh. (1990). Soil Engg. Theory & Practice. Asia Publishing House (P) Ltd., New Delhi.
2. B.C.Punmia &A.K.Jain.(1996). Soil Mechanics & Foundations. Laxmi Publication Pvt.Ltd., Ansari road, Darya Ganj. New Delhi-110002

AUTO CAD APPLICATION

Course Objectives:

- To understand procedure of integration between different manufacturing modules
- To acquire skills of design and drafting different aspect of production in digital era

Application of computers for design. CAD- Overview of CAD window –Explanation of various options on drawing screen. Study of draw and dimension tool bar. Practice on draw and dimension tool bar. Study of OSNAP, line thickness and format tool bar. Practiceon OSNAP, line thickness and format tool bar. Practice on mirror, off set and array commands. Practice on trim, extend, chamfer and fillet commands. Practice on copy, move, scale and rotate commands. Drawing of 2 D-drawing using draw toolbar. Practice on creating boundary, region, hatch and gradient commands. Practice on Editing polyline- PEDIT and Explode commands.Setting of view ports for sketched drawings.Printing of selected view ports in various paper sizes. 2D-drawing of machine parts with all dimensions and allowances. Foot step bearing and knuckle joint .Sectioning of foot step bearing and stuffing box.

Drawing of hexagonal, nut and bolt and other machine parts. Practice on 3-D commands-Extrusion and loft. Practice on 3-D commands-on sweep and press pull. Practice on 3-D Commands-revolving and joining. Demonstration on CNC machine and simple problems.

Practicals

1. Introduction to CAD LAB-1.
2. Line type, Dimensions and Drafting setting.
3. Use of Draw tool bar.
4. Use of drawing status bar.
5. Use of Modify tool bar.
6. Uses of Geometric constraints and Dimensional constraints.
7. Practice set using- trim, extend, fillet and chamfer commands.
8. Practice set using-Geometric constraints.
9. Practice set using – Dimensional constraints.
10. Practice set using- explode, boundary.
11. Practice set using- copy, mirror, and move commands.
12. Practice set using- polar array and rectangular array.
13. Practice set using- extrusion and loft.
14. Practice set using- revolving and joining.

TextBooks/ References

1. Steven Harring ton: Computer Graphics-A Programming Approach, McGraw Hill.
2. M.P.Groover and E.W.Zimmers: CAD/CAM-Computer Aided Design and Manufacturing, Prentice- Hall of India, New Delhi
3. Surendra Kumar and A.K.Jha: Technology of Computer Aided Design and Manufacturing CAD/CAM, Dhanpat Rai & Sons, Delhi.

TRACTOR AND AUTO MOTIVE ENGINES

Course Objective:

The students will be able to learn about different sources of farm power, construction and functioning of CIand SI engines, IC engine fuels, Coolants, anti freeze and anti corrosion materials.

Course Contents:

Unit-I Sources of farm power: Conventional and non-conventional energy sources.Classification of tractors and CI engines. Difference between CI and SI, Two stroke and four stroke engines. Status of tractor and power tiller industries in India. Review of thermodynamic principles of CI engines and deviation from ideal cycle. Simple numerical problems horse power calculation.

Unit-II CI Engine systems: Study of engine components their construction, operating principles and functions. Valves & valve mechanism. Fuel, intake and exhaust, ignition, starting and electrical systems.

Unit-III IC engine fuels: Properties & combustion of fuels, gasoline tests and their significance, diesel fuel tests and their significance, detonation and knocking in IC engines, Simple numerical problems on fuel combustion.

Unit-IV Study of properties of coolants, anti freeze and anti-corrosion materials, lubricant types and study of their properties. Engine cooling and lubricating systems. Engine governing systems: centrifugal and pneumatic. Familiarization with the basics of engine testing.

Practical

1. Introduction to different systems of a CI engine; Engine parts and functions.
2. Valve system–study and adjustments.
3. Oil & Fuel- determination of physical properties.
4. Study of Air cleaning system.
5. Study of Fuel supply system of CI engine.
6. Study of cooling system: thermostat and radiator.
7. Study of lubricating system.
8. Study of Starting and electrical system of tractor.
9. Study of engine performance curves.
10. Visit to engine manufacturer /assembler/spare parts agency.

TextBooks\ References

1. Liljedahl, B.J., Turnquist, P.K.Smith, W.D. and Hoki Vaketo 1989. Tractor and their Power units. Jhon Wiley & Sons., New York.
2. Jones, F .R.-Farm Gas Engines & Tractors Mc. Grow Hill Book Company, New York.
3. Mosses & Frost–Farm Power, John Wiley & Sons, New York.
4. Rai & Jain–Farm Tractor Maintenance and repair, Tata McGraw Hill Publishing Co. Ltd., New-Delhi.
5. Mathur, M.L. and Sharma, R.P.Internal Combustion Engine, Dhanpat Rai & Sons, New Delhi.
6. Gupta, R.B. Auto mobile engineering, Satya Prakashan, New Delhi.

APPLICATIONS

Course Objectives:

- Understand and implement the basics of Internet.
- Understand and implement the basics of web programming for designing web applications using HTML.
- Understand and implement the basics of web programming for designing web applications using Cascading Style Sheets.
- Understand and implement internet programming and internet use using java script and other common internet applications.

Course Contents:

Unit –I Introduction to Internet: Evolution of Internet, Introduction to Internet Protocol- TCP/ IP, UDP, HTTP, Secure Http (SHTTP), Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society–Crime on /through the Internet. Internet Networks: LAN, MANWAN, Services on Internet (Definition and Functions) E-mail, WWW, Telnet, FTP, IRC and Search Engine.

Unit–II Mark-up language- HTML: Introduction, Basic Tags, Attributes, Heading, Formatting, Styles, Links, Images, Multimedia, Tables, Lists, Forms, Colors, Layout, Frames, Font, Head, Metatags, Overview of DHTML, Designing web pages using Dream weaver.

Unit–III Cascading Style Sheets: Introduction, Inline Styles, Embedded Style Sheets, Conflicting Styles, Linking External Style Sheets, Positioning Elements, Backgrounds, Elements Dimensions, Box Model and Text Flow, Media Types, Drop-Down, User Style Sheets, Document Object Model.

Unit–IV Scripting and recent trends in Internet: Introduction to JavaScript, Decision Making, Control Statements, Functions, Objects, Arrays, EventHandling. Creating Web Banners. Learning to use FTP, Uploading of Site. Introduction to database connectivity, Flash. Internet Phone, Internet Video, e-commerce, VoIP.

Practicals

1. Write a program to addall basic HTML tags.
2. Write a programto set background image in a frame.
3. Write a program to implement nested lists.
4. Write a program to implement table tag and its various attributes.
5. Write a program to create forms in HTML.
6. Write a program to implement various features of CSS.
7. Write a program to create popup boxes in Java Script.
8. Write a program to perform arithmetic operations using Java Script.

9. Write a program to implement in-built string functions in Java Script.

10. Develop static web site using various HTML features including validation of various user details using Java Script.

TextBooks/References

1. Internet for Every one, Alexis Leon and Mathews Leon, Vikas Publishing House Pvt.Ltd, New Delhi.

2. OLevel ModuleM1.2 Internet & web page designing, VK. Jain, B P B Publication, New Delhi.

3. Web Design the complete Reference, Thomas Powell, Tata Mc Graw Hill.

4. HTML and CSS The complete Reference, Thomas Powell, Tata Mc Graw Hill.

5. Java Script 2.0: The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider

IRRIGATION ENGINEERING AND SPRINKLEAND MICROIRRIGATION SYSTEMS

Course Objective:

To train the students and develop basic understanding of soil water plant relationship and select and design appropriate method of water application in varied situations and design of field specific Drip and Sprinkler Irrigation system, their proper operation and the maintenance.

Course Contents:

Unit-I Major and medium irrigation schemes of India, purpose of irrigation, source of irrigation water, present status of development and utilization of different water resources of the country; measurement of irrigation water: weir, flumes and orifices and other methods; open channel water conveyance system: design and lining of irrigation field channels, on farm structures for water conveyance, control & distribution; under ground pipe conveyance system: components and design.

Unit-II **Soil water plant relationship:** Soil properties influencing irrigation management, soil water movement, infiltration, soil water potential, soil moisture characteristics, soil moisture constants, measurement of soil moisture, moisture stress and plant response; water requirement of crops: concept of evapo transpiration (ET), measurement and estimation of ET

Unit-III Water and irrigation requirement of crops, depth of irrigation, frequency of irrigation, irrigation efficiencies; surface methods of water application: border, check basin and furrow irrigation- adaptability, specification and design considerations.

Unit-IV Sprinkler irrigation: Adaptability, types of sprinkler irrigation systems; design of sprinkler irrigation system: layout selection, hydraulic design of lateral, sub-main and main pipe line, design steps; selection of pump and power unit for sprinkler irrigation system; performance evaluation of sprinkler irrigation system: uniformity coefficient and pattern efficiency;

Micro Irrigation Systems: Types-drip, spray, & bubbler systems, merits and demerits, different components; Design of drip irrigation system: hydraulics of drip irrigation system, maintenance of micro irrigation system: fertigation: advantages and limitations of fertigation.

Practical

1. Measurement of soil moisture by different soil moisture measuring instruments;
2. Measurement of irrigation water;
3. Measurement of infiltration characteristics; determination of bulk density, field capacity and wilting point;
4. Estimation of evapo transpiration;
5. Design of under ground pipe line system;
6. Estimation of irrigation efficiency;

7. Study of advance, recession and computation of infiltration opportunity time; infiltration by in flow- out flow method;

8. Evaluation of border irrigation method;

9. Evaluation of furrow irrigation method;

10. Evaluation of check basin irrigation method.

11. Study of different components of sprinkler irrigation system;

12. Design and installation of sprinkler irrigation system; cost economics of sprinkler irrigation system;

13. Study of different components of drip irrigation;

14. Design and installation of drip irrigation system;

15. Field visit to micro irrigation system and evaluation of drip system; cost economics of drip irrigation system.

Suggested Readings

1. Allen R.G., L.S .Pereira, D.Raes, M.Smith.1998. Crop Evapo transpiration guidelines for computing crop water requirement. Irrigation and drainage Paper56, FAO of United Nations, Rome.

2. Choudhary M.Land Kadam U.S2006. Micro irrigation for cash crops West ville Publishing House.

3. IsraelsenOW. And Hansen V.Eand Stringham G.E.1980. Irrigation Principles and Practice, John Wiley & Sons, Inc.USA.

4. Keller Jack and Bliesner RonD.2001. Sprinkle and Trickle Irrigation. Springer Science + business Media, New York.

5. Majumdar D. K. 2013. Irrigation Water Management Principles. PHI learning Private Limited New Delhi 2nd Edition.

6. Mane M.S and Ayare B.L. and Magar S.S. 2006. Principles of Drip Irrigation systems, Jain Brothers, New Delhi.

7. Mane M.S. and Ayare B.L. 2007. Principles of Sprinkler Irrigation systems, Jain Brothers, New Delhi.

8. Michael A.M. 2012. Irrigation: Theory and Practice. Vikas Publishing House New Delhi.

9. Michael A.M, Shri mohan and KR Swaminathan. Design and evaluation of irrigation methods, (IARI Mono graph No.1). Water Technology Centre, IARI New Delhi.

10. Murthy VVN.2013. Land and Water management Engineering. Kalyani Publishers, New Delhi.

SOIL AND WATER CONSERVATION ENGINEERING

Course Objective:

To have understanding about the degradation of productive soil globally and its effect the reon, also to know about the causes about waters carcity and their solution to fight against theevil effects through soil and water conservation technologies.

Course Contents:

Unit-I Soil erosion: Introduction, causes and types - geological and acceleratederosion, agents, factors affecting and effects of erosion.Water erosion -Mechanics and forms - splash, sheet, rill, gully, ravine and stream bank erosion. Gullies-Classification, stages of development.

Unit-II Soil loss estimation: Universal soil loss equation (USLE) and modified USLE. Rain fall erosivity - estimation by KE>25 and EI_{30} methods. Soil erodibility - topography, crop management and conservation practice factors. Measurement of soil erosion - Runoff plots, soil samplers. Water erosion control measures - agronomical measures - contour farming, strip cropping, conservation tillage and mulching.

Unit-III Engineering measures: Bunds and terraces. Bunds-contour and graded bunds - design and surplussing arrangements. Terraces – level and graded broad base terraces, bench terraces - planning, design and layout procedure, contour stone wall and trenching. Gully and ravinereclamation-principles of gully control-vegetative measures, temporary structures and diversion drains.

Unit-IV Grassed water ways and design:

Wind erosion- Factors affecting, mechanics, soil loss estimation and control measures-vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes.Land capability classification. Rate of sedimentation, silt monitoring and storage loss in tanks.

Practical

1. Study of different types and forms of water erosion.
2. Exercises on computation of rain fall erosivity index.
3. Computation of soil erodibility index in soil loss estimation.
4. Determination of length of slope (LS) and cropping practice (CP) factors for soil loss estimation by USLE and MUSLE.
5. Exercises on soil loss estimation/ measuring techniques.
6. Study of rain fall simulator for erosion assessment.
7. Estimation of sediment rate using Coshocton wheel sampler and multi-slot devisor.
8. Determination of sediment concentration through oven dry method.

9. Design and layout of contour bunds.

10. Design and layout of graded bunds.

11. Design and layout of broad base terraces.

12. Design and layout of bench terraces. Design of vegetative water ways.

13. Exercises on rate of sedimentation and storage loss in tanks.

14. Computation of soil loss by wind erosion. Design of shelterbelts and wind breaks for wind erosion control.

Visit to soil erosion sites and watershed project areas for studying erosion control and water conservation measures.

Suggested Readings

1. Singh Gurmel, C. Venkataraman, G. Sastry and B.P. Joshi. 1996. Manual of Soil and Water Conservation Practices. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

2. Mahnot, S.C. 2014. Soil and Water Conservation and Watershed Management. International Books and Periodicals Supply Service, New Delhi.

3. Mal, B.C. 2014. Introduction to Soil and Water Conservation Engineering. 2014. Kalyani Publishers.

4. Michael, A.M. and T.P. Ojha. 2003. Principles of Agricultural Engineering. Volume II. 4thEdition, Jain Brothers, New Delhi.

5. Murthy, V.V.N. 2002. Land and Water Management Engineering. 4th Edition, Kalyani Publishers, New Delhi.

6. Norman Hudson. 1985. Soil Conservation. Cornell University Press, Ithaka, New York, USA.

7. Frevert, R.K., G.O. Schwab, T.W. Edminster and K.K.Barnes. 2009. Soil and Water Conservation Engineering, 4th Edition, John Wiley and Sons, New York.

8. Suresh, R. 2014. Soil and Water Conservation Engineering. Standard Publisher Distributors, New Delhi

THEORY AND DESIGN OF MACHINES

Course Objectives:

- To understand the kinematics and rigid- body dynamics of kinematically driven machine components
- To understand the codes, standards and design guidelines for different elements

Course Contents:

Unit I   **Mechanisms:** Elements, links, pairs, kinematic chain, and mechanisms. Classification of pairs and mechanisms. Lower and higher pairs. Four bar chain, slider crank chain and their inversions.

           Gear: Types of gears. Law of gearing, Involute and cycloidal profile for gear teeth. Spur gear, nomenclature. Interference and under cutting. Introduction to helical, spiral, beveland worm gear.

           GearTrains: Simple, compound, reverted, and epi cyclic trains. Determining velocity ratio by tabular method.

Unit II **Power Transmission:** Beltdrives, types of drives, belt materials. Length of belt, power transmitted, velocity ratio, belt size for flat and Vbelts. Effect of centrifugal tension, creep and slipon power transmission. Chain drives. Flywheel: Turning moment diagrams, co-efficient of fluctuation of speed and energy, weight of flywheel, fly wheel applications. Friction: Types of friction, laws of dry friction. Friction of pivots and collars. Single disc, multiple disc, and cone clutches. Rolling friction, anti friction bearings.

Unit III **Introduction:** Meaning of design, Phases of design, design considerations. Common engineering materials and their mechanical properties. Types of loads and stresses, theories of failure, factor of safety, selection of allow able stress. Stress concentration.

           Design of joints: Cotter joints, knuckle joint and pinned joints, turn buckle. Design of threaded fasteners subjected to direct static loads, bolted joints loaded in shear (eccentric loading not included).

Unit IV **Design of shafts, keys and couplings:** Design of shafts under torsion and combined bending and torsion. Design of keys. Design of muff or sleeve, and rigid flange couplings. Design offlat belt drives. Design of brackets, levers. Design of helical and leaf springs.

TextBooks / References

1. Joseph E.Shigley and John J.Uicker, Jr.: Theory of Machines and Mechanisms (International Edition), Mc Graw Hill Inc.
2. R.S.Khurmiand J.K.Gupta: Theory of Machines, S.Chand & Co.Ltd. , New Delhi.
3. P.L.Ballaney: Theory of Machines, Khanna Publishers, Delhi.
4. Joseph Edward Shigely: Mechanical Engineering Design, Mc Graw Hill Book Company, Singapore.
5. P.C.Sharma and D.K.Aggarwal: Machine Design, SK Kataria & Sons, Delhi.
6. R.S.Khurmi and J.K.Gupta: A Text Book of Machine Design, S.Chand & Co. Ltd., New Delhi.

FARM MACHINERY AND EQUIPMENT–I

Course Objective:

To identify the need offarm mechanization in India. Also equip the students with technical knowledge and skills required for the operation, maintenance and evaluation of Tillage, Sowing and inter cultural operational machinery needed for agricultural farms. To abreast the students with mathematical, experimental and computational skills for solving different field problems. To develop skills in the students required to develop and modification of indigenous farm machines as per the need of the area and farmers.

Course Contents:

Unit-I Status of farm mechanization, Introduction to various farm operation, implement types. Classification of farm machines. Materials of construction. Tillage and its objectives. Field capacities, field efficiency and simple numerical problems.

Unit-II Primary and secondary tillage equipment; Ploughs: Disc, Mouldboard, Subsoiler, Rotary tiller, disc harrow and Puddlers. Forces acting on Disc, M.B. Plough and disc harrow. Draft measurement of tillage equipment and simple numerical problems.

Unit-III Crop planting methods: Sowing and planting equipment-their construction, metering mechanism, furrow openers, covering devices and metering mechanism for fertilizer applications, calibration and adjustments. Paddy transplanter and its construction. Simple numerical problems on seed drills and planters. Introduction to plot seed drills and precision planters.

Unit-IV Methods and equipments for inter culture and weed control. Introduction to plant protection equipment: Sprayers, dusters and their calibration,Constructional features of different components and adjustments of knapsack and foot sprayers and rotary duster. Simple numerical problems on calibration of sprayers. Introduction to earth moving equipment, construction & working principles of Bull dozer and numerical problems on its out put.

Practicals

1. Introduction to various farm machines and visit to implement"s shed.
2. Construction details, adjustments and working of M.B. plough.
3. Construction details, adjustments and working of disc plough.
4. Construction details, adjustments and working of disc harrow.
5. Construction details, adjustments and working of secondary tillage tools.
6. Field capacity and field efficiency measurement of tillage and planting equipment.
7. Draft & fuel consumption measurement of different implements.
8. Working of seed-cum-fertilizer drill and its calibration.

9. Working of planters.

10. Weeding equipments and their use.

11. Study of knapsack and foot sprayers.

12. Study of rotary duster.

13. Construction and working of rotavator.

14. Study of bull dozer.

TextBooks \ References

1. Bainer, R.Barger, E.L. and R.A. Kepner. (1997). Principles of Farm Machinery. John Wiley & Sons, Inc, New York.

2. A. C. Shrivastava etal. Principle of Farm Machinery ASAE publications.

3. H.P.Smith. (1977). Farm Machinery and Equipment, Tata Mc- Graw Hill Publishing Co.Ltd. New Delhi.

4. H Singh and O.S. Bindra. (1980). Pesticides and Application Equipment, Oxford & IBM publishing Co.

5. O.P.Singhal. Elements of Agricultural Engineering, PartI and II. Saroj Prakashan, Allahbad.

6. FAO, Bulletin. (1977). Elements of Agricultural Machinery, volumeI.

7. R.L. Peurifoy. Construction, Planning, Equipment and Methods.

8. Singh, S. Principles of Farm Machinery. DIPA, ICAR, KAB-I, New Delhi

9. Singh, Surendra. Farm Machinery Principle and Application. ICAR Publication.

10. Singh, Surendra and S.R.Verma. Farm Machinery Maintenance and Management. ICAR Publication.

BUILDING CONSTRUCTIONS AND COST ESTIMATION

Course Objectives:

1. To how the wood, cement, admixtures is used for buildings and construction process.
2. To develop the building walls and foundations and how they are useful for buildings.
3. In these mainly we know about building arches, roofs, doors, windows and ventilators and how they are given for buildings.
4. To develop the form work and finishing work which is used for buildings and to solve the defects of building properties which are able to know with material
5. Impart the knowledge of Estimating, Costing and Valuation for Civil Engineering Structures.
6. Prepare and evaluate contract documents.

(A)   BUILDING CONSTRUCTION

Unit-I Components of a building and their function. Foundation: Function, shallow and pile foundation. Causes of failure and remedial measures. Masonry Construction: English bond and Flemish bond for one bricks thick wall. Stone Masonry: Types of stone masonry, Essentials of good stone masonry.

Unit-II Concept in Concrete Technology and test on concrete.

Load Carrying Floors: Types, stone Patti, timber and R.C.C. floors.

Floor Finishing: Lime, Cement concrete, terrazzo, marble and P.V.C. tiles, details of construction.

Roofs: Simple roof trusses, king post roof truss, queen postro of truss.

Earthquake Disaster Management: Introduction, causes of earthquake, their intensities, its effect, safety measures and precautions to face earth quake problem.

(B)   COST ESTIMATION

Unit-III Object, Main item of works, the unit of measurement for various item of works & materials.

Various methods of building estimate i.e. long wall-short wall methods & centre line method for one & two room building.

Unit-IV Organization of Engineering Department: General discussion of

P.W.D. accounting & procedure of works classification of work. Contract & contact document. Tender Notice- how to invite tender notice. Opening of tender & various conditions to accept it. Running & Final bill, Earnest money, Security money & measurement book.

Valuation: Purpose of valuation, Out goings, Scrap value, Salvage value, Market value, Book value, annuity capitalized value, Methods of calculating deprecation, Sinking fund deprecation, Valuation of building.

Text Books / References

1. S.P.Arora and Bindra.Building Construction.Dhanpat Rai & Sons,New Delhi
2. S.N.Awaasthy. Building Construction, Publishing House, Bhopal.
3. B.N.Datta. (1994). Estimating & Costing in Civil Engineering, Theory & Practice, Publishing Distributors Ltd., New Dehli.

TRACTOR SYSTEMS AND CONTROLS

Course Objective:

At the end of the course, the student will be able to:

•   Gaining knowledge about various tractor systems, their construction and working.

•   Learning fundamentals of tractor chassis design and traction theory.

Course Contents:

Unit-I Study of transmission system: Functions of transmission, Clutch: single and multiple clutches and their functions, Gear box: sliding and constant mesh, differential and final drive mechanism. Simple numerical problems on calculation of speed ratios.

Unit-II Familiarization of brake mechanism: Mechanical and hydraulic. Steering: Ackerman and hydraulic. Hydraulic system of tractor: Automatic position and draft control.

Unit-III Tractor power outlets: P.T.O., belt pulley, draw bar. Introduction to traction mechanics. Tractor chassis mechanics: C.G. determination and weight transfer. Simple numerical problems on tractor chassis mechanics.

Unit-IV Tractor stability: Grade and non-parallel pull, turning at high speed. Simple numerical problems on tractors tability. Introduction to ergonomic considerations: Anthropometry and physiological cost measurements and tractor safety. Introduction to advances in tractor systems and controls.

Practical

1. Study of brake systems: Drum and disc brakes, Mechanical and Hydraulic brakes

2. Introduction to transmission systems and components: study of different types of gear boxes and design problems on gear box.

3. Study on differential and final drive and planetary gears.

4. Study of clutch functioning and parts.

5. Appraisal of various controls in different makes tractors in relation to anthropometric measurements.

6. Determination of location of CG of a tractor.

7. Traction performance of a traction wheel.

Suggested Readings

1. John B.Liljedahl, PaulK Turnquist, David WSmith and Makoto Hoki, Tradctor andTheir Power UnitsCBS Publisher, 2004.

2. RodichevV and GRodicheva, Tractor and Automobiles MIR Publication Moscow, 1984.

3. Kirpal Singh, Automobile Engineering Vol-I "Standard Publisher Distributor, Delhi 13th Edition, 2012.

4. Joseph Heitner, Automotive Mechanics: Principles and Practices "CBS Publishers 2006.

5. C.B.Richey, Agricultural Engineering Hand book, Mc Graw Hill Inc.USA 1961.

TRACTORS AND FARM MACHINERYOPERATIONANDMAINTENANCE

Course Objective:

First hand experience in field operation and adjustments of various agricultural implements and equipments Exposure to small scale farm machinery manufacturing unit.

Practical

1. Familiarization with different makes and models of agricultural tractors. Identification of functional systems including fuels system, cooling system, transmission system, steering and hydraulic systems.

2. Study of maintenance points to be checked before starting a tractor. Familiarization with controls on a tractor. Safety rules and precautions to be observed while driving a tractor.

3. Driving practice of tractor. Hitching & De-hitching of mounted and trailtype implement to the tractor.

4. Practice of operating a tillage tool (mould- board plough / disc-plough) and their adjustment in the field. Study offield patterns while operating a tillage implement.

5. Introduction to tractor maintenance – precautionary and break-down maintenance.

6. Introduction to trouble shooting in tractors. Familiarization with tools for general and special maintenance. Introduction to scheduled maintenance after 10, 100, 300, 600, 900 and1200 hours of operation.

7. Safety hints. Top end overhauling. Fuel saving tips. Preparing the tractor for storage.

8. Care and maintenance procedure of agricultural machinery during operation and off-season.

9. Replacement of furrow openers and change of blades of rotavators.

10. Maintenance of cutter barin area per.

11. Adjustments in a thresher for different crops. Replacement of V-belts on implements.

12. Setting of agricultural machinery work shop.

Suggested Readings

1. Ghosh RK and S Swan. Practical Agricultural EngineeringVol-I&II, Naya Prakash, 1993.

2. Jain SC and CR Rai. Farm TractorMaintenance and Repair", Standard Publishers and Dist., Delhi, 2010.

3. Operator's manuals of tractors and service manuals provided by manufacturers.

DAIRY AND FOOD ENGINEERING

Course Objective:

To acquainted with various dairy engineering operations such as homogenization, pasteurization, thermal processing, evaporations, freezing and drying of milk.

Course Contents:

Unit-I Deterioration in food products and their controls, physical, chemical andbiological methods of food preservation. Dairy development in India, engineering and chemical properties of milk and milk products.

Unit-II Principles and equipment related to receiving of milk, pasteurization, sterilization, homogenization, centrifugation and cream separation. Filling and packaging of milk and milk products. Preparation methods and equipment for manufacture of butter.

Unit-III Principles of operation and equipment for thermal processing, canning, aseptic processing. Evaporation of food products: principle, types of evaporators, steam economy, multiple effect evaporation, vapoure compression.

Unit-IV Drying of liquid and perishable foods: Principles of drying, spray drying, drum drying, freeze drying, Filtration: principle, types of filters; Membrane separation, water activity and MSI.

Practical

1. Study of pasteurizers.
2. Study of sterilizers.
3. Study of homogenizers.
4. Study of separators.
5. Study of butter churns.
6. Study of evaporators.
7. Study of milk dryers.
8. Study of freezers.
9. Study of filtration.
10. Visit to multi-product dairy plant, Estimation of steam requirements.
11. Visit to Food industry.

Suggested Readings

1. Ahmed, T. 1997. Dairy Plant Engineering and Management, 4th Ed. Kitab Mahal.
2. Mc Cabe, W.L. and Smith, J.C.1999. Unit Operations of Chemical Engineering, Mc Graw Hill.
3. Rao, D.G. Fundamentals of Food Engineering, PHI learning Pvt. Ltd., New Delhi.
4. Singh, R.P. and Heldman, D.R. 1993. Introduction to Food Engineering, Academic Press.
5. Toledo, R.T. 1997. Fundamentals of Food Process Engineering, CBS Publisher.

BIO-ENERGY SYSTEMS: DESIGN AND APPLICATIONS

Course Objective:

The main objective of this course is to provide fundamentals of utilization of crop residues and agro industrial waste for energy production through different conversion routes and to understanding the bio fuels system, renewable feed stock and their productions that following the completion of this course, students will have the expertise to solve agro industrial, social, and environmental problems with appropriate techniques and tools.

Course Contents:

Unit-I Fermentation processes and its general requirements. An overview of aerobic and anaerobic fermentation processes and their industrial application. Heat transfer processes in anaerobic digestion systems, land fill gas technology and potential.

Unit-II Biomass Production: Wastelands, classification and their use through energy plantation, selection of species, methods of field preparation and transplanting. Harvesting of biomass and coppicing characteristics. Biomass preparation techniques for harnessing (size reduction, densification and drying).

Unit-III Thermo-chemical degradation. History of small gas producer engine system. Chemistry of gasification. Gas producer – type, operating principle. Gasifier fuels, properties, preparation, conditioning of producer gas. Application for shaft power generation, thermal application and economics.

Unit-IV Trans-esterification for bio diesel production. A range of bio-hydrogen production routes. Environmental aspect of bio-energy, assessment of green house gas mitigation potential.

Practical

1. Study of anaerobic fermentation system for industrial application.
2. Study of gasification for industrial process heat.
3. Study of bio diesel production unit.
4. Study of producer gas burner.
5. Study of biomass densification technique (briquetting, pelletization, and cubing).
6. Integral bio energy system for industrial application.

Suggested Readings

1. British Bio Gen. 1997, Anaerobic digestion of farm and food processing practices- Good practice guidelines, London, available on www. British bio gen.co. UK.
2. Butler, S. 2005. Renewable Energy Academy: Training wood energy professionals.
3. Centre for bio mass energy. 1998. Straw for energy production; Technology- Environment- Ecology. Available: www.ens.dk.

DESIGN OF STRUCTURES

Course Objective:

CO1: Analyze Singly and doubly rein forced beams,T-beams

CO2: Understand shear behavior and analyze one way &two-way slabs

CO3: Design and analyze of RC Column

CO4: Analyze tension and compression member

Course Contents:

(A)   REIN FORCED CEMENT CONCRETE STRUCTURES

Unit-I Introduction: Grade of Concrete and Characteristics strength, permissible stress in concrete and steel rein forcement.

> **Singly Reinforced Beams:** Fundamental assumptions, Equivalent area of sections, Neutral axis and Moment of resistance. Balanced, Under-rein forced and Over-rein forced sections. Types of problems in singly rein forced beams.

> **Doubly Reinforced Beam:** Neutral axis, Moment of resistance. Type of problems.

> **T-Beams:** Dimensions, Neutral axis. Lever arm, Moment of resistance with or with out web compression.Type of problems in T-Beams.

Unit-II Shear: Shear stress in R.C.beams, Effect of shear, Rein forcement design for shear. Bond, anchorage, development length. Slabs spanning in one direction. Two way slabs: Supported on four edges with corners not held down and carrying U.D.L.

Unit-III   Axially loaded columns: Long and short columns. Types of columns.

> Load carrying capacity, I. S. recommendations, Deign of columns with lateral and spiral rein forcement.

(B)   STEEL STRUCTURES

Unit-IV   Introduction: Types of steels as a structural material, various grades of structural steel, properties and their permissible stresses. Various rolled steel sections and their properties.

> Design of tension and compression member.

Note: The use of IS 456:2000, SP16, IS800:2007 shall be allowed in the examination.

TextBooks / References

1. B.C. Punmia. (1992). Reinforced Concrete Structure, Vol.I, Standard Publishers & Distributors, Delhi.

2. Jainand Jaikrishna. (1992). Plane and Reinforced Cement Concrete, Nemi Chand Bros., Roorkee.

3. M.M.Malhotra. (1992). Design of Steel Structure, Jain Brothers, New Delhi.

4. Ram Chandra. (1992). Design of Steel Structures, standard Publishers & Distributors, New Delhi.

ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS MANAGEMENT

Course Objective:

- Understand the concept of entrepreneurship in Indian and global economy; planning and execution of ventures; government report for industry & innovation, contract & joint ventures in horticulture and will be motivated for becoming entrepreneur.

- Explain various entrepreneurship models

Course Contents:

Unit-I Entrepreneurship, management – Management functions – planning-Organizing - Directing – motivation – ordering – leading – supervision-Communication and control –Capital– Financial management –importance of financial statements – balance sheet – profit and lossstatement, Analysis of financial statements – liquidity ratios – leverage ratios, Coverage ratios– turn over ratios– profitability ratios.

Unit-II Project –project cycle – Project appraisal and evaluation techniques –undiscounted measures – payback period – proceeds per rupee of out lay, Discounted measures – Net Present Value (NPV) – Benefit-Cost Ratio (BCR) – Internal Rate of Return (IRR) – Net benefit investment ratio (N / K ratio) – sensitivity analysis- Importance of agribusiness in Indian economy International trade- WTO agreements – Provisions related to agreements in agricultural and food commodities.

Unit-III Agreements on agriculture (AOA) – Domestic supply, market access, export subsidies agreements on sanitary and phyto-sanitary (SPS) measures, Trade related intellectual property rights (TRIPS). Development (ED): Concept of entrepreneur and entrepreneurship Assessing overall business environment in Indian economy– Entrepreneurial and managerial characteristics- Entrepreneurship development Programmes (EDP)-Globalization and the emerging business entrepreneurial environment-Managing an enterprise: Importance of planning, budgeting, monitoring evaluation and follow-up managing competition.

Unit-IV Role of ED in economic development of a country- Overview of Indian social, political systems and their implications for decision making by individual entrepreneurs-Economic system and its implications for decision making by individual entrepreneurs-Social responsibility of business. Government schemes and incentives for promotion of entrepreneurship. Government policy on small and medium enterprises (SMEs) /SSIs/ MSME sectors-, contract farming (CF) and joint ventures (JV), public- private partner ships (PPP).

Practical

1. Preparation of business–Strengths Weaknesses Opportunities and Threats (SWOT) analysis,

2. Analysis of financial statements (Balance Sheet, Profit loss statement).

3. Exercise on Compounding and discounting,

4. Study of Break-even analysis with suitable example.

5. Visit to agro-based industries–I in the locality,

6. Visit to agro-based industries–II

7. Studyof Agro-industries Development Corporation,

8. Analysis of Ratio–I with suitable examples.

9. Analysis of Ratio–II with suitable examples.

10. Study of application of project appraisal technique–I (Undiscounted measures).

11. Study of application of project appraisal technique–II (Discounted Measures).

12. Formulation of project feasibility reports–Farm Machinery Project proposal sasentrepreneur–individual and group

13. Presentation of project proposals in the class.

Suggested Readings

1. Harsh, S.B., Conner, U.J. and Schwab, G.D.1981. Management of the Farm Business. Prentice Hall Inc., New Jersey.

2. Joseph, L.Massie. 1995. Essentials of Management. Prentice Hall of India Pvt. Ltd., New Delhi.

3. Omri Raw Lins, N. 1980. Introduction to Agri business. Prentice Hall Inc., New Jersey

4. Gittenger Price, J.1989. Economic Analysis of Agricultural Projects. John Hopkins University, Press, London.

5. Thomas W Zimmer and Norman M Scar borough. 1996. Entrepreneurship. Prentice-Hall, New Jersey.

6. Mark J Dollinger. 1999. Entrepreneurship Strategies and Resources. Prentice-Hall, Upper Saddal Rover, New Jersey.

7. Khanka SS. 1999. Entrepreneurial Development.S. Chandand Co. New Delhi.

8. Mohanty SK. 2007. Fundamentals of Entrepreneurship. Prentice Hall India Ltd., New Delhi.