BANKURA UNIVERSITY

(West Bengal Act XIX of 2013- Bankura University Act, 2013)

Main Campus, Bankura Block-II, P.O.: Purandarpur, Dist.: Bankura, Pin- 722155, West Bengal

Office of the Secretary

Faculty Council for Undergraduate Studies

Ref: BKU/FCUG/109/2026 Date: 12/05/2026

NOTIFICATION

As directed, the undersigned is pleased to inform all concerned that Bankura University has initiated the process to implement New Curriculum and Credit Framework for Undergraduate Programme, UGC 2022 (as per NEP 2020) for 4-years Undergraduate programme with Forestry as Major, Minor etc. from the academic session 2023-2024. The syllabus as framed / drafted and partially implemented deserves to be analysed after receiving feedback from different stakeholders. As an important corollary to the process, a workshop will be organized on the date mentioned herewith to get the feedback from the stakeholders. Present Students, Alumni, Guardians, Academicians and other stakeholders related to the specific programme/course are requested for their kind participation in the workshop and to present their views/ observations, etc. The stakeholders may go through the draft syllabus attached herewith and convey their observations to the office of the undersigned on ugsecretaryoffice@bankurauniv.ac.in within three days from the date of publication of this notice.

Date: 20/05/2026
Time: 11:30 AM
Google Meet joining link: https://meet.google.com/okf-qhmx-xdu

Sd/-
Dr. Arindam Chakraborty
Secretary
Faculty Council for Undergraduate Studies

Ref: BKU/FCUG/109(6)/2026 Date: 12/05/2026

1. Registrar (Addl. Charge), Bankura University.
2. Dean (Officiating), Faculty Council of P.G. Studies in Arts, Science etc. Bankura University.
3. Chairperson / Convenor, Undergraduate Board of Studies in Forestry, Bankura University with request for necessary action.
4. System Administrator, Bankura University with request to upload this in website.
5. Secretary, Hon'ble Vice Chancellor, Bankura University.
6. Guard File.

Sd/-
Dr. Arindam Chakraborty
Secretary
Faculty Council for Undergraduate Studies

Syllabus

For

Four Year Under-Graduate Course

In

Forestry

Semester VII

[New Curriculum and Credit Framework for Undergraduate Programmes]
Following NEP 2020

With effect from the Academic Session 2024-2025

BANKURA UNIVERSITY

BANKURA, WEST BENGAL

PIN- 722155

Introduction

In line with NEP-2020 and the new Curriculum and Credit Framework for Undergraduate Programmes (CCFUD), the undergraduate Forestry syllabus has been drafted to align with UGC guidelines while offering students the flexibility to shape their educational journey. The revised syllabus is designed to provide a well-rounded understanding of Forestry, blending core concepts with practical techniques, and allowing individual universities to adapt the content according to their specific resources and expertise.

The framework includes a flexible choice-based credit system and emphasizes a multidisciplinary approach, enabling students to tailor their studies to their interests and career goals. This new structure not only supports a broad and adaptable curriculum but also ensures that students gain a robust foundation in both theoretical and practical aspects of Forestry.

The syllabus incorporates contemporary techniques and emerging trends in the field, ensuring that students are well-prepared for current and future challenges. It is designed to equip graduates with essential skills for immediate employment, thereby enhancing job prospects without necessarily requiring further academic pursuits.

Recognizing the diversity in institutional resources and student needs, the syllabus accommodates variations in infrastructure and faculty expertise. It also integrates opportunities for research and internships, providing students with valuable hands-on experience and exposure to real-world applications in Forestry.

A. Program Outcomes:

1. To impart students with practical knowledge and to assist them in becoming well-known forestry professionals.
2. To impart students with awareness for conserving and managing forest resources, as well as protecting wildlife.
3. To develop both quantitative and qualitative methods to analyse resources and solve problems.

4. To develop the design to provide students with the most up-to-date equipment and technology used in the field of forestry.
5. To develop consciousness among students for managing forest resources, incorporate knowledge of fundamental biology, physical science, forest and wildlife ecology, and social science.
6. To develop consciousness among students for information and methods from the fields of geomatics, silviculture, economics, operations, bioproducts, and policy to design and assess alternative approaches for managing forest resources.
7. To develop appropriate concepts, models, and efficient approaches to create and assess forest resource plans that take into account numerous conflicting objectives, from woodlots to landscapes.
8. It will help to establish bonding with forest - dependent community. Thus it will help in community development.

B. Program Specific Outcomes:

1. To impart knowledge about forestry techniques from antiquity to the present.
2. To disseminate comprehensive practical knowledge of technique of growing forest tress.
3. To provide thorough knowledge about agricultural related industries.
4. To develop knowledge consciousness for geomatics, silviculture, economics, bioproducts, and policy to design and assess alternative approaches for managing forest resources.
5. Detailed knowledge about forest policies and management of forests.

Course Structure- 2024-25

Semester-Wise courses in Four Years B.Sc.(Honours) in Forestry

Semester VII (20 Credit Hours)

Sl. No.	Course Code	Course	Credit		Marks			Total Marks	Teaching Hours/Week		
			Theory	Practical	End Semester Exam		Internal Marks		Lec.	Tu.	Pr.
					Theory	Practical					
1	S/FST/701/MJC-17	Forest Economics and Entrepreneurship Development	3	1	25	15	10	50	3	NA	2
2	S/FST/702/MJC-18	Watershed Planning and Management	3	1	25	15	10	50	3	NA	2
3	S/FST/703/MJC-19	Forest Tribology, Ethno-medicine and Extension	3	1	25	15	10	50	3	NA	2
4	S/FST/704/MJC-20	Research Methodology and Statistical Techniques	3	1	25	15	10	50	3	NA	2
5	S/FST/605/MN-7 (For students of other discipline)	Watershed Management	4	0	40	0	10	50	4	NA	0
Total			16	4	140	60	50	250	16	NA	8

Course	Major	Minor Stream	Multidisciplinary (MD)	Skill Enhancement Courses (SEC)	Ability Enhancement Courses(AEC)	Value Added Courses	Internship	Research project/ Dissertation	Total Credit
Certificate course	2x4=8	2x4=8	2x3=6	2x3=6	2x2=4	2x4=8	4*	0	40+4
Diploma	8x4=32	4x4-16	3x3=9	3x3=9	4x2=8	2x4=8	4*	0	82+4
UG HONS.	24x4=96	8x4=32	3x3=9	3x3=9	4x2=8	2x4=8	1x2=2	0	164
UG HONS. WITH RESEARCH	21x4=84	8x4=32	3x3=9	3x3=9	4x2=8	2x4=8	1x2=2	12	164

(MJC-Major Course, MN=Minor, MD=Multi Disciplinary, SEC=Skill Enhancement Course, AEC=Ability Enhancement Course, VAC=Value Added Course, INT=Internship, RPD=Research Project/Dissertation)

Summer Internship (Compulsory for 1 Year Certificate course)

Theory:-1Credit =1hour/Week, Practical:-1Credit =2hours/Week

*Students who want to exit after first or second year have to complete one Summer Internship of 4 credits in addition to the 40 credits of First Year and 82 credits after Second Year.

**Honours students not undertaking research will do 3 courses for 12 credits for Major in lieu of a research project/Dissertation and total four courses in Major in VIII semester.

***Honours with Research students will opt any one core course from available courses in Major in VIII semester.

**Honours with Research Students Will Opt Any One Course from Available Four (4) Courses in Major in VIII Semester

UG Honours Total Credit	MJC=24x4=96 MN=8x4=32 MD=3x3=9 SEC=3x3=9 AEC=4x2=8 VAC=2x4=8 INT=1x2=2	164
4 Year Honours with Research Total Credit	MJC=21x4=84 MN=8x4=32 MD=3x3=9 SEC=3x3=9 AEC=4x2=8 VAC=2x4=8 INT=1x2=2 RPD=1x12=12	164

Note: Forestry Syllabus (NEP-2020) under new curriculum and credit framework are prepared at par with the other B. Sc. (Major/Minor/Honours) syllabus of Bankura University but there are some uniqueness in forestry.

1. The students who opt for Forestry (Major) will not be able to change **Major and Minor** in the forthcoming semester.
2. The question pattern is different from other B. Sc. Subject. The patters and number of the questions are enclosed herewith.
3. There is a compulsory internship & District/State forest visit in the specific semester.

Distribution of Marks: For a course of 50 marks, 10 marks allotted for Internal Assessment and 40 marks for End Semester Examination (MJC-Major Course, MN=Minor, MD=Multi Disciplinary, SEC=Skill Enhancement Course)

Examination:

Question pattern: End-Semester Examination				
Sl. No	Questions to be answered	Out of	Marks of each question	Total Marks
For 40 Marks				
1	05	8	1	5×1 = 5
2	05	8	2	5×2 = 10
3	05	8	5	5×5 = 25
For 25 Marks				
1	5	08	1	5×1 = 5
2	5	08	2	5×2 = 10
3	2	05	5	2×5 = 10

Practical Exam Marks Pattern for Credit Course

For 15 Marks

Exam/ Hand Practice/ Laboratory work/Field Work/ Experiment etc.	Note Book/ Record	Viva-Voce	Total
5	5	5	15

For 50 Marks

Internship/Project or Dissertation planning and Report writing/ Study Tour Report etc.	Regularity	Presentation	Viva-Voce	Total
20	10	15	5	50

For 40 Marks

Internship/Project or Dissertation planning and Report writing/ Study Tour Report etc.	Regularity	Presentation	Viva-Voce	Total
20	5	10	5	40

Semester VII (20 Credit Hours)

Sl. No.	Course Code	Course	Credit		Marks			Total Marks	Teaching Hours/Week		
			Theory	Practical	End Semester Exam		Internal Marks		Lec.	Tu.	Pr.
					Theory	Practical					
1	S/FST/701/MJC-17	Forest Economics and Entrepreneurship Development	3	1	25	15	10	50	3	NA	2
2	S/FST/702/MJC-18	Watershed Planning and Management	3	1	25	15	10	50	3	NA	2
3	S/FST/703/MJC-19	Forest Tribology, Ethno-medicine and Extension	3	1	25	15	10	50	3	NA	2
4	S/FST/704/MJC-20	Research Methodology and Statistical Techniques	3	1	25	15	10	50	3	NA	2
5	S/FST/605/MN-7 (For students of other discipline)	Watershed Management	4	0	40	0	10	50	4	NA	0
Total			16	4	140	60	50	250	16	NA	8

1. S/FST/701/MJC-17: Forest Economics and Entrepreneurship Development (3+1)

Objective	• To understand economic principles, farm and forest management, marketing, finance, and crop insurance relevant to agriculture and forestry. • To develop entrepreneurial traits and skills, and explore business and enterprise opportunities. • To acquire management skills to effectively run and operate forest-based enterprises.

Theory	Topic	Lectures/ Hours
Unit I	Introduces the fundamentals of Economics and Forest Economics, covering the meaning, definition, scope, and importance of economics. It explains key concepts such as goods, services, utility, value, price, wealth, and welfare. The unit discusses human wants – their characteristics, classifications, and significance. It covers the theory of consumption, including the law of diminishing marginal utility, law of equi-marginal utility, and consumer surplus. Students learn about demand and supply, their types, laws, elasticity, factors influencing them, and their role in pricing timber and non-timber forest products. The unit also introduces forest planning, policy, and development.	**15**
Unit II	Production – meaning, factors of production: land, labour, capital, organization, entrepreneurship. Distribution – rent, wages, interest, profit. National Income – definition, concepts. Public finance – meaning, public resources, sources, taxation (types), public expenditure (principles). Money – meaning, evolution. Inflation – definition, types. Welfare economics – meaning, basic concepts.	**10**
Unit III	Covers Marketing – definition, marketing process, need and role of marketing, marketing functions, classification of markets, marketing channels, price spread,	**5**

	marketing efficiency, integration, constraints in agricultural marketing, market intelligence, project report guidelines, bank norms, insurance, SWOT analysis, crisis management.	
Unit IV	Entrepreneurship development – assessing Indian business environment, social, political, economic systems, globalization, emerging entrepreneurial environment, concept of entrepreneurship, entrepreneurial and managerial characteristics, managing enterprise, motivation, planning, monitoring, evaluation, follow-up, managing competition, entrepreneurship development programs, SWOT analysis, generation, incubation, commercialization of ideas/innovations. Covers government schemes and incentives, SME/SSI policies, export/import policies relevant to forestry, venture capital, contract farming, joint ventures, public-private partnerships, forestry inputs industry, characteristics of Indian forestry processing/export industry, social responsibility of business.	**15**
Practical	Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural and forestry products and its value-added products. Identification of marketing channel– Calculation of Price Spread – Identification of Market Structure – Visit to different Markets. SWOT analysis, developing leadership skills, developing managerial skills, problem solving skill, supply chain management and total quality management, project planning formulation and report preparation.	30

Outcome	• Understand fundamental concepts of Economics and Forest Economics, including consumption, demand-supply, pricing, production, distribution, and public finance as applied to forestry. • Gain knowledge of marketing principles, market functions, project analysis, and apply them to forest products. • Develop entrepreneurship and management skills, including enterprise development, government schemes, and commercialization, to support sustainable forestry and resource management.

Suggested Readings

1. Dewett,K. K.2005.Modern Economic Theory. S. Chand, New Delhi.
2. Dewett, K. K., Verma.2004 Elementary Economic Theory, S. Chand, New Delhi
3. Jhingan, M. L. 2012. Macro-Economic Theory. Vrindapublishers, New Delhi.
4. Reddy, S.S., Raghu Ram,P., Neelakanta Sastry, T.V.,Bhavani, D.I.2004. Agricultural Economics. Oxford and IBH Publishers, New Delhi.Maslow,
5. A.H (1970) Motivation and personality. Harper and Row publishers, New York.
6. Perelson, B and Steiner, G (1964) Human behaviour. Harcourt Brace Jovanovich, New York.

2. S/FST/702/MJC-18: Watershed Planning and Management (3+1)

Objective	To teach the students on different aspects of hydrology and watershed management and to impart basic knowledge on various measures of soil and water conservation

Theory	Topic	Lectures/ Hours
Unit I	Introduction – Hydrology and its importance in forestry. Hydrologic cycle. Precipitation – forms. Rainfall – types. Intensity, duration and frequency. Infiltration, percolation, evaporation, transpiration and evapotranspiration. Runoff - runoff process – factors affecting runoff - prediction and estimation of runoff. Hydrograph – unit hydrograph. Sedimentation and stream gauging.	**10**
Unit II	Soil erosion – Principles - types of erosion - geological and accelerated. Forms of erosion - water erosion - kinds and forms - causes and effects - degree of erosion. Wind erosion – types – saltation, suspension, surface creep. Control of wind erosion - shelter belts and wind breaks. Sand dune stabilization. Land capability classification - recommended land use.	**10**
Unit III	Soil and water conservation - historical review – its need. Biological measures – afforestation, contour farming, strip cropping, cropping systems as inter cropping, crop rotation and mixed cropping, mulching and tillage practices. Grassland management. Mechanical measures - Contour bunds, Graded bunds, Bench terracing and Stone wall - Design of structures for soil conservation. Erosion control measures for non-agricultural lands, Soil conservation on Wastelands - contour and staggered trenching. Gully control structures - Temporary and permanent –check dams – types. Spillways – drop and chute spillways, drop inlet.	**10**
Unit IV	Water Harvesting – definition, methods and techniques - treatment of catchments. Water Harvesting for Trees and Shrubs. Ground water – Aquifer – water harvesting for ground water recharge. Storage structures – Ponds – types. Watershed Management – definitions. Characteristics of watershed - elements and components. Selection of Priority areas - Planning and implementation of watershed programs in forest watersheds. Watershed work plan. Monitoring and evaluation of watershed programs. Remote sensing and GIS in watershed management.	**15**
Practical	Preparation of watershed maps (manual methods or software tools). Quantitative analysis of watershed parameters — slope, area, drainage density, shape etc. Computation of mean rainfall – Isohyet and Thiessen polygon methods. Determination of infiltration with double ring infiltrometer. Estimation of runoff. Erosion estimation – Problems on USLE. Design of shelterbelts and windbreaks. Design of contour bunds, stone wall and bench terraces. Design of check dams. Visit to erosion prone and watershed areas. Design of water harvesting systems – roof water harvesting and percolation ponds. Design of micro catchment water harvesting systems for trees. Visit to soil conservation sites and silt monitoring station. Exercises on Demarcation of watershed. Preparation of watershed plan - monitoring and evaluation of watershed programs. Visit to soil erosion sites and various watershed project areas to study erosion control measures, water conservation practices, and watershed management and development activities.	**30**

Outcome	
	• Understand hydrologic processes, runoff, soil erosion, and methods for soil, water, and wind conservation, including biological and mechanical measures, land use planning, and water harvesting techniques. • Apply principles of watershed management, including planning, implementation, and monitoring, using modern tools like Remote Sensing and GIS for sustainable forest and water resource management.

Suggested Readings

1. Das, Ghanshyam. 2009. Hydrology and Soil Conservation Engineering. PHI Publishers, New Delhi.
2. Datta, S.K. 1986. Soil Conservation and Land Management, International Book Distributors, Dehra Dun.
3. Hamilton, I.S. 1987. Forest and Watershed Development and Conservation in Asia and the Pacific, International Book Distributors, Dehra Dun.
4. Oswal, M.C. 1999. Watershed Management (For Dry land Agriculture), Associated Publishing Company, New Delhi.
5. Rama Rao. 1980. Soil Conservation. Standard Book Depot, Bangalore.
6. Richard, Lee. 1980. Forest Hydrology, Columbia University Press, New York.
7. Suresh, R. 2000. Soil and Water Conservation Engineering. Standard Publishers, New Delhi.

3. S/FST/703/MJC-19: Forest Tribology, Ethno-medicine and Extension (3+1)

Objective	To impart basic knowledge on local indigenous peoples their knowledge on ethno medicines and the extension skills and knowledge with reference to forestry

Theory	Topic	Lectures/ Hours
Unit I	Definition and characteristics of a tribe. Tribes and aborigines- an anthropological perspective. Racial classification and distribution of tribes. Tribes in India and West Bengal. Tribal economy. Tribals and Constitution of India Administration of tribal areas in independent India- appraisal of tribal development - problems of tribal identity and integration in the mainstream.	**10**
Unit II	Relation between tribes and forests- forest as their immediate environment. Forests as the means of livelihood. Girijan habitat - changes consequent to government control of forests. Forest management and tribal welfare-management conflicts and way forward. Role of forest department in tribal welfare. Role of Non wood Forest products in the economy of tribal's and Tribal cooperative societies. Social forestry and tribal welfare. Ethno- medicines of tribals in Eastern India. Traditional Botanical Knowledge.	**10**
Unit III	Ethno- medicines of the plants from the following families. Guttiferae (Clusiaceae), Malvaceae, Fabaceae, Mimosaceae, Caesalpiniaceae, Combretaceae, Umbelliferae (Apiaceae), Rubiaceae, Asteraceae, Ebenaceae, Apocynaceae, Asclepiadaceae, Euphorbiaceae, Lauraceae, Palmaceae, Poaceae, Liliaceae, Coniferae, Santalaceae and Thymeliaceae.	**10**
Unit IV	Introduction- human behaviour and psychology. Extension education: meaning, definition, nature, scope, objectives, principles, approaches and history. Types of education, Formal, informal non-formal education. Rural Development: meaning, definition, objectives and genesis. Transfer of technology programs like RD, OFT, FLD, KVKs – AKIS (Agricultural Information System), ATMA – ICT enable extension services. Communication: meaning, definition, elements and selected models. Audio-visual aids: importance, classification and selection. Diffusion and adoption process.Programming planning process – meaning, scope, principles and steps. Evaluation: meaning, importance and methods. Scope	**15**

	and importance of Participatory Rural Appraisal (PRA). Rural social groups, primary and secondary groups, formal, informal group, temporary, permanent groups, references group, classification of group.	
Practical	Visits to study structure, functions, linkages and extension programmers of KVKs or ICFRE institutes/voluntary organizations/Mahila Mandal/Village Panchayat/Van Panchayat/ State Forest Department (Social forestry wing). Group discussion at farm homesteads. Preparing individual and village level production plans. Preparation of charts, posters and flash cards. Participation in conducting exhibitions and method demonstrations/campaigns at the village level. Familiarization of the use of audio-visual aids. PRA exercises. Field visit to Different tribal regions to gain ethnobotanical knowledge and the interrelation between plant and people - Survey and identification of plants used by the tribals for medicine, food and other social purposes - Collection and preparation of herbarium specimens of the locally available medicinal plants.	**30**

Outcome	• Develop knowledge about tribal characteristics, economy, governance, forest relationships, traditional knowledge, and ethnomedicinal practices, especially in India. • Apply principles of extension education, communication, participatory methods, programme planning, and technology transfer for effective rural and tribal development.

Suggested Readings

1. FAO. 1984. Forestry extension, making it works, An international journal of forestry and forest industries, Unasylva - No. 143, Published by FAO.
2. Furer-Haimendorf, C.V. 1985. Tribes of India - the struggle for survival. OUP. New Delhi
3. Hasnain, N. 2007. Tribal India. New Royal Book Company
4. K.A. Jalihal and V. Veerabhadraiah. 2007. Fundamentals of Extension Education and Management in Extension, Concept Publishing Company.
5. L.K. Jha and P. K. Sen Sarma, A.P.H. 2008. A Manual of Forestry Extension Education, Published by VEDAMS, P. 386 p.
6. Maheshwari, J.K. 2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific Publishers, Jodhpur, India, 672 p.
7. Sharma, R.N. and Bakshi, S. 1984. Tribes and tribal development. Uppal Publ. House, New Delhi.
8. Sim, D. and Hilmi, H. A.1987. Forestry Extension Methods, FAO Forestry Paper-80, P. 153.
9. Thakur, D. 1986. Socio-economic development of tribes in India. Deep and Deep Publications, New Delhi
10. Vidyarthi, L.P. and Rai, B.K. 1985. The tribal culture of India. Concept Publ. Co., New Delhi.

4. S/FST/704/MJC-20: Research Methodology and Statistical Techniques (3+1)

Objective	• To understand some basic concepts of research and its methodologies. • To identify appropriate research topics and define appropriate research problem and parameters. • To organize and conduct research (advanced project) in a more appropriate manner • To write a research report and thesis • To understand and apply measures of central tendency, dispersion, probability, sampling

	theory, and probability distributions. • To develop skills in hypothesis testing, correlation, regression, ANOVA, and design and analysis of experiments (CRD, RBD, LSD). • Analyze Statistical data using MS-Excel, and Other software package.

Theory	Topic	Lectures/ Hours
Unit I	Concept of Research, Definition, meaning, need, process and types of research (Qualitative and Quantitative). Research design: Definition, types, Principles, identification and formulation of problem, components and criteria. Research Methods, Research Techniques and Tools: Questionnaire, Schedule, Interview, Observation, library records and reports. Nominal and operational definition; Designing research proposal; Literature search: Print and Non-print and Electronic Sources. Guidelines of Research Reporting	**10**
Unit II	Introduction to Statistics and its Applications in forestry, agriculture and Ecology. Basic concepts – statistics – variable – types and sources of data – classification and tabulation of data. Descriptive Statistical –Measurement of Central Tendency; Corelation, Regression. Statistical Techniques: Measures of Mean, Mode, Median. Measures of Dispersion: Mean deviation.	**10**
Unit III	Diagrammatic and graphical representation of data – simple, multiple, component and percentage bar diagrams, pie diagram – frequency polygon, frequency curve and histogram. Construction of frequency distribution tables. Measures of dispersion: range, quartile deviation, mean deviation, standard deviation, and coefficient of variation – skewness and kurtosis – merits and demerits. Probability – basic concepts –Probability distributions – Discrete distributions: Binomial and Poisson. Continuous distribution: Normal distribution – definitions and properties.	**10**
Unit IV	Sampling theory – population – sample – parameter and statistic – sampling distribution – sampling vs complete enumeration – Types of sampling –Null and alternative hypothesis – types of errors – critical region and level of significance – degrees of freedom. Large sample test –Small sample tests – F-test – t-test– chi square test– 2 × 2 contingency table – Yates' correction for continuity. Correlation –Karl Pearson's correlation coefficient definition – types and properties. Regression – simple linear regression – properties of regression coefficient. Analysis of Variance (ANOVA) –Basic principles of experimental designs – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Latin Square Design (LSD) – lay out, analysis, merits and demerits of the above-mentioned designs.	**15**
Practical	Formation of frequency distribution tables – Diagrammatic and graphical representation. Computation of different measures of central tendency and computation of various measures of dispersion for raw and grouped data – calculation of coefficient of variation (CV) – measures of skewness and kurtosis. Simple problems in Binomial distribution, Poisson and Normal distribution – Selection of simple random sampling. Large sample test for single proportion and difference between two proportions and large sample test for single mean and difference between two means. t-test for single mean – t-test for testing the significance of two means for independent and paired samples – chi square test	**30**

	for goodness of fit and test for independence of two attributes in a contingency table – Yates correction for continuity – calculation of the correlation coefficient – fitting of simple linear regression equation – One way and two-way ANOVA – completely randomized design (CRD) – randomized block design (RBD) – Latin square design (LSD). Use of software packages.	

Outcome	• Understand some basic concepts of research and methodologies. • Understand fundamental statistics, construct and interpret graphs/diagrams, and compute measures of central tendency and dispersion. • Apply probability, sampling methods, and hypothesis testing (t-test, F-test, chi-square) in data analysis. • Analyze relationships using correlation and regression, perform ANOVA, and design and interpret experiments using CRD, RBD, and LSD.

Suggested Readings

1. Anderson, R.L. and Bancroft, T.A. (1952). Statistical Theory in Research. Mc. Graw Hill Book Co., New York.
2. Cochran, W.G and Cox, G.M. (1958). Experimental designs. Wiley, New York
3. Das, M.N. and Giri, N.C. (1986). Design and Analysis of Experiments. Wiley Eastern Ltd., New Delhi.
4. Federer, W.T.(1955), Experimental Design. Macmillan, New York.
5. Gomez, K.A. and Gomez, A.A. (1984). Statistical Procedures for Agricultural Research. John Wiley and Sons. New York. 680 p.
6. Kempthorne, O. (1952). The design and analysis of experiments. Wiley, New York.
7. Nigam A.K. and Gupta, V.K. (1979). Hand boo kon Analys is of Agricultural Experiments. IASRI Publication, New Delhi.
8. Panse, V. G. and P.V. Sukhatme. (1967). Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research, New Delhi, India.
9. Petersen Roger G. (1994) Agricultural Field Experiments: Design and Analysis. Marcel Dekker,New York.

5. S/FST/605/MN-7: Watershed Management(4+0)

Objective	• To understand the fundamentals of hydrology, including the hydrological cycle, precipitation, runoff, soil water, and groundwater processes. • To develop knowledge of watershed management, soil and water conservation methods, water harvesting, and forest treatments for sustainable land and water use. • To learn to use modern tools like Remote Sensing, GIS, and hydrological modeling to plan, monitor, and implement integrated watershed management programs.

Theory	**Topic**	**Lectures/ Hours**

Unit I	Introduces the importance and scope of hydrology, along with basic definitions and key concepts. Hydrological cycle, its stages, and processes. The unit also covers energy and water balance equations, and precipitation including types such as rain, snow, sleet, and hail, along with methods to measure intensity, duration, and frequency. Concepts of interception, infiltration, evaporation, transpiration, and evapotranspiration are explained. Groundwater fundamentals, including aquifers, water table, and recharge and discharge processes, are also introduced.	**15**
Unit II	Focuses on paired watersheds and watershed experiments, surface water, and runoff processes. Hydrographs, including unit hydrographs, and understand soil water energy concepts, movement, availability, and measurement techniques, field capacity, and wilting point. The factors influencing runoff and infiltration.	**15**
Unit III	Watershed management as a key approach for sustainable productivity. Principles and practices of watershed management are discussed, along with soil and water conservation methods such as contour farming, strip cropping, terracing, check dams, and gully control. Water harvesting techniques, both traditional and modern, are explained, including the role of trees in water conservation, natural terracing, species suitability, and recharging of springs, ponds, and small water bodies. Forest treatment practices for improving water yield are also covered.	**15**
Unit IV	Use of Remote Sensing and GIS for watershed delineation and monitoring. Hydrological modeling for watershed planning and integrated watershed management, which includes land use planning, forestry, agriculture, and soil conservation. The unit also discusses watershed development programs and policies, climate change impacts on hydrology.	**15**

Outcome	• Understand and analyze hydrological processes, soil water dynamics, and groundwater availability for watershed studies. • Apply watershed management principles, including soil and water conservation, water harvesting, and forest treatment techniques. • Use of modern tools (Remote Sensing, GIS, modeling) to design, implement, and evaluate integrated watershed management programs, considering policy and environmental impacts.

Suggested Readings

1. Bennet, H. H. 1965. Elements of Soil conservation. Mc Graw Hill Book Co. Inc. NewYork
2. Dhruva Narayana V. V. 1993. Soil and Water Conservation Research in India, ICAR, New Delhi
3. Dhruva Narayana V. V., G. Sastry and U. S. Patnaik. 1997. Watershed Management. Indian Council of Agricultural Research, New Delhi, 176 p
4. Gurmail Singh et al., 1988. Manual of Soil and Water Conservation. Oxford IBH Publishing Co.
5. Hamilton L. S. 1983. Tropical Forested Watersheds: hydrologic and soils response to major uses or conversions. International Book Distributors, Dehra Dun
6. Hamilton, L.S. (ed.). 1983. Forest and Watershed Development snd Conservation in Asia and the Pacific. International Book Distributors, Dehra Dun.
7. Hewlett, JD and Nutter, WL 1969. An Outline of Forest Hydrology. University of Georgia Press, Athens 132p
8. Lal R. 2000. Integrated Watershed Management in the Global Ecosystem. CRC Press, London
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Summary of total Major Paper up to Semester VII

Sl. NO	Semester	Major
1	I	Introduction to Forestry and Agroforestry
2	II	Silviculture
3	III	Forest Mensuration, Inventory and Yield Prediction
4	III	Forest Plant Biology
5	IV	Wood Anatomy and Identification
6	IV	Forest Ecology and Management
7	IV	Tree Physiology and Biochemistry
8	IV	Commercial Forest Products and NTFP
9	V	Forest Health and Protection
10	V	Wood Science and Technology
11	V	Fundamentals of Forest Genetics & Biotechnology
12	V	Forest Logging and Ergonomics
13	VI	Remote Sensing and GIS
14	VI	Forest Resource Management, Laws and Policies
15	VI	Wildlife and Rangeland Management
16	VI	Tree Improvement
17	VII	Forest Economics and Entrepreneurship Development
18	VII	Watershed Planning and Management
19	VII	Forest Tribology, Ethno-medicine and Extension
20	VII	**Research Methodology and Statistical Techniques**

Summary of total SEC Paper up to Semester VII

Sl. NO	Sem	SEC
1	I	Tree Seed, Nursery and Plantation Management
2	II	Forest Soil, Nutrient and Degraded Land Management
3	III	Forest Survey & Engineering