

# **UNIVERSAL OBJECTIVE FORESTRY**

# About the Author

Mr. Mohit Husain was born in Dhoondli (Bijnor), a small village in the state of Uttar Pradesh. His father, Amisher Khan is a businessman and had motivated him to pursue an under graduation studies in forestry science.

Mr. Mohit Husain, did his B.Sc. (Forestry) from college of Horticulture and Forestry, Agricultural University Kota, Rajasthan in 2016. Currently, he is pursuing his Master degree in forestry science from Sher-e-Kashmir University of Agricultural Science and Technology of Kashmir. His current research focuses on Vegetation analysis, Biomass production and carbon stock in the grasslands of Gulmarg. He has qualified ICAR-UG and ICAR-PG examinations and has received ICAR scholarship.

He was awarded gold medal in B.Sc. And was also awarded as *Best student of the year-2016* during the same.

Mr. Mohit Husain has attended various National and International conferences/ seminars and gave oral presentations as well as poster presentation. He has done various trainings in both agricultural and Forestry field. He has published 23 research papers and articles in National and International journals.

He has also written a practical manual on tree physiology, forest nursery and also edited a book, entitled *objective forestry*.

# **UNIVERSAL OBJECTIVE FORESTRY**

**(For UPSC, PSCS, ARS/SRF/JRF/AFO, STATE PG & PH.D.  
Entrance Examinations and Interviews of All Forest Services)**

**Mohit Husain**

M.Sc. (Forestry)  
(UG-Goldmedalist)



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*Dedicated to my beloved parents*

*Mr. Amisher Khan  
&  
Mrs. Hanipha Khatoon*



# Preface

Forestry is a broad subject. It covers all the basic subject of science. Therefore students have to pass through all the forestry related subject with elementary courses during under graduation. After passing graduation, higher degrees are done in specialized field of forestry, so there is no need to read all forestry subject in M.Sc. and Ph.D. programme.

But for the preparation of various forestry competition examinations students have to read all the basic books of forestry to cover the syllabus. And at that time most of the students do not have all the necessary books and ample of time to read them.

Therefore, to overcome these problems the author have tried his best to write this book through reading various books, states forest reports and other sources of forestry, to covers brief information of all the subjects in one book.

Covering all the subjects of forestry in one books is a very hard task so some errors may be present, therefore your suggestions are invited (mohit.husainchf@gmail.com) for further improvement of this book.

I express my appreciation for the hard work and affinity of my sincere and respected professors who have guided me for bring all the content in this single book.

The forbearance shown by my mother, Mrs. Hanipha Khatoon, father Mr. Amisher Khan, brothers Mr. Kamil Hussain & Mr. Suhaiv Akhtar and sister Ms. Nargis Khatoon, is worth placing high on record who always favoured me in collecting and bearing the assignment.

I hope this book would be very helpful for those appearing in various competition exams of forestry.

**Mohit Husain**





# **JRF Syllabus for Forestry**

**UNIT I:** Importance of Agriculture/Forestry/Livestock in national economy. Basic principles of crop production. Important rural development programmes in India Elementary principles of economics and agri-extension. Organizational set up of Agricultural Research, education and extension in India. Major diseases and pests of crops. Elements of statistics.

**UNIT II:** Forest-importance, types, classification, ecosystem, biotic and abiotic components, ecological succession and climax, nursery and planting technique, social forestry, farm forestry, urban forestry, community forestry, forest management, silvicultural practices, forest mensuration, natural regeneration, man-made plantations, shifting cultivation, taungya, dendrology, hardwoods, softwoods, pulp woods, fuel woods, multipurpose tree species, wasteland management. Agro forestry – importance and land use systems, forest soils, classification and conservation, watershed management, forest genetics and biotechnology and tree improvement, tree seed technology, rangelands, wildlife – importance, abuse, depletion, management, major and minor forest products including medicinal and aromatic plants, forest inventory, aerial photo interpretation and remote sensing, forest depletion and degradation – importance and impact on environment, global warming, role of forests and trees in climate mitigation, tree diseases, wood decay and discolouration, tree pests, integrated pest and disease management, biological and chemical wood preservation, forest conservation, Indian forest policies, Indian forest act, forest engineering, forest economics, joint forest management and tribology.



# NET Syllabus for Agroforestry

**UNIT 1.** National Forest Policy 1894, 1952 and 1988; Indian Forest Act, 1927; Forest Conservation Act, 1980 and Wildlife Protection Act, 1972; Forests-extent, basis for classification and distribution in India; Geographical distribution and salient features of major world forest types; Phytogeographical regions and vegetation of India; Role of forests in national economy - productive, protective and ameliorative, tribal and rural livelihoods; Forest types of India: distribution and types; Succession, climax and retrogression; Concepts of biomass, productivity, energy flow and nutrient cycling in forest ecosystem; Migration and dispersal mechanism.

**UNIT 2.** Concept and definition of agroforestry, social forestry, community forestry and farm forestry; Benefits and constraints of agroforestry; Historical development of agroforestry and overview of global agroforestry systems. Classification of agroforestry systems: structural, functional, socio-economic and ecological; Diagnosis and design of agroforestry system; Land capability classification and land use; Criteria of an ideal agroforestry design, productivity, sustainability and adoptability; multipurpose tree species and their characteristics suitable for agroforestry.

**UNIT 3.** Plant management practices in agroforestry; Tree-crop interactions: ecological and economic; Concept of complementarity, supplementarity and competition; Productivity, nutrient cycling and light, water and nutrient competition in agroforestry; Concept of allelopathy and its impact on agroforestry; Energy plantations - choice of species and management; Lopping of top-feed species such as frequency and intensity of lopping; Organic farming; Financial analysis and economic evaluation of agroforestry systems: cost benefit analysis and land equivalent ratio; Agroforestry practices and systems in different agro - ecological zones of India.

**UNIT 4.** Extent and causes of land denudation; Effects of deforestation on soil erosion, land degradation, environment and rural economy; Wastelands: their extent, characteristics and reclamation; Watershed management and its role in social, economic and ecological development; Biomass production for fuel wood, small timber, raw material for plant-based cottage industries, non-wood forest products such as gums, resins & tannins, medicinal plants, essential oils, edible fruits, spices, bamboo and canes; Wood quality and wood preservation; Plywood and pulp industries.

**UNIT 5.** Forest mensuration - definition, object and scope; Measurement of diameter, girth, height, stem form, bark thickness, crown width and crown length; Measurement methods and their principles. Measurement and computation of volume of logs and felled/standing trees; Construction and application of volume tables; Biomass measurement; Growth and increment; Measurement of crops; Forest inventory: kinds of enumeration, sampling methods, sample plots and photo interpretation; Geographic information systems and remote sensing - concept and scope.

**UNIT 6.** Definition, object and scope of silviculture; Site factors - climatic, edaphic, physiographic, biotic and their influence on forest vegetation; Forest regeneration: natural and artificial; Silvicultural systems - high forest and coppice systems; Silviculture of important tree species - Populus, Eucalyptus, Dalbergia, Acacia, Tectona, Shorea, Prosopis, Casurina, Pinus, Gmelina, Azadirachta, Diospyros, Pterocarpus, Anogeissus, Santalum, Quercus and Albizia.

**UNIT 7.** Seed collection, processing, storage, viability and pre-treatment; Seed dormancy and methods for breaking dormancy; Seed testing and germination tests; Seed certification and ISTA Rules; Forest nursery - need, selection and preparation of site, layout and design of nursery beds; Types of containers; Root trainers; Growing media and sowing methods; Management of nursery-shading, watering, manuring, fertilizer application, weed control, insect pest and diseases control; Planting techniques: site selection, evaluation and protection; Soil working techniques for various edaphic and climatic conditions; Planting patterns; Plant spacing, manure and fertilizer application, irrigation/moisture conservation techniques; Choice of species. Afforestation on difficult sites: saline-alkaline soils, coastal sands, lateritic soils, wetlands, ravines and sand dunes, dry and rocky areas, cold desert; Tending operations - weeding, cleaning, climber cutting, thinning - mechanical, ordinary, crown and selection thinning, improvement felling, pruning and girdling; Forest fires: causes, types, impacts and control measures; Major forest pests and weeds.

**UNIT 8.** Forest management: definition and scope; Concept of sustained yield and normal forest; Rotation; Estimation of growing stock, density and site quality; Management of even aged and uneven aged forest; Regulation of yield in regular and irregular forests by area, volume, increment and number of trees; Working plan; Joint forest management; Conservation and management of natural resources including wildlife; Forest evaluation; Internal rate of return, present net worth and cost benefit analysis.

**UNIT 9.** Tree improvement: nature and extent of variations in natural population; Natural selection; Concept of seed source/ provenance; Selection of superior trees; Seed production areas, exotic trees, land races; Collection, evaluation and maintenance of germplasm; Provenance testing. Genetic gains; Tree breeding: general principles, mode of pollination and floral structure; Basics of forest genetics - inheritance, Hardyweinburg Law, genetic drift; Aims and methods of tree breeding. Seed orchard: types, establishment, planning and management, progeny test and designs; Clonal forestry - merits and demerits; Techniques of vegetative propagation, tissue culture, mist chamber; Role of growth substances in vegetative propagation.

**UNIT 10.** Forestry in bio-economic productivity of different agro-eco-systems and environmental management; Global overview and classification of agroforestry systems; Tree-crop interaction in agroforestry; Biomass production for fuel' wood, small timber, raw material for plants-based cottage industries, non-wood forest products such as gums, resins, tannins, medicinal plants, essential oils, edible fruits, bamboos and canes; Principle and criteria of plant selection in agroforestry; Resource use-efficiency in agroforestry.

**UNIT 11.** Measurement of trees and stand – diameter, girth, height, form and crown characteristics; Measurement methods and their principles; Volume/biomass estimation, volume tables; Measurement of rangeland productivity; Forest enumeration: sampling methods, sample plots, surveys and photo interpretation; Concept and application of GIS and remote sensing; Introduction to internal rate of return, present net worth, cost benefit analysis and land equivalent ratio; Agroforestry and environmental conservation; Role of green revolution in forest conservation in India.

**UNIT 12.** Climate change: greenhouse effect, sources and sinks of greenhouse gases, major greenhouses gases; Global climate change – its history and future predictions; Impact of climate change on agriculture, forestry, water resources, sea level; Livestock, fishery and coastal ecosystems; International conventions on climate change; Global warming: effect of enhanced CO<sub>2</sub> on productivity; Ozone layer depletion; Disaster management, floods, droughts, earthquakes; Tsunami, cyclones and landslides; Agroforestry and carbon sequestration.

**UNIT 13.** Statistics: definition, object and scope; Frequency distribution; Mean, median, mode and standard deviation, introduction to correlation and regression; Experimental designs: basic principles, completely randomized, randomized block, Latin square and split plot designs.



# Contents

<i>Preface</i>	vii
<i>About the Author</i>	viii
<i>JRF Syllabus for Forestry</i>	ix
<i>NET Syllabus for Agroforestry</i>	xi–xiii
1. General Forestry	1—34
2. Ecology and Environment	35—56
3. Forest Management	57—82
4. Wildlife Management	83—96
5. Forest Utilization	97—134
6. Plant and Wood Anatomy	135—146
7. Forest Mensuration	147—178
8. Remote Sensing	179—186
9. Rangeland Management	187—194
10. Forest Protection	195—202
11. Silviculture	203—232
12. Agroforestry	233—242
13. Social Forestry	243—248
14. Genetics & Tree Improvement	249—272
15. Tree Seed Technology	273—278
16. Soil Science	279—294
17. Agricultural Extension	295—304
18. Agricultural Statistics and Economics	305—312
19. Plant Physiology	313—336
20. Memory based JRF Paper 2015	337—346
21. Memory based JRF Paper 2016	347—364
22. Memory based NET Paper 2015	365—382
23. Memory based SRF Paper 2014	383—398
24. UPPSC ACF Exam Paper 2015	399—414

