

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Agriculture Technology, IV-Semester

BE-3001 Energy, Environment, Ecology & Society

Unit –I

Energy- Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

Unit –II

Ecosystem – Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation,

Unit –III

Air Pollution & Sound Pollution -

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain.

Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

Unit –IV

Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent.

Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

Unit –V

Society, Ethics & Human values– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

References:

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
- 6 BK Sharma, "Environmental Chemistry" ; Goel Publ. House.

7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunningham WP and MA; principles of Environment Sc; TMH
11. Pandey, S.N. & Mishra, S.P. Environment & Ecology, 2011, Ane Books , Pvt. Ltd, New Delhi
12. Joseph, B. Environmental Studies, 2009 Tata Mcgraw Hill, Edu India Ltd. New Delhi.
13. Gour R.R, Sangal, R &Bagaria, G.P. , Excel Books, A-45, Naraina Phase-I New Delhi.-110028

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AT-4002 Farm Machinery-I

Course Objective: Students should understand the technological introduction in different farm operations.

UNIT I

Objectives of farm mechanization. Classification of farm machines. Materials of construction & heat treatment. Principles of operation and selection of machines used for production of crops. Field capacities & economics.

UNIT II

Tillage; primary and secondary tillage equipment. Forces acting on tillage tools and their designs. Hitching systems and controls. Draft measurement of tillage equipment

Earth moving equipment - their construction & working principles viz., Bulldozer, Trencher, Elevators etc.;

UNIT III

Sowing, planting & transplanting equipment - their calibration and adjustments. Fertilizer application equipment including farm yard manure applicator.

UNIT IV

Weed control, Inter-culture and Plant protection equipment – weeders (manual, animal and power operated weeders) earthing and intercultural equipment), sprayers and dusters, their calibration, selection, constructional features of different components and adjustments.

UNIT V

Principles & types of cutting mechanisms. Construction & adjustments of shear & impact-type cutting mechanisms. Crop harvesting machinery: mowers, windrowers, reapers, reaper binders, combine harvesters and forage harvesters. Forage chopping & handling equipment. Specialized harvesting equipment such as Maize harvesting & shelling equipment, Root crop harvesting equipment-potato, groundnut etc., Cotton picking & Sugarcane harvesting equipment.

Threshing, threshing principles and different types of threshers. Straw handling equipment such as Straw combines, residue mulcher, etc

.Practicals:

1. Introduction to various farm machines, visit to implements shed and research hall;
2. Field capacity and field efficiency measurement for at least two machines/implements;

3. Calibration of seed drills
4. Draft & fuel consumption measurement for different implements
5. Study of sprayers, dusters, measurement of nozzle discharge, field capacity etc.
6. Visit to Agricultural implements manufacturing industry to identify the different types of implements and their use.

Course Outcome: The students will understand different farm machines/tools used in primary, secondary tillage operations along with their principle of operation

References:

1. Kepner R.A., Bainer R & Berger EL., 1978, Principles of Farm machinery, AVI Publ. Co.
2. Michael A M and Ojha, T.P. Principles of Agricultural Engineering. Jain Brothers 873, East Park Road, Karol Bagh, New Delhi.
3. C P Nakra, Farm Machines and Equipments, Dhanpat Rai Publishing Company Pvt. Ltd., 4787/23, Ansari Road, Dariyaganj, New Delhi.
4. Jain S C, Philip Grace, Farm Machinery – An approach. Standard Publishers and Distributors, 1705-B, Nai Sarak, Post Box No.1066, New Delhi-110006.
5. Radhey Lal and A.C.Dutta, Agricultural Engineering (Through Worked out examples), Saroj Prakashan, 646 Katra, Allahabad-2.
6. Sahay J. Elements of Agricultural Engineering. Irshad Ali, Kitab Mahal, Sarojini Naidu Marg, Allahabad.
7. Srivastav AC. 2001. Elements of Farm Machinery. Oxford & IBH 9. Bhattacharya T K. A Work Book of Practical Farm Machinery (Vol.I & II) Saroj Prakashan, Allahabad-211002.

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AT-4003 Agriculture Production Technology –II

Course Objective : The course introduces students to package of practices of crop production and environmental issues related to sustainable agro-ecosystems management.

UNIT I

Concept of Mono-cropping, Double cropping, Multiple cropping, Sequential cropping, Intercropping, Mixed cropping, Alley cropping, Relay cropping, Cropping intensity, Land equivalent ratio.

UNIT II

Environmental Issues and their Impact on Agriculture: Global climate change, emission of green house gases from Indian agriculture, different indices for environmental monitoring such as- Air quality index (AQI), Biocide residue index (BRI), Ecological footprint, Environmental sustainability index (ESI), Environmental performance index (EPI), Environmental vulnerability index (EVI), Global warming potential (GWP), *P* index, *T* value (Soil loss tolerance), Soil quality indicator (SQI), Soil sustainability index (SSI), Soil threat index (STI), Sustainable yield index (SYI), Water quality index (WQI) etc.

UNIT III

Concept of organic farming, its objectives and promotion, certification and inspection regime, niche areas and crops for organic farming, myth and concerns.

UNIT IV

Agronomic package of practices for cultivation of major pulses oil seed and fodder crops, highlighting Scientific name, family, origin, climatic requirement, sowing time, land preparation, seed rate, sowing methods, Important varieties, fertilizer requirement, water requirement, inter-culture operations, plant protection measures, harvesting etc.

Practicals:

1. Identification of major pulse, oil seed and fodder crops and their phenotypic differences
2. Identification of major weeds of these crops,
3. Composting techniques,
4. Measurement protocols of green house gases,
5. Visits to farms engaged in organic farming

Course outcomes: After successful completion of course, students are expected to possess basic understanding and knowledge about the package of practices for the production of important pulse, oil seed and fodder crops, different types of cropping, recycling of rural wastes and protocols of GHGs measurements.

References:

1. Annonymus: Latest edition of *Handbook of Agriculture* published by Directorate of Knowledge Management in Agriculture, ICAR New Delhi.
2. Principles of Plant Nutrition by Konrad Mengel and Ernest A. Kirkby.
3. Textbook of Field Crop Production by Rajendra Prasad.
4. Introduction to Agronomy & Principles of Crop Production by S.R.Reddy.
5. Principles of Agronomy by T.Y.Reddy and G.H.S.Reddy

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AT-4004 Soil Technology –II

Course objectives: : The course introduces students to advance knowledge related to the management of soil health and improvement of soil fertility for higher crop production.

UNIT I

Soil as a source of plant nutrients; Essential and beneficial elements, criteria of essentiality, forms of nutrients in soil; Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants; Measures to overcome deficiencies and toxicities

UNIT II

Problem soils-acid, salt affected and calcareous soils, characteristics, nutrient availabilities; Reclamation-mechanical, chemical and biological methods.

UNIT III

Movement of soil water - Saturated and unsaturated flow of water, Poiseuille's law, Darcy's law; Hydraulic conductivity, permeability and fluidity, hydraulic diffusivity; Infiltration, Percolation, Permeability, Drainage; Solute transport, movement of chemicals in soil-root continuum; Quality of irrigation water and its appraisal.

UNIT IV

Soil fertility-Different approaches for soil fertility evaluation; Methods, soil testing-Chemical methods, critical levels of different nutrients in soil; Soil test based fertilizer recommendation to crops; Factors influencing nutrient use efficiency (NUE) in respect of N,P,K,S, Fe and Zn fertilizer; Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions.

Practicals:

1. Principles of analytical Instruments and their calibration and applications,
2. Colorimetry and flame photometry;
3. Estimation of cation exchange capacity;
4. Estimation of available N, P, K, S and Zn in soils;
5. Preparation of interpretative reports of soil analysis and fertilizer recommendation;
6. Lime requirement and gypsum requirement of problem soils;
7. Evaluation of liquid and plastic limits;
8. Soil compaction test;
9. Evaluation of water retention characteristics of soil;
10. Measurement of saturated hydraulic conductivity of soil;
11. Measurement of infiltration rate.

Course outcomes : After successful completion of course, students are expected to possess basic understanding and knowledge towards better management of soil fertility to support higher crop production and maintenance of soil health.

References:

1. Soils and soil fertility – C.M. Thomson and F.R. Troeh
2. Soil fertility and fertilizers – S.L.Tisdale, W.L.Nelson, J.D. Beaton and J.L. Havlin
3. Soil Chemistry – Kim H. Tan.

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AT-4005 Hydrology

Course Objective: Introducing the students about the hydrological cycle, hydrographs and flood routing techniques, so that the students would be able to find out the water balance and estimated runoff from a given rainfall event.

UNIT I

Introduction; Hydrologic cycle; Precipitation-forms, Weather systems for precipitation, Characteristics of precipitation in India; Rainfall measurement, rain gauge network, optimum number; Representation of rainfall data-Mass curve, hyetograph, Moving average curve etc; Mean precipitation over an area-Different methods.

UNIT II

Frequency analysis of point rainfall, Calculation of rainfall return period and probability, plotting position; Estimation of missing data, test for consistency of rainfall records; Double mass curve technique; Abstractions from precipitation- interception; Depression storage; infiltration; evaporation; evapo-transpiration - estimation and measurement; Reservoir evaporation-methods of reduction, Infiltration indices.

UNIT III

Geomorphology of watersheds - stream number, stream length, stream area, stream slope and Horton's laws; Runoff - factors affecting, measurement; Runoff characteristics of streams, estimation of peak runoff rate and volume; Rational method, Cook's method, SCS Curve number method.

UNIT IV

Stream flow- measurement of stage and velocity, rating curve, extension of rating curve; Hydrograph; components, Factors affecting the shape of hydrograph, base flow separation, unit hydrograph theory – Assumptions, applications, derivation of unit hydrographs, unit hydrograph of different durations, dimensionless unit hydrograph, distribution hydrograph, synthetic unit hydrograph, uses and limitations of unit hydrograph.

UNIT V

Floods-Terms and definitions, Head water flood control - methods, retards and their location; flood routing – graphical methods of reservoir flood routing; Channel routing-Muskingum method; Hydrology of dry land areas - drought and its classification; introduction to watershed management and planning.

Practicals:

1. Visit to meteorological observatory to study different types of rain gauges;
2. Exercise on analysis of rainfall data;
3. Exercise on Double mass curve technique;
4. Determination of average depth of rainfall and frequency analysis;
5. Study of stage recorders and current meters;
6. Exercise on estimation of peak runoff rate and runoff volume;
7. Exercises on hydrograph and unit hydrograph;
8. Exercises on flood routing problems.

Course Outcome: By the end of the semester, the students will understand the estimation of runoff and flood routing techniques

References:

1. Chow, V.T. (1964). Hand Book of Applied Hydrology. Mc Graw Hill, New York.
2. Linsley, R.K., Kohler, M.A., and Paulhus, J.L.H. (1984). Hydrology for Engineers. Mc Graw Hill Pub.Co. Japan.
3. McCuen, R. H. (1989). Hydrologic Analysis and Design. Printice Hall.
4. Mutreja, K.N. (1990). Applied Hydrology. Tata Mc Graw Hill Pub. Co., New York.
5. Raghunath, H.M. (2006). Hydrology-Principles, Analysis and design. New age International (P) Ltd.
6. Singh, V. P. (1992). Elementary Hydrology. Prentice Hall India.
7. Subrahmanya, K. (1987). Engineering Hydrology. TataMcGrawHillPub.Co. New Delhi.

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AU/IP/ME/MI/AT- 4006 Computer Programming-II

C language alphabet set, identifiers, Variables and constants Data types, Builtin and user Defined Data types Arrays operators and expressions Simple assignment and Input-output statements, preprocessor directives writing simple 'C' programs, compiling and executing 'C' Programs.

Conditional statements and loops: IF statement IF-ELSE statement, SWITCH statement, FOR statement, WHILE and Do WHILE statement.

Function: Function declaration or prototype. Function definition, function calling: call by value, call by reference, Recursion.

Introduction to pointers, File processing: concept of files, file opening, editing, reading and writing.

Reference Books :

1. Programming in ANSI C, by Balagurusamy, Tata McGraw Hill
2. The C programming Language. By Brian W. Kernighan and Dennis M. Ritchie. Published by Prentice-Hall
3. Let us C by Y.Kanetkar, BPB Publication

Lab assignments :

1. Design and execute a 'C' program for multiplying two nXn matrices.
2. Design a 'C' program to calculate Average of 'n' numbers.
3. Design a 'C' program to add two numbers using call by value parameter passing mechanism.
4. Design a 'C' program to swap the contents of two variables using call by reference parameter passing mechanism.
5. Design a 'C' program to open a file and add contents to modify the file.