Semester -VI

Subject Code	Credits	Name of Subject	Internal/CCE		Assignment		Theory		practical		Total marks
			Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
AG- 601	2 (1+1)	Introduction to Forestry	30	15	-	-	50	25	20	10	100
AG- 602	1(1+0)	Introductory Biology*/Elementary Mathematics*	30	15	-	-	50	25	20	10	100
AG- 603	1(1+0)	Human Values & Ethics (non gradial)	40	20	10	5	50	25	-	-	100
AG- 604	2 (1+1)	Farm Management, Production & Resource Economics	30	15	-	-	50	25	20	10	100
AG-605	1(1+0)	Intellectual Property Rights	40	20	10	5	50	25	-	-	100
AG-606	2 (1+1)	Crop Improvement- II (Rabi crops)	30	15	-	-	50	25	20	10	100
AG- 607	3(2+1)	Practical Crop Production -II (Rabi crops)	-	-	-	-	-	-	100	50	100
AG-608	2(2+0)	Environmental Studies and Disaster	30	15	-	-	50	25	20	10	100

		Management									
AG- 609	2 (1+1)	Farm Management, Production & Resource Economics	30	15	-	-	50	25	20	10	100
AG- 610	2 (2+0)	Principles of Food Science and Nutrition	40	20	10	5	50	25	-	-	100
AG- 611	2(1+1)	Geoinformatics and Nano-technology and Precision Farming	30	15	-	-	50	25	20	10	100
AG-612	2 (1+1)	Renewable Energy and Green Technology	30	15	-	-	50	25	20	10	100
TOTAL	**23(15+7)**										

Third Year **SEMESTER-VI**

Subject Title	Subject Code	Credit
Introduction to Forestry	**AG-601**	**2(1+1)**

Theory

Unit-I Introduction – definitions of basic terms related to forestry, objectives of silviculture , forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations.

Unit-II Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement-geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

Unit-III Agro forestry – definitions, importance, criteria of selection of trees in agroforestry, different agro forestry systems prevalent in the country, shifting cultivation, taungya,alley croppingpractices of two important fast growing tree species of the region.

Practical

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer .Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

References

- Indian Forestry — K. Manikandan and S. Prabhu
- Principles and Practices of Silviculture — A.P.dwivedi
- A Text Book Of Agroforestry — B.S.Chundawant and S.K.Goutam
- A Hand Book of Forestry — S.S. Negi
- Plantation Trees — R.K.Luna

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Introductory Biology*/Elementary Mathematics*	**AG-602**	1(1+0) /1(1+0)*

Introductory Biology (New) 2(1+1) Theory

Unit-I Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics.

Unit-II Binomial nomenclature and classification Cell and cell division. Morphology of flowing plants.Seed and seed germination.

Unit –III Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae.Role of animals in agriculture.

Practical

Morphology of flowering plants – root, stem and leaf and their modifications. Inflorence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants – Brassicaceae , Fabaceae and Poaceae.

References

- Hand of biology — Arihant Publication Meerut
- A Class Book of Botany — A.C. Dutta, 2000
- Textbook of Botany — V.Verma, 2009
- College Botany Vol I — Gangulee Das & Dutta 2009
- College Botany Vol lI — Gangulee & Kar 2011
- Introductory Botany — Rastogi Publication.Meerut
  Ashok Bendre and P.C. Pande 1996
- Textbook of Botany Class XI and XII. (2012) — NCERT Publications
- Biology: Study Material — NCERT Publications

Elementary Mathematics (New) 1(1+0)

Theory

Unit-I Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point for of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two St. lines, Angles between two St. lines, Parallel lines,

Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose center and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x1, y1) & (x2,y2), Tangent and Normal to a given circle at given point (Simple problems),Condition of tangency of a line y = mx + c to the given circle x2 + y2 = a2.

Unit-II Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problem son continuity, Differentiation of xn , ex , sin x &cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based onit). Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation**.**

References

- Agricultural Mathematics — R.Singh, Alok Kansal, Meerut Aman Publication
- A Text Book Of Matrices — Shasnti Narayan, S.Chand publication
- Calculus by — Gilbert strang, Wellesley Cambridge press
- Mathematics for Agriculture — Betty C. Rogers, 2nd Editions

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Human Values & Ethics (non gradial)	**AG-603**	1(1+0)

Theory

Unit-I Values and Ethics- An Introduction .Goal and Mission of Life .Vision of Life .Principles and Philosophy. SelfExploration. SelfAwareness. SelfSatisfaction. DecisionMaking. Motivation. Sensitivity. Success.Selfless Service .Case Study of Ethical Lives .Positive Spirit .Body, Mind and Soul .Attachment and Detachment . Spirituality Quotient

.Examination.

References

Human Values and Professional Ethics	R.R.Gaur, R. Sangal and G.P. Bagaria
Foundation of Ethics and Management	Excel Books
Human Values	A.N. Tripathy- New Age International Publication
Science and Humanism	P.L.Dhar, R.R. Gaur – Commonwealth publisher

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Farm Management, Production & Resource Economics	AG-604	2(1+1)

Theory

Unity- I Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms.

Unity-II Principles of farm management: concept of production function and its type, use of production function in decision- making on a farm, factor-product, factor-factor and product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage.

Unity-III Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income.

Unity-IV Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts.

Unity-V Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises.

Unity –VI Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of

natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical

Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equil-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India.

References

- Agribusiness management W,David Downey and Steven P.Erickson
- Introduction of Agril. Businness Mgmt. Davis, J. and Gold Berg
- Project management and Control P.C.K. Rao
- Project Management S.Choudhary, Hill Publication Company, Delhi
- Project Management Nagaraja
- Agri. Business Management Broadway, Himalaya Publication Company,Delhi
- Project Planning, Analysis, Selection, Prasanna Chandra financing, Implementation and Review
- Element of Farm Management I.J.Singh and V.K.Puri
- Economics of Farm Management A.S.Kahlon and Karam Singh
- Farm Business Management S.S.Johl and T.R. Kapoor
- Farm Management S,P.Dondyal

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Intellectual Property Rights	AG-605	1(1+0)

Theory

Unit-I Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc.

Unit-II Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit-III Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge- meaning and rights of TK holders.

Unit-IV Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

References

- IPR Bulletin,Vol. 9, No. 10, October Information India, Council — Department of Science and Technology, 2011, Techology Government of India,New Delhi Forecasing and Assessment
- Intellectual Property and its Agriculture — (A manunal for e-course PGS-503, DRS/ Management in JnKVV/technical manual 2016/11
- Hand Book On Intellectual property — Rajkumar S. Adukia Page No. 1-22 Right in India
- Intellectual Property Rights — Neeraj Pnadey, Khushdeep Dharni (2008) ,PHI Publication, New Delhi
- Science and Technology policy 2003 — Department of Science and Technology, Government of India, New Delhi
- IPR Bulletin, Vol,9,No. 10, October 2011 — Techology Information,Forecasting and Assesment Council, Department of Science And Technology, Government of India, New Delhi

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Crop improvement–II (Rabi crops)	AG-606	2(1+1)

Practical

Unity-I Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce.

Unity-II The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

References

- Practical Manual on Basic Agronomy — Prof. NR Das Scientific Publishers
- Modern Technology of Raisigh Field Crops — Chhidda Singh Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Environmental Studies and Disaster Management	AG-607	3(2+1)

Theory

Unit-I Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use andover-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefitsand problems. c) Mineral resources: Use and exploitation, environmental effects of extracting andusing mineral resources, case studies. d) Food resources: World food problems, changes causedby agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies. e) Energy resources: Growing

energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Roleof an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles.

Unit-II Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-III Biodiversity and its conservation: - Introduction, definition, genetic, species &ecosystem diversity and bio geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega- diversity nation .Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex- situ conservation of biodiversity.

Unit -IV Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal polluting. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation . Consumerism and waste products. Environment Protection Act .Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

Unit-V Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

Disaster Management

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents,

air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Practical

Pollution case studies. Case Studies- Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site- Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems- pond, river, hill slopes, etc.

References

- Principles of agricultural Ecology — G.S. Dhaliwal & G.S. Klear
- Fundaments Of Environmental Environment — K.CAgrawal Biology Ecology and
- Ecology and Environment — P.D.Sharma
- A text book Environment — V. Subramaniam
- Ecology and Environmental Science — Purohit, S.S. and agrawal, A.K.
- Environmental Studies — S.Singhal and N.Sighal
- Essentials Of Environmental Science — Dhaliwal, G.S. and Kukal, S.S.
- Environmental Biology — P.D.Sharma
- Environmental Studies — Rajesh Dharkar
- Environmental Biology — K.C.Agrawal
- A text book Environment Science — G.S.Bhaliwal, G.S.Sanjha
- Perspectives in Environmental Studies — Kaushik, A. and Kausshik, O.P.
- Ecology — Subramanyam, N.S. and Sambaurthy
- Environmental Studies — H.Kaur
- Environmental Studies — S.V.S. Rana

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Principles of Food Science and Nutrition	AG-608	2 (2+0)

Theory

Unity-I Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bio actives, important reactions).

Unity- II Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.); Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/modified diets, Menu planning, New trends in food science and nutrition

References

- Preservation of Fruit and Vegetables Girdhari lal, G.S. Sidappa, G.L. Tondan
- Fruit and vegetable Preservation G.S.Giriharilal, Sidhappa and G.L. Toadan
- The Technology of Food Preservation Norman w. Desrosier & J.N.Desrosies, CBS Publication and Distributer, New Delhi
- Food Science Nariman Porter and Hotchkiss1997. 5th Ed. CBS
- Food chemisty Meyer LH.1987.CBS
- Food Microbiology Frazier J and Westhoff DC. 1988. 4th Ed.McGrew Hill.
- Basic Food Micobilogy Banawant GJ.1989. 2nd Ed.AVI Publication
- Fruit and Vegetable Preservation-Principles and Practics Shivastva R.P. and Kumar S.2003. International Book Distributors
- Food proxessing Principles and Application Ramaswamy H and Marcotte M.2006. Taylor and Francis
- Essentials of Food and Nutrition Swaminathan M. 1974.Vol.II. Ganesh and Co.

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Entrepreneurship Development and Business Communication	AG-609	2(1+1)

Theory

Unit-I Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agrienterprises, Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agrientrepreneurship and rural enterprise.

Practical

Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

References

- Textbook on Rural Development Communication Skills — Mondal, S. and Ray, G.L.-Kalyani Entrepreneurship and
- Trainer's Manual on Developing Entrepreneurial — Movelopment Akhori, M.M.P., Mishra, S.P. and Sengupta Roth (1989), NIESBUD
- Entrepreneurial Development — Khanka, S.S.S.Chand Co.Ltd.Ramnagar

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Problematic Soils and their Management	AG-610	2(2+0)

Theory

Unit-I Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties. Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.

Unit-II Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

Unit-III Multipurpose tree species, bio remediation through MPTs of soils, land capability and clasisfication, land suitability classification. Problematic soils under different Agro-ecosystems.

References

- Salt affected Soil: Reclamation and management — S.K. Gupta & I.C.Gupta
- Soil salinity Assessment — FAO
- Remote sensing & GIS — Kail Charan Sahu
- Fundamentals of Soil Science — ICAR Publication , New Delhi

- Fundamental of Entrepreneurial — Agrawal R.C., Laxmi Narayan Agrawal, Agra (U.P.)
- Dynamics of Enterpreneurial — Desai, Vasant, Himalayan Publication House, New Delhi
- Farm Communication through Mass in the New Millennium — Samant, A.G. Associated Media Publishing Company, Karol Bag, New Delhi
- Enterprenurshiip Development Programme in — Patel, V.G. India and its relevance

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Geoinformatics and Nano-technology and Precision Farming	AG-611	2(1+1)

Theory

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical

Introduction to GIS software, spatial data creation and editing.Introduction to image processing software.Visual and digital interpretation of remote sensing images.Generation of spectral profiles of different objects.Supervised and unsupervised classification and acreage estimation.Multispectral remote sensing for soil mapping.Creation of thematic layers of soil fertility based on GIS.Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology.Use of GPS for agricultural survey.Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

References

- Geoinformatics and Nano-technology for New Delhi.

S.R. Reddy, Kalyani Publishers, Precision farming

Third Year **Semester VI**

Subject Title	Subject Code	Credit
Renewable Energy and Green Technology	AG-612	2(1+1)

Theory

Unit-I Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifies, biogas, bio alcohol, biodiesel and biooilproduction and their utilization as bioenergy resource, introduction of solar energy, collectionand their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

Practical

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio- fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

References

- New and renewable energy Sources — A.N . Mathur, N.S. Rathore
- Bio- gas Technology — K.C. Khandelwal and S.S.Mandi
- Renewable Energy Sources — J.N.Twiveel and a. weir
- Bio- mass Combustion Technologies — FAO 1988
- Advances in **biogas** Technology — O.P. Chawla
- Solar Energy — S.P. Sukhatme
- Non Conventional Sources of energy — G.D.Rai