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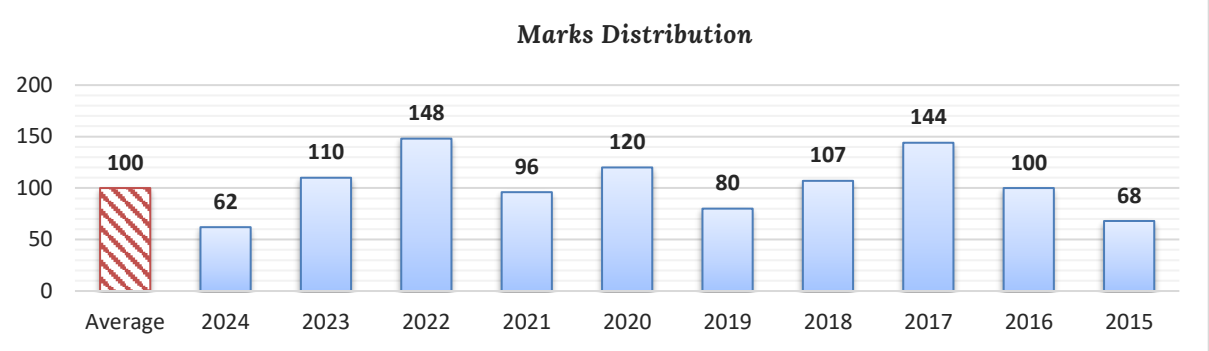
Paper - 1

CONTENTS

CHAPTER 1

SILVICULTURE

General Silvicultural Principles : Ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests; methods of propagation, grafting techniques; site factors; nursery and planting techniques. Nursery beds, polybags, and maintenance, water budgeting, grading and hardening of seedlings; special approaches; establishment and tending.



2024	• What is ***Silvics***? Explain its practical application. Discuss in brief the objects of study of silviculture [P1/4 (b) | 15 M]. • What are ***Ecosystem Services***? Differentiate between use values and non-use values. Explain different methods of valuation of ecosystem services [*Linked Q* | **P2**/Q7 (b) | 15 M]. • Differentiate amongst ***Radiation Frost***, ***Pool Frost*** and ***Advective Frost***. Give at least two examples each for frost hardy, moderately hardy and frost tender tree species [**P2**/6(c) | 10 M]. • Briefly summarize the characteristic features of cold arid forest vegetation. Discuss their mechanism of ***Survival Under Extreme Cold*** temperatures [*Linked* Q : P1/1 (b) | 8 M]. • Give four examples of tree species for each of the following methods by which their flowers are pollinated [P1/1 (c) | 8 M]. (i) Anemophily (ii) Zoophily (iii) Entomophily (iv) Hydrophily • Enumerate the ***Standard Tree Classification*** adopted in Indian Forestry [P1/3 (c) | 10 M]. • "Pruning is an important ***Tending Operation*** in plantation forestry for the improvement of the tree or its timber." Justify [P1/2 (c) | 10 M].
2023	• What is ***Frost Hole***? How does frost affect regeneration? [P1/1 (d) | 8 M]. • What are ***Biofertilizers***? Enlist the factors associated with the ***Mycorrhizal Development*** in trees. Discuss the types of mycorrhizae [15 M] [*Linked Q* | P1/8 (a) | 15 M]. • Explain the following [P1/4 (c) | 15 M].

	(*i*) Lignotuber (*ii*) Root sucker (*iii*) Vermiculite (*iv*) Buttresses (*v*) Ortet and Ramet • The shoot portion of seedlings of some tree species like ***Sal*** and ***Sandal***, under ***Natural Regeneration***, keeps on drying year after year but the roots remain alive. Discuss [P1/1(a) | 8M]. • Write the factors which affect the ***Natural Regeneration*** of Sal (*Shorea robusta*). Discuss the procedure to obtain natural regeneration of *Moist Sal Forests* [P1/2 (b) | 15 M]. • Discuss the significance of ***Exotics*** in tree improvement. Name four exotic tree species [*Linked Q* | P1/5 (b) | 8 M]. • Write the botanical names of three tree species each of [P1/1 (e) | 8 M]. (*i*) Non-coppicers, (*ii*) Poor coppicers, (*iii*) Good (fair) coppicers and (*iv*) Strong coppicers. • Describe the ***Seed Collection*** and ***Storage Methods*** of the following tree species [P1/2(a) | 15 M]. (*i*) *Santalum album* (*ii*) *Chukrasia tabularis* (*iii*) *Cedrus deodara* (*iv*) *Azadirachta indica* (*v*) *Dalbergia latifolia* • Calculate the ***Quantity of Seeds*** (kg) required to establish a teak plantation over an area of 10 ha. [P1/1 (b) | 8 M]. • What is ***Deforestation***? Discuss the impact of deforestation on the environment [*Linked Q* | P1/6 (c) | 15 M]. • Explain the present status, scope and constraints of ***Biofuel Production*** in India. Write the botanical names of five tree-borne oilseeds [*Linked Q* | **P2**/8 (b) | 15 M].
2022	• What is the ***Purpose of Classifying Forests***? How are the forests classified for silvicultural management? [*Linked Q* | **P2**/1 (a) | 8 M]. • How do ***Sacred Groves*** help in conservation of biodiversity? [P 1/5 (b) | 8 M]. • What is ***Precision Silviculture***? Explain the silvicultural techniques for the following [P1/3 (b) | 15 M]. (a) *Dalbergia Sissoo*, (b) *Eucalyptus tereticornis* • "Success of commercial forest plantations depends on ***Site-Specific*** and ***Strategic Planning***" Justify the statement [**P2**/1 (d) | 8 M]. • Describe the ***Adverse Climatic Factors*** causing damage to forests [**P2**/8 (b) | 15 M]. • Explain the ***Role of Mycorrhizae*** in plant growth and development of forest trees [P1/7 (b) | 10 M]. • What are ***Commensalism***, ***Amensalism***, ***Mutualism*** and ***Symbiosis***? Write the function of an ecosystem [*Linked Q* | **P2**/8 (c) | 10 M]. • What are the ***Biotic and Abiotic Stresses*** on trees? Explain the responses of trees to these

	stresses [*Linked Q* | **P2**/5 (a) | 8 M]. • Discuss the significance of ***Bamboo Flowering*** [P1/1 (e) | 8 M]. • How are ***Nurseries Classified*** in India? What is a clonal nursery? Explain the nursery technique for *Casuarina equisetifolia* [P1/3 (a) | 15 M]. • Explain the techniques for upgradation and ***Hardening of Nursery Seedlings*** of *Lagerstroemia lanceolata* [*Linked Q* | P1/1 (d) | 8 M]. • What is ***Root : Shoot Cutting***? Write the names of five tree species which are propagated by this method [P1/4 (c) | 10 M]. • Explain the following – (iv) ***Enrichment Planting*** [P1/2 (c) *iv* | 2.5 M]. • Is coastal rehabilitation using mangrove species a success? Explain the ***Plantation Technique*** for degraded mangrove forest [*Linked Q* | P1/3 (c) | 10 M]. • Differentiate between ***Thinning Cycle*** and ***Thinning Intensity***. Why is thinning essential for the management of ***Forest Stand***? Describe the merits and demerits of French thinning [P1/4 (b) | 15 M]. • Explain the ***Salvage Operations*** for plantation trees after natural disasters [*Linked Q* | **P2**/6(c) | 10 M]. • Explain the silvicultural practices that help in the ***Modification of Site Factors*** in forestry [P1/4(a) | 15 M].
2021 2021	• How are ***Forest Sites Classified*** on the basis of vegetation? [P1/4(c) | 10 M]. • What is ***Site Quality Index***? How does it differ from fractional site quality? Explain any one method used for developing site quality classes with the help of neat diagram [P**2**/3(b) | 15 M]. • Do the trees of same species have different response to ***Light Conditions*** at different ages? [P1/1(e) | 8 M]. • What is the ***Role of Forest*** plantations in carbon sequestration? [P**2**/7(c) | 10 M]. • Differentiate ***Stand Density*** and ***Canopy Density***. Mention Canopy density classification as per Forest Survey of India [*Linked Q* | P**2**/1(d) | 8 M]. • What is meant by ***Climax*** in ecological succession? Give an example and describe types of ecological succession [P**2**/5(b) | 8 M]. • What factors are considered important while ***Choosing a Species*** under ***Avenue Plantation***? [8 M] [*Linked Q* | P1/1(b) | 8 M]. • Are ***Non-Native Tree*** species an option or a threat in forest ecosystem / Plantation under climate change? [P1/1 (d) | 8 M]. • Why is ***Grading*** operation of nursery seedlings essential for successful forest plantations? [P1/3(c) | 10 M]. • What do you mean by ***Tending Operations***? Enumerate various tending operations carried out in forest crops. Discuss improvement felling [P1/3 (a) | 15 M]. • How does soil organic matter decomposition influence ***Forest Productivity***? [*Linked Q* | P1 / 5(d) | 8 M].
2020	• Define ***Silviculture***. Relate the applications of silvicultural to different branches of forestry [P1/1(a) | 8 M]. • ***Frost Resistance*** in trees depends on the internal and external factors. Explain [P1/1(b) | 8 M]. • Write the adaptive characteristics of plant species of ***Cold Desert*** [P 1/1 (d) | 8 M].

	• How does ***Slope Aspect*** impact forest stand characteristics and soil properties? [P**2**/4 (c) | 10 M]. • Describe the following terms [P1/2 (a) | 10 M]. (a) ***Dominant***, (b) ***Dominated***, (c) Crop height, (d) Top height, (e) ***Hardening*** • What are the factors that affect a ***Stand Structure***? Describe in brief the DBH distribution in even, uneven and multi-aged normal forest stands [*Linked Q* | P**2**/2 (a) | 15 M]. • What are the structural and functional changes that occur in a forest ecosystem during ***Succession***? [P**2**/7 (b) | 15 M]. • Describe the methods of ***Artificial Regeneration*** of *Tamarindus indica* [P1/1 (e) | 8 M]. • What are the different factors governing the successful ***introduction of an exotic*** tree species? [P1/6 (c) | 10 M]. • What are ***Orthodox and Recalcitrant seeds***? Give five examples for each of these categories of seeds [P1/8 (a) | 10 M]. • Write down the ***pre-sowing seed treatments*** for the following tree species [P1/3(c) | 15 M]. (a) *Tectona grandis,* (b) *Santalum album,* (c) *Dalbergia sissoo,* (d) *Albizia lebbeck,* (e) *Acacia nilotica.* • Define ***Afforestation***. Discuss in brief the afforestation techniques, including the choice of species, for ravine lands. [*Linked Q* | P1/3 (a) | 10 M]. • In India, large tracts of mixed even or uneven aged forests have been degraded due to biotic interference. Suggest the method and measures to improve their condition and composition. [*Linked Q* | P1/4 (a) | 10 M]. • What is the significance of Afforestation and Reforestration to the ecosystem? How are the National Afforestation Programmme, Green India Mission and Forest Fire Prevention and Management Scheme helping in restoration of forests? [*Linked Q* | P**1**/7 (a) | 15 M].
2019	• Describe various physiological mechanisms underlying drought resistance, drought tolerance and drought avoidance in forest species. [P**2**/Q6 (b) | 15 M]. • Draw a schematic diagram showing ***Altitudinal Zonation*** of forest vegetation [P1/4(a) | 10 M]. • Write scientific names of four major tree species in each of ***southern Tropical Semi-evergreen*** Forest and ***Northern Tropical Wet-Evergreen*** Forest [P1/1 (a) | 8 M]. • Discuss the factors which influence the ***choice between natural and artificial regeneration*** [P1/1(d) | 8 M]. • Describe how controlled ***fire*** can be used as a ***tool in forest*** management [*Linked Q* | P**2**/5(d) | 8 M]. • Explain the ***Modern Nursery Techniques*** for the production of quality planting stock [P1/1 (c) | 8 M]. • What are the different types of ***Grafting***? Explain 'Cleft Grafting' with neat sketches [P1/Q1 (e) | 8 M]. • Explain different ***Grades of Thinning***. Discuss in brief the thinning practices adopted for teak plantations [P1/4 (b) | 15 M].
2018	• Justify that the study of ***Silvics*** is essential for the successful afforestation program in India

	[P1/1 (a) | 8 M]. • Discuss the physiology of **Root Parasitism** in Sandal tree [*Linked Q* | P1/1 (e) | 8 M]. • Explain the **Eco-Physiological Factors** that are more concerned to the silviculturist [P1/Q2 (a) | 15 M]. • Write in detail about the **Influence of Parent Rock** in the distribution of tree species [8 M]. [*Linked Q* | P1/5(c) | 8 M]. • What is **Hydrology**? Describe the role of hydrology in the planning and management of watershed development. Do tree species improve the infiltration rate, soil temperature, water level, and hydrological cycle? Justify with few examples [*Linked Q* | P1/8 (a) | 10 M]. • What is **Succession** and *climax*? Give the causes of forest succession [P2/6 (c) | 10 M]. • Write in brief on the **criteria of selection** of tree for resistance to adverse environments for high-quality timber production [*Linked Q* | P1/5 (a) | 8 M]. • Write the problem and prospects of **Exotic** tree species in India with suitable examples [P1/3 (c) | 15 M]. • Explain **Seed** production and certification system in Indian forestry [*Linked Q* | P1/Q6 (c) | 10 M]. • Enlist different types of **Nurseries** and write different types of nursery beds used in a nursery [P1/4 (c) (i) | 7.5 M]. • Enlist different **types of containers** used in a forest nursery and explain different methods of seed sowing followed in a nursery [P1/4 (c) (ii) | 7.5 M]. • What is a mother tree? How is a plant prepared through **Vegetative Propagation** different from a plant raised through seed? [P1/3 (a) | 15 M]. • Explain different **Kinds of Thinning** and its application in the forest [P1/1 (b) | 8 M].
2017	• Why **Site-Specific Planning** is essential for forest management? Explain different Components of site-specific management. [*Linked Q* | P2/Q1 (a) | 8 M]. • Regulation of **Solar Radiation** given a powerful tool to the forester justify [P1/2 (d) | 10 M]. • Discuss in detail the kind of Soil **Mycorrhizae** and the benefits derived by plant from them [P1/5 (b) | 8 M]. • What is **Sub-Climax**? Explain its importance in the context of Indian forestry. [P1/4(c) | 10 M]. • Explain various types of **Succession**. Describe the major theories explaining succession [P1/8 (b) | 10 M]. • Define **Succession**. Explain different types of succession in details, citing suitable examples. Discuss various theories of succession [P2/6 (a) | 15 M]. • Enlist four groups of **Forest Types** under the moist tropical forest as per the Champion and Seth classification of forest types. [P1/1 (b) | 8 M]. • Explain the classification of *forest types* in India by Champion and Seth. Enlist major forest types and their group [P2/Q7 (c) | 10 M]. • Enlist the general rules governing the felling of bamboo in forests. What are the consequences of **Gregarious Flowering** of bamboo? What special measures would you take in the event of gregarious flowering? [*Linked Q* | P1/3 (c) | 15 M]. • Give four examples of uses of **Pollarding** in Indian forestry [P1/1 (a) | 8 M]. • Enlist the advantages and disadvantages of **Vegetative Propagation**. What future do you foresee for it in forestry? [P1/4 (d) | 10 M]. • Calculate the number of **Seeds Required** to raise a 20-hectare plantation with 4 m x 4 m spacing

	and an extra plant in the centre of each square. Plant percent of the species is 75% [P1/Q1 (e) | 8 M]. • Name the method of ***Thinning*** that best promotes genetic improvement of the regular stand besides controlling density. Give reasons in support of your answer [P1/1 (c) | 8 M]. • Describe the ***Effect of Thinning*** on volume increment [P2/2 (c) | 10 M]. • Some rural communities are opposed to ***Chir-pine*** and advocate removal of ***Chir-pine*** and its replacement with broadleaved multipurpose trees. What is your reaction to this matter? [P1/2 (c) | 10 M].
2016	• How are the forests classified in India? Discuss its significance in forest management [*Linked Q* | P2/1 (a) | 10 M]. • Comment on 'Forest has moderating influences on soil and air temperature' [P1/1 (b) | 8 M]. • Explain the role of forests in environmental conservation. [P1/7 (a) | 10 M]. • Justify the statement "Forest substantially check soil erosion and control run-off" [P1/Q1 (a) | 8 M]. • Enumerate the classification of tropical dry deciduous forests given by Champion and Seth (1964). Mention two species for each forest type [P2/6 (d) | 10 M]. • Discuss the reasons for widespread use of ***Exotics*** for plantations and specific advantages of exotics over native species [*Linked Q* | P1/Q5 (e) | 8 M]. • Provide scientific names of four potential NFTs each suitable for Tropical and Temperate conditions [*Linked Q* | P1/5 (c) | 8 M]. • Write the importance of soil organic matter in the forest. How is ***calculation of number of seedlings*** carried under Line, square, Triangular, and Quincunx methods of planting? [P1/3 (a) | 20 M]. • Write in detail the term ***Girdling*** and ***Pruning***. Write scientific names of five trees/Shrubs each for the cold desert and mangrove forest. [*Linked Q* | P1/4 (a) | 20 M]. • Describe the important ***objectives of thinning***. Differentiating crown thinning from ordinary thinning. Write grades of ordinary thinning. [P1/1 (c) | 8 M]. • Clonal forestry approach proved successful in meeting the industrial wood demand particularly pulpwood. Substantiate your view and perception in this regard [P2/4 (a) | 10 M].
2015	• How can a forest with ***Shade Bearer*** and ***Light Demander*** tree species be managed under *uniform shelterwood system*? [*Linked Q* | P1/2 (c) | 10 M]. • Comment upon the adaptive and ***Survival Strategies*** of the plant species endemic to the cold desert area of the Western Himalaya [*Linked Q* | P1/4 (c) | 10 M]. • Explain How the ***Latitude influences the forest types*** of the earth [P1/4 (a) | 10 M]. • Can you differentiate between the terms mixed plantations in forestry and mixed cropping in agriculture? Justify the differences between them. [*Linked Q* | P2/1 (a) | 8 M]. • Comment upon the ***Dieback*** (dying back) phenomenon in *Shorea robusta*. Is it a problem or an adaptation? [P1/1 (a) | 8 M]. • Describe the methods of ***Pre-sowing treatment of seeds*** for raising Nursery [P1/2 (b) | 10 M]. • Explain the term ***Hardening off***. What are the internal factors affecting forest resistance? [P1/3 (a) | 10 M].

	• Explain the necessity of ***Grading of seedlings*** before plantation [P1/4 (d) | 10 M].
2014	• Why does height of a tree consider a better criterion for a ***Site Selection*** than its diameter? Discuss [5 M]. • How is ***Site Quality*** important in timber production? Discuss the methods used to measure the site quality [Paper – **2** | 15 M]. • Explain the importance of soil and air ***Temperature*** on the growth of forest trees [10 M]. • Explain the importance of ***Snow*** in regeneration of *Cedrus deodara* [5 M]. • Explain the survival strategies of the following group of plants [20 M] - (a) ***Halophytes***, (b) ***Phraetophytes***, (c) ***Xerophytes***, (d) ***Succulent***. • Difference b/w - (1) ***Ectomycorrhizae*** and ***Endomycorrhizae*** [4 M]. (2) Exogenous ***dormancy***, and endogenous dormancy [4 M]. • Describe the characteristics and structure of an ***even-aged stand*** [Paper – **2** | 10 M]. • ***Mixed forest stand*** offers complete utilization of land, Comment [8 M]. • Give a short account on the management of ***uneven-aged forests*** [*Linked Q* | 8 M]. • What is ***Stand Density***? How spacing is used to control stand density? Discuss [Paper – **2** | 15 M]. • Discuss in detail the evolution of the *concept of* ***Plant Succession*** [20 m]. • Discuss the ***Natural Regeneration*** in Sal, give steps recommended for ensuring its successful regeneration [8 M] (A typo : in the actual paper, it is written as "Soil" instead of "Sal" as required) • Do you think that the ***Controlled Fire*** is beneficial to forest vegetation? Discuss [*Linked Q* | 10 M]. • Explain why after ***Gregarious Flowering*** bamboo always die [8 M] • Discuss in detail the objective of ***Artificial Regeneration*** [10 M]. • Explain the following – (a) ***Orthodox*** and ***Recalcitrant*** seeds [5 M]. (b) ***Elite thinning*** are often difficult to execute [5 M]. • ***Exotics*** have potential, do you agree or disagree. Justify your response [5 M]. • Comments on the statement that "***Vegetative Propagation*** is a dead end of breeding" [10 M] • What do you mean by ***Plantation Schedule***? give in detail the factors which decide the success of plantation program [10 M]
2013	• Based on objectives, what are the different ***Classifications*** of the ***Forestry***? [10 M]. • What are the main contributions of ***Dr. D. Brandis*** in Indian forestry? Enumerate the various stages of working plan. What is the role of silvicultural system in the working plans? [*Linked Q* | Paper – **2** | 8 M]. • Write critical notes on any four of the following – (i) Plants of ***Sacred Groves*** with two Examples well-known in the country [Paper – **2** | 2.5 M]. • What are the sources and nature of elements considered as ***Essential Plant Nutrients***? [10 M]. • Discuss the mechanism of ***Drought Resistance***, ***Drought Tolerance***, and ***Drought Avoidance*** in plants [Paper – **2** | 10 M]. • Write a note on 'role of ***Micro-Organism*** and ***Rhizobium*** in amelioration of forest soils [10 M]. • Configuration of the ***Land Surface*** has an impact on local climatic conditions and wind movement, which in turn have a bearing on forest." Comment [8 M]. • Willow is the life line in dry temperate region (Lahaul-Spiti) but its ***large-scale drying*** is

	causing great concern. Give your viewpoints [Paper – **2** | 8 M]. • Explain the evolution of the concept of ***Plant Succession*** [8 M]. • Describe the different theories of ***Climax***. Name different types of climax (plant community) that are observed [Paper – **2** | 8 M]. • Describe flora and distribution of group: ***Type 14/C₂*** East Himalayan sub-alpine birch fir forests [Paper – **2** | 10 M]. • Large-scale ***Mortality*** has been noticed in *Dalbergia sissoo* and *Acacia nilotica.* What could be the possible reasons for this mortality? [10 M]. • Explain various factors affecting the choice between ***Artificial*** and ***Natural*** regeneration with reasoning [10 M]. • Enumerate the factors which decide the ***Choice of Species*** for plantation [8 M]. • Write about species diversity and ***Centre of Origin*** of Willows (Salix species). Describe its various uses under short rotation forestry [Paper – **2** | 8 M]. • Elaborate upon the multipurpose tree species ideotype selection criteria [*Linked Q* | P**1** | 8 M]. • Describe the operational use of ***Vegetative Propagation*** in tree improvement [10 M]. • Explain the role of ***Thinning*** in forestry. What are the different methods of thinning followed in regular crops? Discuss in detail crown thinning [20 M]. • What are the traditional practices and recent advances in tropical silvicultural research? [10 M].
2012	• Comment critically on the following (Each in about 75 Words) :– (a) Failure of forest plantations [5 M]. (b) Recycling of nutrients in Natural Forest [5 M]. (c) Successful regeneration in a forest depends upon silvicultural system [*Linked Q* | 5 M]. (d) Basis of *forest classification* and why there is a need for such classification [5 M]. (e) How *snow* affects the forest vegetation? [5 M] (f) Importance of ***Plant Succession*** in Forestry practices [5 M]. (g) Reasons of *dying Dalbergia sissoo* [5 M]. • Discuss in detail the ***Protective Role*** of national forests in India [10 M]. • Describe the altitudinal variations in flora of ***Eastern*** and ***Western Himalayas*** through a schematic diagram [Paper – **2** | 10 M]. • Differentiate between – (1) Growth and development of trees, (2) ***Ectomycorhizae*** and ***Endomycorrizae*** [5 × 2 = 10 M]. • Explain with the help of suitable examples the various kinds of Population Interactions during their growth period and give difference between ***Commensalism*** and ***Amensalism*** of plant relationship [*Linked Q : Forest Ecology* | Paper – **2** | 10 M]. • Discuss the ***Role of Forest*** in interception, surface runoff, Infiltration of rainfall, regulation of stem flow, and maintaining Soil fertility [5 M]. • Do forests influence the rainfall? If so, how? [75 Words | 5 M]. • Briefly discuss the - ***Canopy Architecture*** in forestry [5 M]. • List the ***pioneer's flora*** of sand dunes under – (i) on dunes, (ii) Spread out sand, and (iii) Stabilized dunes [*Linked Q* | Paper – **2** | 8 M]. • Describe flora and distribution of Group : **16 C₁** of Champion & Seth's Forest Type [Paper – **2** | 8M] • ***Gregarious Flowering*** is an indicator of drought in the area.' Do you agree with this statement? [4 M].

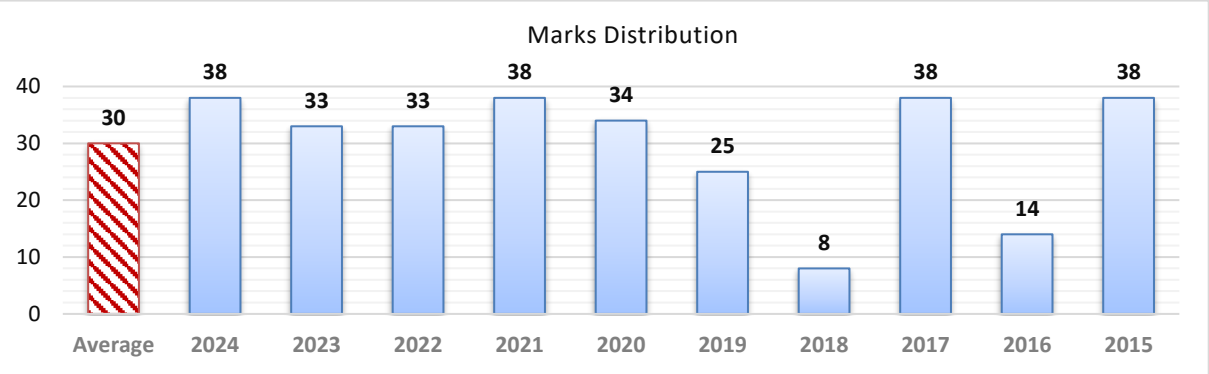
	• Differentiate clearly between ***Natural*** and ***Artificial Regeneration*** of forest. Describe the manner in which natural regeneration of Teak, Sal and Deodars takes places [4+4+4+4 = 16 M]. • What are the ecological aspects for Selecting the tree species? Discuss [8 M]. • Write Short notes on – ***Exotics*** in Indian Forestry [5 M]. • Highlight the salient features of – (1) ***Aerial Seeding*** (2) ***Stump Planting*** [2 × 3 = 6 M]. • What are the major ecological consideration in ***Afforestation*** [75 Words | 5 M].
2011	• Give ***Legal Definition of Forests*** in India. Write about the major groups of forest types of India. [Paper – **2** | 10 M]. • Describe the tangible and intangible ***Benefits of Forests*** [Paper – **2** | 10 M]. • Write Short Notes on – (ii) ***Sacred Groves*** [2 ¼ M] • Why are ***Locality Factors*** considered important for any silvicultural operation? [10 M]. • Explain "***Adiabatic Lapse Rate***" [Paper – **2** | 10 M]. • Define ***Micro-Climate*** giving suitable examples [Paper – **2** | 10 M]. • Differentiate between ***Ectomycorrhizae*** and ***Endomycorrhizae*** with respect to structure and function [Paper – **2** | 10 M]. • Compare ***Nutrient Cycling*** in a natural forest, an agroforestry system and an agricultural field. Discuss how it helps to sustain soil fertility. [*Linked Q* | 10 M]. • Describe the initial causes of ***Secondary Succession***. Write various seral stages of succession leading to the development of *Shorea robusta* forests [Paper – **2** | 10 M]. • Define a ***Forest Type***. Discuss the different forest types found along with tidal swamp forests with their species composition. Give a note on how *Rhizophora racemosa* is managed in the mangrove forest of Sundarbans. [*Linked Q* | 3 + 12 + 5 = 20 M]. • Explain the ***Role of Fire*** in the silviculture of *Shorea robusta* [10 M]. • Differentiate between [5 × 2 = 10 M]. (a) Exogenous ***Dormancy*** and endogenous dormancy (b) Artificial regeneration and Natural ***Regeneration*** • Explain the following points in relation to ***Nursery Management*** – (1) Site selection and layout, (2) Soil working, (3) Methods of raising nursery stock, (4) Plant protection measures, (5) ***Nursery Register***. [4 × 5 = 20 M]. • How do we calculate the ***Seed Requirement*** *of a species* while raising nursery? Also explain the method of calculating the number of plants required per hectare for plantation [10 M]. • Write Short notes on – (i) _____, (ii) ***Cultural Operations*** [P1/3 (b)*ii* | 5 M].
2010	• Why do forest ***Plantations Fail***? cite relevant examples. [P1/1(a) | 5 M]. • What are the different ***Types of Containers*** used in raising forest nurseries? List their advantages and disadvantages [P1/1(c) | 5 M]. • Explain the role of ***Growth Regulators*** in rooting of cuttings [P1/1(e) | 5 M]. • Briefly discuss ***Low-Temperature Injuries*** in forest trees [P1/1 (g) | 5 M]. • Briefly describe the merits and demerits of '***High Density Short Rotation***' forestry. Enlist suitable species in this regard along with their productivity potential [P1/2 (a) | 10 M]. • What do you understand by the term ***Locality Factors***? How these affect the decision of plantations undertaken by the silviculturist? [P1/2 (b) | 10 M]. • Why is ***LAI*** important in deciding the productivity of forest trees? Explain the concept of

	optimum LAI and how it varies with the type of forest and climate [P1/Q2 (c) | 10 M]. • Differentiate between the – (ii) Photosynthetic efficiency and Nutrient use efficiency (iii) ***Site Quality*** and ***Site Index***, (v) ***Gregarious Flowering*** and sporadic flowering in bamboo. [P1/3 (a) | 4× 3 = 12 M]. • Comment on following – (a) ***Pure stand*** of forest result incomplete utilization of the site, (b) Plantation forestry has high production potential but low conservation value [5 × 2 = 10 M]. • Distinguish between "***Tending operations***" and "***Cultural operations***" in forestry [10 M] • Write short notes on – (a) ***Canopy architecture***, (b) Radiation absorption and energy balance in forest, (c) ***Seed coating*** and pelleting, (d) ***Nutrient cycling*** in natural forest [5 × 4 = 20 M]. • Write on tree species for smoke and dust pollution control. [*Linked Q* | P1/7 (c) (i) | 5 M]. • Mention 10 species (Scientific name) of trees tolerant to salinity [*Linked Q* | 10 M]. • What morphological, Anatomical, and physiological features are suited in ***Xerophytic Plants***. [P**2**/Q6 (a) | 10 M]. • What are ***Live Fences***? Name five plant species most commonly used as live fences. How do these differ from other types of fences? [P**2**/Q6 (c) | 10 M]. • How are ***Ectomycorrhizal*** fungi beneficial in managing soil borne diseases of forest nurseries? Give examples. [P**2**/Q7 (a) | 10 M]. • How do variation in density and quality of a forest influence annual yield estimation? [*Linked Q* | P**2**/1 (d) | 8 M]. • Illustrate the succession of mangrove vegetation in sea coast [P**2**/5 (e) | 8 M].

CHAPTER 2

MANGROVES & COLD DESERT

Mangrove : ◈ Habitat and characteristics of mangrove ◈ Plantation – establishment, and rehabilitation of degraded mangrove formations. ◈ Silvicultural systems for mangrove; ◈ Protection of habitats against natural disasters. ***Cold Desert*** – Characteristics, identification and management of species.



2024	• Briefly summarize the ***Characteristic Features*** of cold arid forest vegetation. Discuss their mechanism of survival under extreme cold temperatures [P1/1(b) | 8 M]. • Write in brief on the current scenario of the growth pattern of cold desert areas in India. Describe in detail, the ***Causes of Desertification in cold areas***. Suggest suitable restoration plan [P1/2(b) | 15 M]. • What is the ***Status of Mangrove Forests*** in India? How are they associated with the sustainability of coastal areas? Enumerate the list of challenges faced by mangroves [P1/4 (a) | 15 M].
2023	• What are mangroves? Write their ecological implications [P1/1(c) | 8 M]. • What are the sequences of operations followed in mangrove afforestation? Discuss in detail the ***Fishbone Technique*** of mangrove plantation [P1/3(b) | 10 M]. • What is a cold desert? Describe the ***Distribution Pattern*** of cold desert species in India. How are cold desert areas afforested? [P1/4(a) | 15 M].
2022	• What are the ***Major Threats*** to mangrove forests? [P1/1(b) | 8 M]. • Describe the ***Characteristics of Cold Desert***. How does choice of species play an important role in cold desert afforestation programme? How are cold desert areas afforested? [P1/2(b) | 15 M]. • Is coastal ***Rehabilitation*** using mangrove species a success? Explain the plantation technique for degraded mangrove forest [P1/3(c) | 10 M].

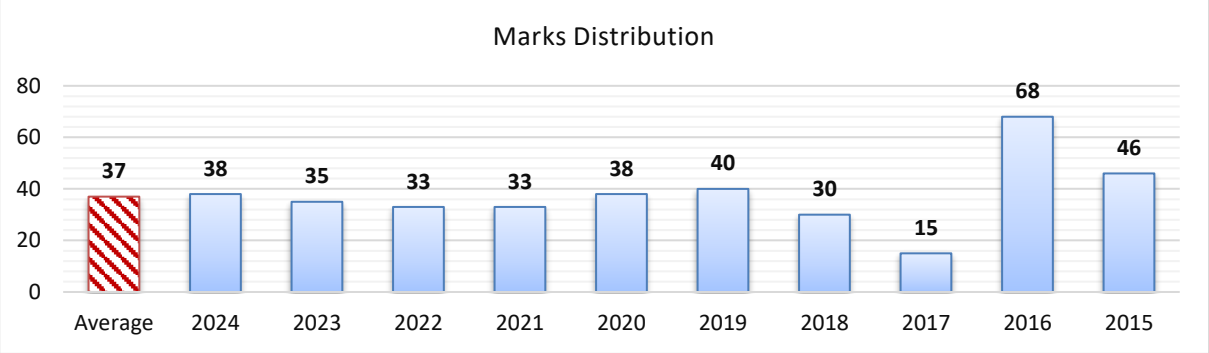
2021	• Why is it difficult to carryout ***Afforestation Programmes*** in cold deserts? [P1/1(a) | 8 M]. • What is the ***Ecological Significance*** of cold deserts? How do plants adapt and survive under cold and harsh desert conditions? Provide a list of common native species of a cold desert [P1/2(a) | 15 M]. • What are the ***Characteristics and Significance*** of mangrove forests ? Discuss important species formation in mangrove forests [P1/3(b) | 15 M].
2020	• Write the adaptive ***Characteristics*** of plant species of cold desert [*Linked* Q | P1/1(d) | 8 M]. • Describe the ***Reforestation Techniques*** of mangrove forests. Explain the following mangrove habitats : (i) Deltaic mangrove habitat, (ii) Coastal mangrove habitat [P1/2(b) | 15 M]. • Describe the various causes of ***Degradation*** of mangrove forests. Discuss the factors responsible for mangrove species regeneration and growth. Write the scientific names of five woody shrubs/tree species of cold desert [P1/4(c) | 15 M].
2019	• What are the ***Major Causes of Degradation*** of mangrove forest? Discuss in brief the methods of rehabilitation of degraded mangroves. [P1/3(c) | 15 M]. • What are the ***Characteristic Features*** of cold deserts of the Himalayas? Write the scientific names of *any 5 tree species* of cold desert. [P1/2(b) | 10 M].
2018	• Define the ***Characteristics*** of mangrove forest [P1/1(d) | 8 M].
2017	• Describe the unique ***Characteristics*** of mangrove forest vegetation. [P1/4(a) | 10 M]. • Enlist ***6 Genera of Mangroves***. Name 2 state and 1 UT with the large area under mangrove forest. [P1/1(d) | 8 M]. • Where are cold desert found in India? explain ***Site Characteristics*** of cold desert and stem suggested to overcome problems in their afforestation. [P1/3(a) | 10 M]. • A soil can be wet, yet ***Physiologically Dry***. How? What steps are suggested to correct the problem? [P1/3(a) | 10 M].
2016	• Write in details the term Girdling and Pruning. Write the ***Scientific name of 5 trees / shrubs*** each for the cold desert and mangrove forest. [*Linked Q* | P1/4 (a) | 20 M]. • Write the ***Characteristics*** of cold desert. Discuss soil working and planting techniques for cold desert. [*Linked Q* | P1/1(d) | 8 M].
2015	• Discuss the ***Sustainable Management*** of mangrove forest in India [P1/1(e) | 8 M]. • How is the accrual of ***Tangible*** *and* ***Intangible*** benefits of mangroves forest being affected by their degradation? [P1/2(d) | 10 M]. • Give the scientific name of – (a) 5 species of mangrove forest, (b) Five tree/Shrub species of the cold desert [P1/3(c) | 10 M]. • Comment upon the adaptation and ***Survival Strategies*** of the plant species endemic to the cold desert area of the western Himalaya. [P1/4(c) | 10 M].
2014	• Discuss the ***Characteristics*** of mangrove forest with examples [P1/5(e) | 8 M].

	• Describe the following – (a) ……, (b) ***Fish Bone Technique*** [P1/6(b) | 2.5 M]. • Discuss the importance of ***Willow Cultivation*** in cold desert [P1/5(c) | 8 M].
2013	• Explain the following mangrove habitat [P1/1(d) | 8 M]. (a) Deltaic mangrove habitat (b) Coastal mangrove habit (both east & west) • Write about the species diversity and centre of origin of Willows (*Salix* species). Describe its various uses under short rotation forestry. [P1/5 (c) | 8 M]. • ***Willow*** is the life line in dry temperate region (Lahul-Spiti) but its large-scale drying is causing great concern. Give your viewpoints. [**P2**/8(c) | 8 M].
2012	• How are the mangrove forest managed in India? [P1/1 (c) | 5 M].
2011	• Suggest measures to ***Rehabilitate*** degraded mangroves forest. [P1/1 (c) | 10 M]. • Define a forest types, Discuss the different ***Forest Types*** found along tidal swamp forest with their species composition. Give a note on how *rhizophora racemosa* in mangroves is managed in mangrove forest of Sundarbans. [P1/3 (a) | 3+12+5 = 20 M].
2010	• Comment on - Mangrove ecosystems have ***Physiologically Dry*** soil [P1/4 (a) *ii*| 5 M]. • Give the ***Zonation of Land-Sea*** interface in a typical mangrove eco-system with its characteristics [P1/1 (d) | 5 M]. • How and why should cold desert forest ecosystem be conserved? [**P2**/7(c) | 10 M].

CHAPTER 3

SILVICULTURE SYSTEMS

Silviculture Systems : ◈ ***Clear feeling***, ***Uniform*** shelter wood, ***Selection***, ***Coppice*** and ***Conversion*** systems. ◈ ***Management of silviculture systems*** of temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to plantation silviculture, choice of species, establishment and management of standards, enrichment methods, technical constraints, intensive mechanized methods, aerial seeding, and thinning.



2024	• What is ***Conversion*** in silvicultural systems? Explain with two examples [P1/1(e) | 8 M]. • Describe the following [P 1/2(a) | 15 M]. (*i*) Regeneration felling (*ii*) Felling Series (*iii*) Seedling Felling (*iv*) Secondary Felling (*v*) Felling Cycle • Give a detailed account of ***Indian Irregular Shelterwood System*** and its applications [P1/3(b) | 15 M].
2023	• What are ***Accessory Systems***? Describe the two-storeyed high forest system [P1/2(c) | 10 M]. • Who developed the ***Andaman Canopy Lifting Shelterwood System***? Describe the different operations being followed in the system. [P1/3(c) | 15 M]. • What is ***Clear Felling System***? Describe the pattern of felling and methods of obtaining regeneration under clear felling system. [P1/4(b) | 10 M].
2022	• ***Improvement Felling*** is not considered as a silvicultural system. Why? [P1/1(a) | 8 M]. • Differentiate between ***Coppice with Standards*** and ***Coppice with Reserves***. Explain in detail the coppice with two rotations and pollard system [P1/2(a) | 15 M]. • Explain the following – (a) Selection felling, (b) Regeneration felling, (c) Selective felling, (d) Enrichment planting [P1/2(c) | 10 M].

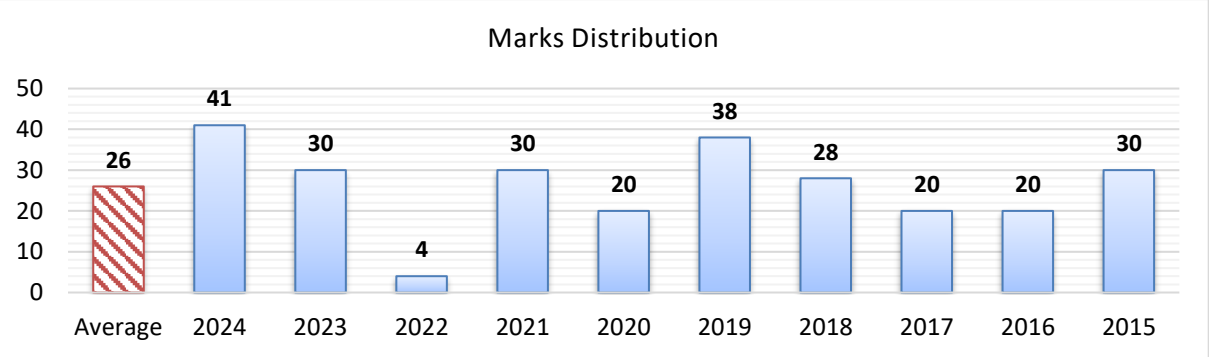
2021	• 'An appropriate silviculture system promotes better regeneration of forest stand' Comment. [P1/1(c) | 8 M]. • Elucidate the pattern of felling and mode of regeneration adopted under ***Selection System*** of management [P1/2(c) | 10 M]. • What are the conditions on which the ***Choice of a Particular Silvicultural System*** to be adopted for specific species in any locality depends? [P1/4(a) | 15 M].
2020	• Explaining the factors which affect the ***Length of Regeneration Period*** in a periodic block [P1/1(c) | 8 M]. • Define ***Coppice With Standard*** system. What are the advantages and disadvantages? Differentiate it from ***Coppice with Two Rotation System***. [P1/3(b) | 15 M]. • Enumerate the objectives of ***Management of Canal Plantations***. Explain the silviculture system to manage them. [P1/4(b) | 15 M].
2019	• Write the special characteristics of ***Indian Irregular Shelterwood System*** and differentiate it from Uniform System. [P1/2(a) | 15 M]. • "Felling height and felling intensity play a major role in the advantages sustainability of clumps of bamboo species" Comment. [P1/3(a) | 10 M]. • Explain the ***Alternative Strip System*** and the clear strip system. Write the advantages and disadvantages of clear-felling system. [P1/3(b) | 15 M].
2018	• Enlist the ***Classification of Silvicultural Systems*** on the basis of mode of regeneration and pattern of felling. [P1/2(b) | 15 M]. • What is ***Conversion***? Discuss the need of conversion of one silvicultural system to another [P1/4(a) | 15 M].
2017	• Enlist the general rules governing the ***Felling of Bamboo*** in forests. What are the consequences of gregarious flowering of bamboo? What special measures would you take in the event of gregarious flowering? [P1/3(c) | 15 M].
2016	• Define ***Clear Felling System***. How is Saransa sal (*Shorea robusta*) forest managed under clear felling followed by natural regeneration? [P1 / 1(e) | 8 M]. • Describe the silvicultural system which may be introduced to manage a plantation forest of *Azadirachta indica* [P1 / 2(a) | 20 M]. • Discuss in brief the ***Simple Coppice System***. Write different types of Coppice System [20 M]. • Describe kinds and pattern of fellings followed in ***Shelterwood Uniform System***. Explain Uniform System which is followed to manage (*Pinus roxburghii*) forests of Himachal Pradesh [P1/3(b) | 20 M].
2015	• Describe the major factors which affect the ***Length of the Regeneration*** period in a Periodic Block [P1/1(b) | 8 M]. • Comment upon the variations practised in the silvicultural system of *Shorea robusta* in the States of UP, Bihar, Odisha and West Bengal [P1/1(c) | 8 M]. • How can a forest with shade bearer and light demander tree species be managed under

	Uniform Shelterwood System? [*Linked Q* | P1/2(c) | 10 M]. • Describe the silvicultural system which is introduced to manage *Shorea robusta* forest after the failure of Uniform System [P1/3(b) | 10 M]. • How is *Tectona grandis* forest managed under ***Clear Felling followed by Artificial Regeneration***? [P1/4(b) | 10 M].
2014	• Discuss the ***Uniform System*** with artificial regeneration [P1/3(c) | 10 M]. • Explain the forest conversion process of ***Coppice System to Uniform*** broad-leaved high forest by natural regeneration [P1/6(a) | 20 M]. • Discuss ***Two Stories High Forest*** and explain its advantages [P1/7(b) | 10 M].
2013	• Explain the factors which affect the ***Length of Regeneration Period*** in a Periodic Block. What is the effect of regeneration period on the form of crop? [P1/1(e) | 8 M]. • How is allotment of areas made in Permanent and Floating ***Periodic Blocks***? [P1/3(a) | 10 M]. • Describe the method followed to introduce the ***Uniform Shelterwood System*** in a forest where *Cedrus deodara* is mixed with *Pinus wallichiana* [P1/3(b) | 10 M]. • Write about the impact of ***Felling Height*** and ***Felling Intensity*** on the sustainability of bamboo's clump [P1/3(c) | 10 M].
2012	• Successful regeneration in a forest depends upon silvicultural. System [P1/1(d) | 5 M]. • How will you classify a silvicultural system? Discuss important features of ***Uniform System*** with 'reference to *Pinus roxburghii* and give its merits and demerits [P1/2(a) | 4+8+4 = 16 M]. • briefly describe the ***Clear-Felling Silvicultural System*** with particular reference to – (a) Nature of crop produced, (b) Felling system, (c) Tending, (d) Regeneration, (e) Advantages and disadvantages [P1/4(b) | 10 M].
2011	• Define forest ***Conversion***. Explain the adverse situations under which conversion is advisable. Write in brief the general techniques of forest conversion [P1/2(a) | 2+4+4 = 10 M]. • Briefly describe the selection system with particular reference to the following - (i) Character of crop produced, (ii) Felling cycle, (iii) Tending, (iv) Regeneration, (v) Advantages and disadvantages [P1/2(c) | 2 × 5 = 10 M].
2010	• Briefly discuss a silvicultural system in which equal or equi-productive areas of mature crops are successfully felled [P1/1(b) | 5 M]. • Successful regeneration in a forest stand depends upon judicious choice of a silviculture system. Comment [P1/2(d) | 10 M]. • Comment upon, "***Conversion***" is an accepted silvicultural system [P1/4(a) *iv*| 5 M].

CHAPTER 4

IMPORTANT INDIAN TREE SPECIES

Silviculture of Trees : ◈ Traditional and recent advances in tropical silvicultural research and practices. ◈ Silviculture of some of the economically important species in India such as **A**cacia *catechu*, *Acacia nilotica*, *Acacia auriculiformis*, *Albizzia lebbek*, *Albizzia procera*, *Anthocephalus Cadamba*, *Anogeissus latifolia*, *Azadirachta indica*, **B**amboo *spp.*, *Butea monosperma*, **C**assia *siamea*, *Casuarina equisetifolia*, *Cedrus deodara*, *Chukrasia tabularis*, **D**albergia *sissoo*, *Dipterocarpus* spp., **E**mblica *officinalis*, *Eucalyptus spp.*, **G**melina *Arborea*, **H**ardwickia *binata*, **L**agerstroemia *Lanceolata*, **P**inus *roxburghii*, *Populus spp.*, *Pterocarpus marsupium*, *Prosopis juliflora*, **S**antalum *album*, *Semecarpus anacardium*, *Shorea robusta*, *Salmalia malabaricum*, **T**ectona *grandis*, *Terminalia tomemtosa*, *Tamarindus indica*.



2024	• Elucidate the phenology, silvicultural characters and artificial regeneration of ***Bamboos*** [P1/1(a) | 8 M]. • Write in detail the distribution and importance of ***Prosopis juliflora*** and ***Emblica officinalis*** [P1/1(d) | 8 M]. • Write the economic importance of the following tree species [P1/3(a) | 15 M]. (*i*) ***Salmalia malabarica*** (*ii*) ***Acacia nilotica*** (*iii*) ***Largerstroemia lanceolata*** (*iv*) ***Pterocarpus marsupium*** (*v*) ***Chukrasia tabularis*** • Discuss the distribution and regeneration of ***Cedrus deodara*** and ***Pinus roxburghii*** [P1/4(c) | 10 M].
2023	• The shoot portion of seedlings of some tree species like *Sal* and ***Sandal***, under natural regeneration, keeps on drying year after year but the roots remain alive. Discuss [*Linked Q* | P1/1(a) | 8 M]. • Write the factors which affect the natural regeneration of ***Sal (Shorea robusta)***. Discuss the procedure to obtain natural regeneration of moist Sal forests [*Linked Q* | P1/2(b) | 15 M].

	• Write the economic importance of the following tree species [P1/3(a) | 15 M]. (*i*) ***Acacia catechu*** (*ii*) ***Casuarina equisetifolia*** (*iii*) ***Hardwickia binate*** (*iv*) ***Butea monosperma*** (*v*) ***Tamarindus indica***
2022	• Explain the techniques for the upgradation and hardening of nursery seedlings of ***Lagerstroemia lanceolata*** [*Linked Q* | P1/1(d) | 8 M].
2021	• Discuss the phenology, Silvicultural characters and regeneration methods of – (i) ***Gmelina arborea***, (b) ***Pinus roxburghii***. [P1/2(b) | 15 M]. • Elucidate the distribution, Nursery techniques and economic importance of – (i) ***Cedrus deodara***, (ii) ***Acacia catechu***, (iii) ***Casuarina equisetifolia***. [P1/4(b) | 15 M].
2020	• Describe the methods of artificial regeneration of ***Tamarindus indica*** [*Linked Q* | P1/1(e) | 8 M]. • Give a brief account of the silvicultural characters and regeneration methods for the following species - (a) ***Acacia catechu***, (b) ***Populus deltoides*** [P1/2(c) | 15 M].
2019	• Write a brief account of the phenology, silvicultural characters and methods of regeneration of ***Dalbergia sissoo*** [P1/1(a) | 8 M]. • Discuss in details silviculture of ***Albizzia lebbeck*** [P1/2(c) | 15 M]. • Give a brief account of origin and natural distribution of the following - (a) ***Adina cordifolia***, (b) ***Cedrus deodara*** and (c) ***Santalum album*** [P1/4(c) | 15 M].
2018	• Discuss the physiology of *root parasitism* in **Sandal Tree** (8M). [P1/1(e) | 8 M]. • Write the *phenology* of the following (5M) – (a) ***Tectona grandis***, (b) ***Melia dubia***, (c) ***Shorea robusta***, (d) ***Cedrus deodara*** [P1/3(b)*i* | 5 M]. • Can climate-change change the period of phenology? Share with examples [P1/3(b)*ii* | 5 M]. • Give the *silvicultural characteristics* and *economic importance* of the following [P1/4(b) | 10 M]. **(a)** ***Azadirachta indica*** **(b)** ***Acacia catechu***
2017	• Describe the natural distribution of – (*i*) ***Shorea robusta***, (*ii*) ***Azadirachta indica*** [P1/2(a) | 10 M]. • Write silvicultural characters of – (*i*) ***Casuarina equisetifolia***, (*ii*) ***Abies pindrow*** [P1/2(b) | 10 M].
2016	• Describe in brief the distribution, phenology, silvicultural characteristics, artificial regeneration and uses of the following species - (a) ***Techtona grandis*** (2) ***Santalum albus*** [P1/4(b) | 20 M].
2015	• Explain how the knowledge about the silvicultural characteristics of a tree enables us to manage the species in a better way [P1/1(d) | 10 M]. • Describe in brief the phenology, silvicultural characteristics and artificial regeneration of the following tree species – [P1/2(b) | 10 M]. (a) ***Pinus roxburghii***, (b) ***Cedrus deodara***, (c) ***Albizia lebbeck*** • Briefly Describe the silviculture characters and natural regeneration of the following – (a)

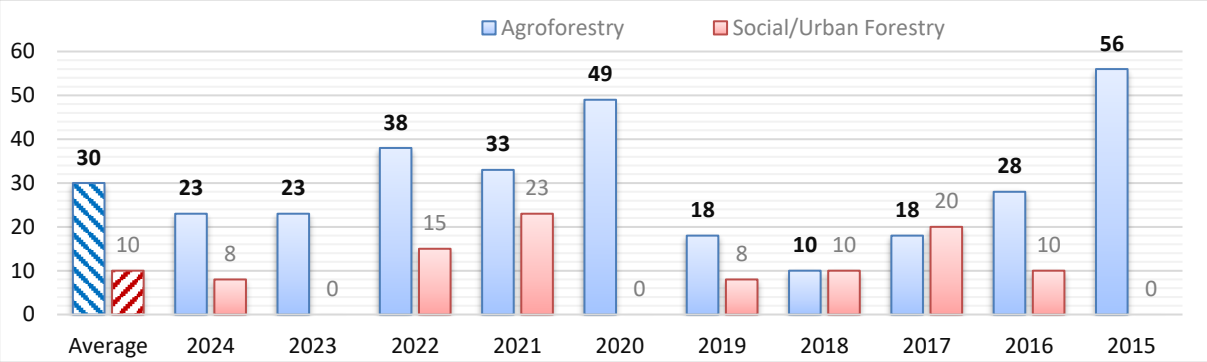
	Dendrocalamus hamiltonii, (b) ***Acacia auriculiformis***, (c) ***Dalbergia sissoo*** [P1/3(d) | 10 M].
2013	• Write critical notes on – (ii) Importance of ***Butea monosperma*** [**P2**/8(b) ii | 2.5 M].
2012	• Give *distribution*, *phenology*, *method of regeneration* and brief silvicultural management of two tree species belonging to each family below - (a) *Melieceae* (b) *Papilionaceae*, grown in India [P1/2(b) | 4 x 4 = 16 M]. • Discuss in brief the *silviculture* of the following species - (a) ***Shorea robusta*** (b) ***Bamboo species*** [P1/4(c) | 2 x 4 = 8 M]. • Describe the economic importance of ***Acacia nilotica***, ***Terminalia belerica***, ***Vitex negundo*** and ***Madhuca latifolia*** in detail [P1/7(d) | 10 M].
2011	• Describe the silvics of ***Tectona grandis*** under the following heads [P1/4(a) | 5 x 4 = 20 M]. (a) Distribution and morphology, (b) Silvicultural characters, (c) Silvicultural system and management, (d) Utilization. • Describe the silvics of ***Casuarina equisetifolia*** under the following heads [P1/4(b) | 5x4 = 20 M]. (a) Ecology and distribution, (b) Propagation and management, (c) Functional uses, (d) Pests and disease.
2010	• "Indian Sandalwood (***Santalum album***) is the most valuable wood in India. However, silvicultural production of this species is not satisfactory." Discuss the above in relation to the phenology of Santalum album and the forest laws governing its cultivation and trade [P1/3(b) | 20 M]. • Give climatic requirement, rotation age, spacing, tending operations and yield of the following forest species – (a) ***Populus deltoides***, (b) ***Casuarina equisetifolia*** [P1/4(b) | 10 M].

CHAPTER 5

AGRO-FORESTRY, SOCIAL & URBAN FORESTRY

Agroforestry : ◈ ***Scope and necessity***; role in the life of people and domestic animals and in integrated land use, planning especially related to (i) soil and water conservation; (ii) water recharge; (iii) nutrient availability to crops; (iv) nature and eco-system preservation including ecological balances through pest-predator relationships and (v) Providing opportunities for enhancing biodiversity, medicinal and other flora and fauna. ◈ ***Agroforestry systems*** under different Agro-ecological zones; Selection of species and role of multipurpose trees and Non-Timber Forest Products (NTFPs), techniques, food, fodder and fuel security. ◈ ***Research and Extension*** needs.

Social / Urban Forestry - Objectives, scope and necessity; People's participation.



AGROFORESTRY

2024	• How is ***Shifting Cultivation*** related with tribal society? Is it a good practice or bad, under present situation? Justify your claim [P1/5(c) | 8 M]. • What is agroforestry? Elucidate the scope, importance and ***Role of Agroforestry*** in climate amelioration [P1/7(a) | 15 M].
2023	• Explain the ***Role*** of ***Windbreaks*** and ***Shelterbelts*** in Agroforestry. Name two tree species for each [P1/5(a) | 8 M]. • Discuss the role of Agroforestry in the well-being of mankind. [P1/6(a) | 15 M].
2022	• How does agroforestry help to achieve the *United Nations*' ***Sustainable Development Goals***? [P1/5 (a) | 8 M]. • What are the differences between ***Traditional Agroforestry*** and ***Ethno-Agroforestry***? Explain in brief, below-ground and above-ground, tree-crop interactions in agroforestry systems [P1/6(a) | 20 M]. • What are the constraints in the ***Value Chain*** under ***Industrial Agroforestry***? [P1/6(b) | 10 M].

2021	• How do agroforestry wood perennials protect the understorey crops? [P1/5(e) | 8 M]. • How does agroforestry promote the ***Sustainable Livelihood*** of marginal farmers? [P1/6(c) | 10 M]. • How does ***Crop Rotation*** and mixed farming improve soil productivity? [P1/8(b) | 15 M].
2020	• "Agroforestry system ***Conserves Soil*** *and* ***Moisture***" Justify the statement [P1/5(b) | 8 M]. • Write the ***Tangible*** *and* ***Intangible Benefits*** of agroforestry. [P1/5(d) | 8 M]. • "***Taungya Cultivation*** is a type of traditional agroforestry system" Justify the statement. [P1/6(b) | 15 M]. • Write the scientific names of any five multipurpose tree species suitable for agroforestry system in (i) Arid and semi-arid and (ii) Sub-tropical Hills of India. [P1/7(c) | 10 M]. • How does ***Shifting Cultivation*** support community livelihood and biodiversity conservation? [**P2**/5(a) | 8 M].
2019	• Agroforestry is a better land-use system for ***Climate Change Mitigation*** and adaptability. Justify. [P1/5(a) | 8 M]. • What are ***Multipurpose Tree Species*** (MPTs)? explain their role in social forestry [P1/7(c) | 10 M].
2018	• Write about the ***Diagnostic*** and ***Design Survey*** of agroforestry. Can it help the farmers in the integration of tree with crops to enhance the crop productivity in agroforestry system? Justify. [P1/6(a) | 10 M].
2017	• Discuss the impact of agroforestry practices on the environment in general and on soil properties in particular, with a suitable example. [P1/5(e) | 8 M]. • Differentiate between ***Windbreaks*** and ***Shelterbelts***. Discuss in brief, their impact on the environment [P1/7(c) | 10 M].
2016	• Discuss the role of agroforestry in nutrient cycling and soil conservation. How is saline soil reclaimed? [P1/7(c) | 20 M]. • Provide scientific names of four potential **NFTs** each suitable for Tropical and Temperate conditions [P1/5(c) | 8 M].
2015	• Discuss the needs and scope of agro-forestry for the benefits of people [P1/5(a) | 8 M]. • Elaborate upon the social ***Objectives*** of agroforestry [P1/5(e) | 8 M]. • Discuss why ***Land-Use System*** is often more appreciated in agroforestry than in pure agriculture [P1/6(a) | 10 M]. • The adoption of agroforestry practices by the farming community is the result of increasing human and cattle populations. Discuss [P1/7(a) | 10 M]. • Outline the role of ***Tree Architecture*** in agroforestry [P1/8(b) | 10 M]. • Can you differentiate between the terms mixed plantations in forestry and mixed cropping in agriculture? Justify the differences between them [**P2**/1(a) | 10 M].
2014	• Describe the ***Benefits*** and ***Constraints*** of agroforestry [P1/1(d) | 8 M]. • Why are agroforestry systems becoming ***Popular in Himalayan Tarai*** regions, Western plains and Southern parts of India? Discuss your answer with reasons and tree-crop combinations

	adopted in these regions and parts of the country [P1/8(b) | 20 M].
2013	• What are the unique requirements for tree improvement in agroforestry? [P1/5(a) | 8 M]. • Elaborate upon the multipurpose tree species ideotype selection criteria [P1/5(c) | 8 M]. • Describe tree-crop ***Allelopathy*** in agroforestry [P1/5(e) | 8 M]. • What are the fundamental bases of ***Classification*** of agroforestry systems? [P1/7(b) | 10 M].
2012	• Differentiate between the – (i) Agroforestry and Silviculture [P1/3(a) i | 5 M]. • How ***Shelterbelt*** and ***Windbreaks*** are helpful in sand dune stabilization and desert control? [P1/5(a) | 5 M]. • Describe the extent, method of cultivation and effects of ***Shifting Cultivation***. Suggest some suitable alternatives to shifting cultivation [P1/5(d) | 5 M]. • What do you know about recent progress in Agroforestry ***Research*** and development in our country for sustainable development? [P1/5(g) | 5 M]. • what is ***D & D*** ? Who can make use of D & D and How? [P1/7(a) | 10 M].
2011	• While selecting the species for agroforestry, the below-ground and above ground interaction between the component species need to be considered. Discuss [P1/5(a) | 10 M]. • Write short notes on – (i) ***Aquaforestry***, (iii) Water Use efficiency, (iv) ***Home Gardens*** [P1/6(a) | 2 ½ × 3 = 7.5 M]. • Explain the various components of a ***Hydrological Model*** for an agroforestry system [P1/6(b) | 10 M]. • Compare ***Nutrient Cycling*** in a natural forest, an agroforestry system and an agriculture field. Discuss how it helps to sustain soil fertility [*Linked Q* | P1/7(a) | 10 M].
2010	• *Acacia Catechu* and *Prosopis juliflora* have emerged as important species for marginal lands. Discuss briefly [P1/1(h) | 5 M]. • Differentiate between the following – (i) ***Shelter Belts*** and ***Wind Breaks*** [P1/3(a) | 4 M]. • What is integrated land use management? Give a plan of integrated land use management for 10 ha. of land in tropics and sub-tropics parts of India [P1/6(b)ii | 10 M]. • Comment on the needs of ***Research*** in Agroforestry in India [P1/7(b)ii | 5 M]. • Write short notes on - ***Diagnosis*** and ***Design*** in Agroforestry [P1/5(c) | 5 M].

SOCIAL/URBAN FORESTRY

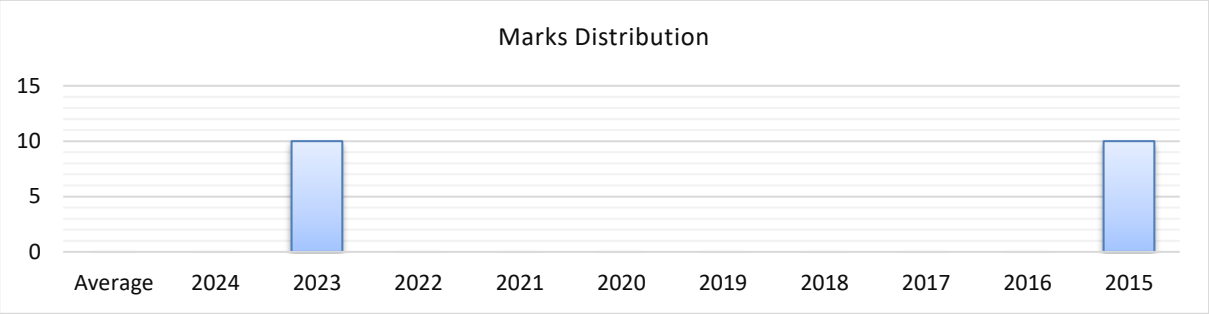
2024	• What do you mean by ***Urban Forestry***? Discuss the choice of species for environmental conservation in these areas. [P1/5(a) | 8 M].
2022	• Discuss the key problems to expand tree cover in urban areas. Explain the role of urban trees in abating soil pollutants [P1/8(a) | 15 M].
2021	• Discuss the problem of commons in social forestry. Suggest some effective strategies to overcome these problems [P1/6(b) | 15 M]. • What factors are considered important while choosing a species under ***Avenue Plantation***?

	[P1/1(b) | 8 M].
2019	• Briefly describe the ***Aim, Objectives*** *and* **Scope** of urban forestry in India. [P1/5(b) | 8 M].
2018	• What is ***Farm Forestry***? Write about the objectives, difficulties and financial return from the farm forestry [P1/8(c) | 10 M].
2017	• Explain the scope and aims of ***Urban forestry***. Discuss the need of urban forestry in the improvement of city environment [P1/6(b) | 20 M].
2016	• Briefly discuss aims, objectives and scope of social forestry. Why is people's participation must in social forestry? [P1/8(b) | 10 M].
2012	• How social forestry differs from other types of forestry? [P1/1(f) | 5 M].
2011	• Management challenges in the urban forestry are unique as compared to other social forestry programs. Discuss [P1/6(c) | 10 M].
2010	• Write Short notes on – (a) Management of urban forestry [P1/5(a) | 5 M]. • Discuss the following – (iv) Drawback of social forestry programs in India [P1/6(a) iv | 5 M].

CHAPTER 6

TRIBOLOGY

Tribology : Tribal scene in India; tribes, the concept of races, Principles of social grouping, stages of tribal economy, education, cultural tradition, customs, ethos and participation in forestry programs.

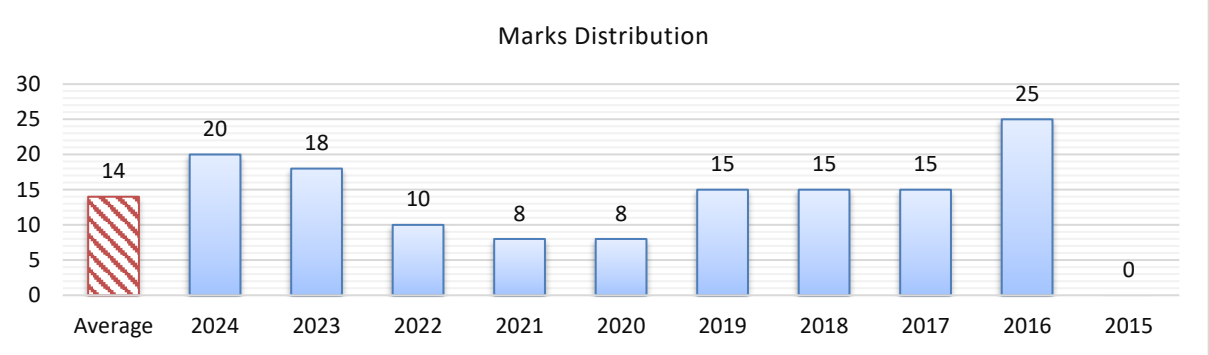


2023	• Enlist the ***Problems Faced*** by the tribal communities in India [P1/7(a) | 10 M].
2015	• Enumerate and discuss the ***factors responsible for restricting*** tribal population in the national parks [P2/8(c) | 10 M].
2014	• ***Name*** different tribes of India ***State-Wise*** and their specific ***Characteristics***. How can we make use of their ***Traditional Knowledge*** in forest conservation (flora and fauna) ? [P1/8(a) | 20 M].
2013	• Give the fundamental ***Characteristics*** of the tribal economy in India [P1/5(b) | 8 M].
2011	• Write short notes on (i) Tribal economy, (ii) Chola Naickans, (iii) Gujjars, (iv) Gonds [P1/5(b) | 10 M]. • Discuss the ***Characteristics*** which are shared by the diverse tribal groups all over India [P1/6(d) | 10 M].
2010	• How can we make use of the ***Traditional Knowledge*** of the major tribes of India in forest conservation (both flora and fauna) ? [*Linked Q* | P1/1(b) i | 10 M].

CHAPTER 7

JOINT FOREST MANAGEMENT

JFM : Details of steps involved such as the formation of Village Forest Committees, Joint Forest Participatory Management. Principles, objectives, methodology, scope, benefits and role of NGOs.



2024	• Elucidate the impact of ***Joint Forest Management*** on the conservation of natural forests and improvement of rural environment [P1/7(c) | 10 M]. • What is ***Eco-Development Committee*** (EDC)? Explain its role in forest conservation and mitigation of human-wildlife conflict [P2/3(c) | 10 M].
2023	• Write a note on the gender issues in Joint Forest Management (JFM). [P1/5(d) | 8 M]. • What is ***Village Forest Committee***? Explain its role in forest management. [P2/2(c) | 10 M].
2022	• "Participatory Forest Management is a success". Illustrate with examples [P2/4(c) | 10 M].
2021	• How do the ***Ownership Rights*** of forests ***Influence the Success*** of joint forest management? [P1/5(b) | 8 M].
2020	• How does collaborative forest management ensure community and household resilience? [*Linked Q* | P2/1(c) | 8 M].
2019	• Why are ***Participatory Rural Appraisal*** (PRA) techniques important for planning and execution of Joint Forest management (JFM) Activities? Explain the ***tools and techniques of PRA***. [P1/6(a) | 15 M].
2018	• Explain the environmental and economic role of community forestry in India [P1/5(d) | 8 M]. • What are the ***Objectives*** of Joint Forest Management (JFM)? Give ***Methods*** used for preserving forest resources through JFM [P2/7(b) | 15 M].
2017	• Write in detail as to why the Joint Forest Management Policy was initiated and what are its ***Constraints*** in implementation? [P2/4(b) | 15 M].

2016	• Trace the ***History of JFM*** in India, narrate any one success story with details [P**2**/3(a) | 15 M]. • Describe the role of ***Corporate Social Responsibility*** (CSR) towards sustainable forest production through Public-Private Partnership (PPP) approach [P**2**/8(a) | 10 M].
2014	• Introduction of JFM in various states in India was found ***Positive in biodiversity conservation***, discuss in details. [P**2**/1(d) | 8 M].
2013	• Describe constitution of ***JFM Network*** by MOEF, GOI with its terms of reference [P**2**/4(b) | 7 M]. • What entry point activities are recommended in joint forest management? [P1/5(d) | 8 M].
2012	• What shifts in attitude among Forest Personnel from the present are required for better success of Joint Forest Management? Discuss [P**2**/4(c) | 10 M].
2010	• How can we make use of the traditional knowledge of the major tribes of India in forest conservation (both flora and fauna) ? [P1/6(b) ii | 8 M]. • How can NGOs, Schools, Banks and Industry help to carry out an afforestation programme? [P1/8(c) | 20 M].

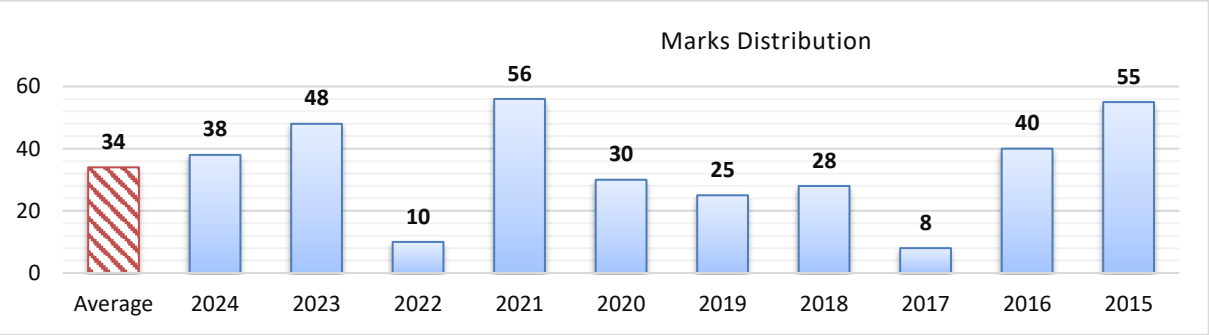
CHAPTER 8

POLLUTION, CLIMATE CHANGE & ENVIRONMENTAL CONSERVATION

ENVIRONMENTAL CONSERVATION AND BIODIVERSITY

Environment - components and importance, principles of conservation, impact of deforestation; forest fires and various human activities like mining, construction and developmental projects, population growth on environment.

Pollution - types, global warming, greenhouse effects, ozone layer depletion, acid rain, impact and control measures, environmental monitoring; concept of sustainable development. Role of trees and forests in environmental conservation; control and prevention of air, water and noise pollution. Environmental policy and legislation in India. Environmental Impact Assessment. Economics assessment of watershed development *vis-a-vis* ecological and environmental protection.



2024	• What is the ***Greenhouse Effect***? Define it. Describe in detail, accounts of its causes, sources and environmental impact [P1/5(e) | 8 M]. • Explain the concept of ***Sustainable Development*** of forests. How is it associated with the biodiversity, forest ecosystem conservation and forest ecosystem health? [P1/6(c) | 15 M]. • Critically analyse the impact of mining, construction projects and human population on ***Environmental Degradation***. Analyse comparatively the management practices followed in India and China [P1/b) | 15 M].
2023	• ***Greenhouse Gases*** result in global warming. Discuss [P1/5(e) | 8 M]. • What is ***Environmental Impact Assessment*** (EIA)? Describe the activities involved and general procedure in EIA [P1/8(c) | 15 M]. • Write on ***Carbon Sequestration*** and discuss the role of afforestation in absorptions of carbon dioxide (CO_2) from atmosphere [P1/6(c) | 10 M]. • Write the components of vehicular air pollution and list the damages caused to roadside trees. [P2/5(c) | 8 M].

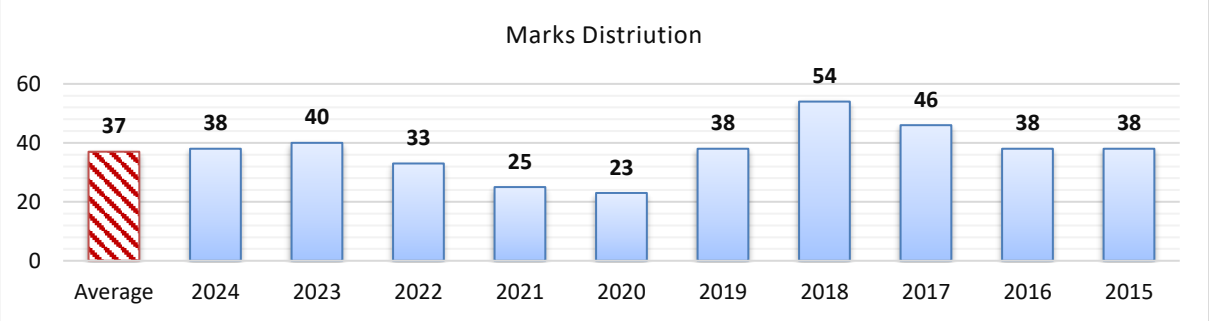
	• What is deforestation? Discuss the impact of deforestation on the environment [*Linked Q* | P1/6(c) | 15 M].
2022	• How do tree and shrub mass influence the mitigation of ***Particulate Matter*** and noise in urban settings? [P1/6(c) | 10 M].
2021	• What is the ***relationship between air pollutants and climate change***? How does forest vegetation abate different types of pollutants? Describe Air (Prevention and Control of Pollution) Act, 1981 in relation to pollution management. Suggest name of suitable plant species. [P1/7(a) | 15 M]. • Explain the ***role of trees and forests in Environmental conservation*** [*Linked Q*| P1/6(a) | 15M]. • What are the ***impacts of COVID-19 pandemic on environment and biodiversity*** [P1/5(a) | 8]. • What id REDD⁺? How does clean development mechanism help in sustainable management of forests? (8m) [P**2**/5(c) | 8 M]. • What is the role of forest plantations in ***Carbon Sequestration***? (10 m) [P**2**/7(c) | 10 M]. • Describe the criteria and indicators of ***Sustainable Forest Management*** [P**2**/1(a) | 8 M].
2020	• Explain the methods of ***Environmental Impact Assessment*** [P1/8(b) | 15 M]. • What is the significance of Afforestation and Reforestation to the ecosystem? How are the National Afforestation Programme, Green India Mission and Forest Fire Prevention and Management Scheme helping in restoration of forests? [P2/7(a) | 15 M].
2019	• List out the *greenhouse gases* that contribute to ***Global Warming***. What are the effects of global warming? Explain the role of trees and forests in combating environmental degradation. [P1/7(b) | 15 M]. • Explain the concept of ***Sustainable Development***. Discuss in brief the agenda for sustainable development. [P1/8(b) | 10 M].
2018	• Write the salient features of the ***Solid Waste Management Act****, 2000 and 2016*. What new initiatives have been taken *in the solid waste management* rules, 2016? [P1/5(e) | 8 M]. • Write about the ***pre- and post-Environmental Impact Assessment*** *(EIA)* of any mining area of India. Does GIS help in EIA? Write the name of the software used in Environmental Impact Assessment for the mining areas [P1/6(b) | 10 M]. • What is ***Sustainable Development***? Write about the criteria and indicator of sustainability fulfilling the needs and demands of growing population of India [P1/8(b) | 10 M].
2017	• Comment on the possible ***Impact of Greenhouse Gases*** on the global environment [P1/5(d) | 8 M].
2016	• Define ***Global Warming***. Explain in brief the principle behind greenhouse effect. Write the consequences of global warming on forest, wildlife and the human health. [P1/6(b) | 20 M]. • What are the objectives of carrying out **EIA**. Discuss sequentially, the different phases of an EIA study. [P1/6(c) | 10 M]. • How are "Environment", Environmental pollutant" and "Hazardous substance" narrated in environment (protection) act, 1986? [P1/7(b) | 10 M].
2015	• What is the penalty prescribed in section 15 of the environmental (Protection) act, 1986 for

	contravention of the provisions of the environmental act, rules and orders? [*Linked Q* | P1/5(c) | 8 M]. • Write the ***Chemistry of Ozonosphere*** and list the adverse effects of ozone layer depletion [P1/6(c) | 10 M]. • Briefly explain the process of acid rain formation and its adverse effects on buildings and aquatic bodies [P1/7(c) | 10 M]. • What is ***Arsenic Pollution***? Discuss the strategies to mitigate it [P1/8(c) | 10 M]. • Growth and productivity of forest plants are affected by different types of air pollutants. What are those? Suggest suitable remedies [P**2**/6(d) | 10 M]. • Narrate how ***Sustainable Forestry*** accounts for the ecological, economic, social and cultural values of forests. Give your opinion [P**2**/7(b) | 15 M].
2014	• What do you understand by the term ***Greenhouse Gases***? Explain how these gases disturb the ecological balance of nature and suggest suitable remedies. [P1/7(d) | 10 M]. • Why is a balance between production, social and environmental objectives necessary in ***Sustainable Forest Management*** plans? [P2/7(a) | 20 M].
2013	• What is ***Global Warming***? Discuss how it disturbs the ecological balance of nature, and suggest suitable remedies. [P1/6(a) | 20 M]. • Explain the following – (i) Criteria pollutant, (ii) Pollutant standard index, (iii) Severance tax, (iv) Smog. [P1/6(b) | 2 ½ × 4 = 10 M]. • How would you view the Indian initiatives for ***Sustainable Forest Management***? Discuss [P**2**/1(c) | 8 M].
2012	• No Direct Question
2011	• Write short notes on – (i) ***Carbon Sequestration***, (ii) Riparian buffers, (iii) ~~Forest decline~~, and (iv) Nitrate pollution. [P1/7(c) | 2 ½ × 3 = 7.5 M]. • What are the effects of particulate ***Air Pollutants*** on the regeneration of a forest ecosystem? Discuss. [*Linked Q* | P**2**/7(b) | 10 M].
2010	• Discuss the following - Rio conference [5 M]. • How is ***Forest Certification*** done in developed countries? Comment on its present status in India. [P**2**/6(d) | 10 M]. • Write on tree species for smoke and dust pollution control [*Linked Q* | P1/7(c) | 5 M].

CHAPTER 9

TREE IMPROVEMENT & SEED TECHNOLOGY

Tree Improvement And Seed Technology : General concept of tree improvement, methods and techniques, variation and its use, provenance, seed source, exotics; quantitative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural forest and stand improvement, genetic testing programming, selection and breeding for resistance to diseases, insects, and adverse environment; the genetic base, forest genetic resources and gene conservation in situ and ex-situ. Cost benefit ratio, economic evaluation.



2024	• Compare the ***Clonal Seed Orchard*** and ***Seedling Seed Orchard***. Which one is preferred to get increased genetic gain? [P1/5(d) | 8 M]. • What do you mean by ***Mating Design***? Describe the complete pedigree designs with their utilities [P1/6(a) | 15 M]. • Explain the genetics of ***Disease Resistance***. Describe the methods of breeding for disease resistance in tree crops [P1/8(a) | 15 M].
2023	• Explain the following – (a) __, (b)__, (iii), (iv), (v) ***Ortet*** and ***Ramet*** [*Linked Q* | P1/4(c) | 15 M]. • Discuss the significance of ***Exotics in Tree Improvement***. Name four exotic tree species [P1/5(b) | 8 M]. • Define ***Heritability*** and its types. How does Narrow Sense Heritability differ from Broad Sense Heritability? [P1/7(c) *i* | 10 M]. • Discuss the scope and future of hybrids in applied tree improvement [P1/7(c)*ii* | 10 M]. • Discuss the ***Significance of Variation*** in tree improvement [P1/8(b) | 10 M].
2022	• Why is ***Conventional Breeding*** that has a much better role to play in genetic improvement of trees not given much importance in research? [P1/5(e) | 8 M]. • What are the objectives of ***Progeny Testing***? Discuss the advantages and disadvantages of different methods of progeny testing [P1/8(b) | 15 M]. • Discuss the *important considerations* that are made before choosing a tree improvement approach [P1/8(c) | 10 M].

2021	• What are the advantages and disadvantages of ***Tree-Breeding Methods*** over biotechnological methods? [P1/7(c) | 10 M]. • Give an overview of forest genetic resources and ***Gene Conservation Programmes*** in India. Suggest effective practices for sustainable management for quality improvement in Indian Forests. [P1/8(a) | 15 M].
2020	• What is meant by ***Accompanied*** and ***Unaccompanied Clonal Seed Orchards***? Why are the gains from the two types so different? [P1/5(a) | 8 M]. • Describe the advantages, peculiar problems and various ***Steps in Tree Improvement***. [P1/7(a) | 15 M].
2019	• What are the ***Objectives*** *of tree improvement*? Explain in Details the ***Five Essential Steps*** of tree improvement [P1/5(e) | 8 M]. • Define : (i) Variation, (ii) Selection differentiation, (iii) Selection intensity, (iv) Heritability. How do you increase the genetic gain for a given trait in tree breeding? [P1/6(b) | 15 M]. • Name the ***Two Phases of tree improvement***. as a tree breeder, how do you use these two phases simultaneously to meet the short-term demand of wood-based industries and the long-term demand of establishing seed orchards for a given tree species [P1/8(a) | 15 M].
2018	• Write in brief on the criteria of selection of tree for resistance to adverse environments for high quality timber production [*Linked Q* | P1/5(a) | 8 M]. • How would you develop ***Tree Improvement Programmes*** for raising productivity in forestry? [P1/8(d) | 10 M]. • What is the importance of ***Heritability*** and how can genetic gain be estimated in tree improvement programme? [P1/6(d) | 10 M]. • Describe incomplete ***Mating Designs*** used in tree improvement [P1/7(b) | 10 M]. • What are the different ***Selection Methods*** used by the tree breeders? [P1/7(d) | 10 M]. • Explain seed production and certification system in Indian forestry [P1/6(c) | 10 M].
2017	• Write in brief on ***Advanced Generation*** tree improvement. [P1/5(a) | 8 M]. • Explain ***General Combining Ability*** (GCA), ***Specific Combining Ability*** (SCA) and their utility [P1/5(b) | 8 M]. • What are ***Seed Production Areas*** (SPA)? Explain the purpose of establishing them. Briefly highlight the advantages and disadvantages of SPA. List the steps involved in establishing SPA. [P1/7(a) | 20 M]. • List the different components of ***Phenotypic Variation***. How are they important for tree breeders? [P1/8(c) | 10 M].
2016	• List the basic causes and kinds of ***Variations*** in tree populations. [P1/5(a) | 8 M]. • Define ***Provenance***. Discuss the role of Provenance trial in tree improvement and mention different phases of a Provenance trial [P1/6(a) | 10 M]. • Define the ***Seed Orchard***. Write types of seed orchard. List the various aspects considered prior and after establishment of seed orchards for its management. [P1/8(a) | 20 M].
2015	• How can magnitude and ***Type of Variability*** be manipulated to obtain good gains in some tree characteristics? [P1/5(d) | 8 M]. • Suggest suitable steps to select ***Exotic Species*** or provenances for plantations. [P1/6(d) | 10

	M]. • As a community of ***Interbreeding Individuals***, what parameters would need to be known to describe a population of forest trees? [P1/7(d) | 10 M]. • Comments upon the relationship of ***General Combining Ability*** and breeding value in forest tree improvement programmes. [P1/8(d) | 10 M].
2014	• Discuss the ***Role of Provenance Tests*** in tree improvement [P1/1(b) | 8 M]. • State genetic drift. Discuss Hardy-Weinburg law with its significance [P1/3(b) | 10 M]. • Explain the possible causes of genetic variation in forest trees [P1/5(b) | 8 M]. • Discuss the important factors while planning of ***Seed Orchard*** [P1/7(c) | 10 M].
2013	• Write a note on ***Pollen Dilution Zone*** in seed orchard. Discuss various factors affecting their effectiveness. What are the options available in lieu of pollen dilution zones? [P1/8(b) | 10 M]. • What is ***Genetic Drift***? State and discuss Hardy-Weinberg law with its significance [P1/7(d) | 10 M]. • Describe the operational use of vegetative propagation in tree improvement [*Linked Q* | P1/8(c) | 10 M]. • How is the knowledge of Forest Genetics essentially needed for the management of forest plantations? Explain [P**2**/3(a) | 15 M].
2012	• Discuss the *use of tree improvement* in natural forest and stand improvement [P1/5(h) | 5 M]. • Write short notes on – [P1/8 | 4 × 5 = 20 M]. (b) ***Breeding Arboretum*** (c) ***Seed Orchard***, (d) Distinction between Selection Intensity and heritability (h) ***Exotics*** in Indian forestry
2011	• Discus the importance of ***Tissue Culture Techniques*** as a tool in tree improvement. [P1/5(e) | 10 M]. • Describe the ***Regression Selection Method*** for plus tree selection in uneven-aged stand. [P1/8(a) | 10 M]. • Describe the various approaches for obtaining ***Genetically Superior Seed***, giving advantages of each [P1/8(b) | 10 M]. • Discuss the statement, even in large experiments with many families, ***Heritabilities*** are not estimated without error (10 m). [P1/8(c) | 10 M].
2010	• Strategies for conventional tree improvement programme [P1/5(g) | 5 M]. • Discuss the following – (i) selection as a method of tree improvement, (ii) ***Selection Intensity*** affects the genetic gain. [P1/6(a) | 10 M]. • What do you understand by the term "***Provenance Trial***"? Explain the stepwise procedure for this trial followed in a forest species. [P1/8(a) | 10 M]. • Discuss the possibilities of ***Biotechnological Interventions*** in tree improvement programmes (10m). [P1/8(b) | 10 M].

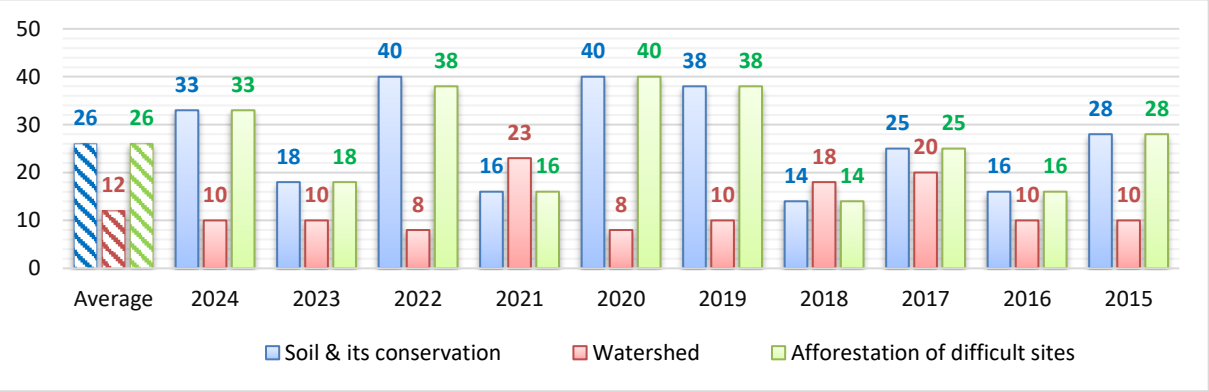
CHAPTER 10

FOREST SOIL, ITS CONSERVATION & WATERSHED MANAGEMENT

Forests Soils : Classification, factors affecting soil formation; physical, chemical and biological properties.

Soil Conservation : Definition, causes for erosion; types – wind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; reclamation of saline and alkaline soils, water logged and other waste lands. Role of forests in conserving soils. Maintenance and build-up of soil organic matter, provision of lopping's for green leaf manuring; forest leaf litter and composting; Role of micro-organisms in ameliorating soils; N and C cycles, VAM.

Watershed Management : Concepts of the watershed; the role of mini-forests and forest trees in overall resource management, forest hydrology, watershed development in respect of torrent control, river channel stabilization, avalanche and landslide controls, rehabilitation of degraded areas; hilly and mountain areas; watershed management and environmental functions of forests; water-harvesting and conservation; groundwater recharge and watershed management; the role of integrating forest trees, horticultural crops, field crops, grass, and fodders.



FOREST SOIL, & ITS CONSERVATION

2024	• Describe in brief the types of forest soils existing under diverse ecological zones. Suggest suitable techniques for the conservation measures followed under ravines, water logged, hot deserts and coastal areas [P1/8(b) | 10 M]. • Explain the concept of soil biological fertility. Suggest a suitable plan for the restoration of soil biological fertility through the use of eco-friendly sources [P1/8(c) | 15 M]. • Briefly describe the current scenario of the ***Saline*** and ***Alkaline Soils*** in India. Draw a management plan using suitable plant species [P1/5(b) | 8 M].
2023	• How does moisture influence the soil formation and growth of vegetation? [P1/5(c) | 8 M]. • Explain the theory of humus formation predominant in forested vegetation [P1/6(b) | 10 M].

2022	• How does C: N ratio of plant residue in soil influence the rate of decomposition and nitrogen availability to plants? [P1/5(d) | 8 M]. • Give a detailed profile of a soil showing various zones and explain the function of each soil zone [P1/7(c) | 10 M]. • Explain the principles of ***Bioengineering*** measures for soil and water conservation. Write in brief four common bioengineering techniques for hill and slope stabilization works using plants [P1/7(a) | 20 M]. • Discuss the components of ***Desert Ecosystem***. Write steps to control shifting of sand dunes [*Linked Q* | P**2**/6(b) | 15 M].
2021	• How does soil organic matter decomposed influence forest productivity? [P1/5(d) | 8 M]. • Explain the terms – (a) Cation Exchange Capacity, (b) Salinity & Alkalinity [P**2**/5(a) | 8 M].
2020	• Write short notes on the following – (a) Soil texture and structure, (b) Soil organic matter, (c) Carbon nitrogen ratio. [P1/8(c) | 15 M]. • What is the different soil type found in India? Identify five tree species growing each in Alluvial soils, red soils, Black cotton soils and Arid and desert soils. [P1/7(b) | 15 M]. • Define afforestation. Discuss in brief the afforestation techniques, including the choice of species, for ravine lands [P1/3(a) | 10 M].
2019	• Soil is an interface of air, minerals, water and life. Comment [P1/5(c) | 8 M]. • What are the ***Paedogenic Process***? Explain the important process of soil formation [P1/8(c) | 15 M]. • What are the characteristics of ***Saline*** and ***Alkaline Soils***. Explain the reclamation of saline and alkaline soils with suitable tree species [P1/7(a) | 15 M].
2018	• Write in detail about the influence of ***Parent Rock*** in the distribution of tree species [*Linked Q* | P1/5(c) | 8 M]. • Write the ***Soil-Water Relationship*** of any forest area. Describe the influence of water table in the growth and development of tree species. [P1/7(a) | 10 M].
2017	• What are the various methods adopted to conserve the soil on sloping areas? Explain in brief. [P1/7(b) | 10 M]. • Where are ***Cold Deserts*** found in India? Explain site characteristics encountered in a cold desert and steps suggested to overcome problems in their afforestation [*Linked Q* | P1/3(a) | 10 M]. • Describe the technique of ***Sand Dune Fixation*** in the thar desert. Also mention the choice of species for plantation [P1/3(b) | 15 M].
2016	• Write distinguish features of ***Saline Alkaline Soil*** [P1/5(b) | 8 M]. • Explain ***Types of Rocks*** based on formation and minerals based on chemical compositions [P1/5(d) | 8 M]. • Write the characteristics of ***Cold Desert***. Discuss soil working and planting techniques for cold desert [*Linked Q* | P1/1(d) | 8 M].
2015	• Why is a lot of emphasis laid on research relating to soil conservation? Discuss [P1/5(b) | 8 M].

	• Describe different textural classes of soil and the way they affect plant growth. [P1/6(b) | 10 M]. • Why is ***Saline-Alkaline Soil*** considered problematic? can you suggest any procedure to make it suitable for plant growth? [P1/7(b) | 10 M].
2014	• Specific problem of ***Coastal Land*** and ***Hot Deserts*** [*Linked Q* | P1/2(b) *iv* | 5 M].
2013	• What are the specific problem of the following wasteland? suggest at least 3 species for planting in each of them (20 m) – (a) Hot desert, (b) Saline alkaline soil, (c) Wetland, (d) Cold desert. [P1/2(a) | 5 × 4 = 20 M].
2012	• Explain different process of soil erosion. Briefly describe them giving examples as to how the vegetation including trees can help in conserving soil and water [P1/7(b) | 10 M]. • Describe briefly the afforestation techniques adopted for ***Ravenous Lands of Yamuna*** giving suitable species [P1/5(f) | 5 M]. • Give suitable forestry techniques for the reclamation of ***Salt Affected Soils*** [P1/6(b) | 8 M]. • How shelterbelt and wind breaks are helpful in ***Sand Dune Stabilization*** and desert control? [P1/5(a) | 5 M]. • Discuss afforestation of inland sand dunes by giving their distribution, site conditions, planting techniques and species suitable in such areas [P1/5(e) | 5 M]. • List the Pioneers flora of sand dunes under – [*Linked Q* | P2/5(b) | 8 M]. (a) On dunes, (b) Spread out sand, and (c) Stabilized dunes.
2011	• Discuss the factors that inhibit tree growth in ***Alkali*** and ***Saline Soils***. How is alkali soil managed for tree species plantation? Write scientific names of four tree species suitable for plantation in Alkali soils [P**2**/6(a) | 20 M].
2010	• "Among the causes of soil erosion some are manageable" comment [P1/7(b) *i* | 5 M]. • Difference between erodibility and erosivity [P1/7(c) *ii* | 5 M]. • What are ***Saline*** *and* ***Sodic Soils*** ? [P1/7(d) *i* | 5 M]. • Mention ten species (Scientific name) of trees tolerant to salinity [P1/7(d) *ii* | 5 M].

WATERSHED MANAGEMENT

2024	• What is the role of ***Watershed Development*** plan in India? Describe its guidelines framed for better implementation. Briefly write on the watershed mission project [P1/6(b) | 10 M].
2023	• Explain the benefits of ***Watershed Management*** [P1/7(b) | 10 M].
2022	• How does ***Watershed Influence*** the ecology and socio-economic development of a region? [P1/5(c) | 8 M].
2021	• How can ***Watershed Management*** enhance and promote sustainable integrated water resource management? [P1/5(c) | 8 M].

	• How do you differentiate a springshed from a ***Watershed***? Explain how a healthy springshed can ensure a better hydrological cycle of an area [P1/7(b) | 15 M].
2020	• What are the roles of forest in ***Watershed Management***? [P1/5(c) | 8 M].
2019	• Write the characteristics of ***Watershed***. Explain the factors affecting watershed management [P1/6(c) | 10 M].
2018	• What are the measures to be taken into consideration during preparation of earthen ***Check Dam*** in the forest areas? [P1/5(b) | 8 M]. • What is ***Hydrology***? Describe the role of hydrology in planning and management of watershed development. Does tree species improve the infiltration rate, soil temperature, water level and hydrological cycle? Justify with few examples [P1/8(a) | 10 M].
2017	• What is ***Water Harvesting***? List the different methods of water harvesting and suggest various practices for efficient use of conserved water [P1/8(a) | 20 M].
2016	• Define ***Watershed***. Describe tree-based models for reclamation of degraded hills [P1/8(c) | 10 M].
2015	• Good ***Watershed Management*** must consider the social, economic and environmental sustainability, and institutional factors. Comment [P1/8(a) | 10 M].
2013	• What is ***Watershed Management***? Explain its objectives and role in rural development [P1/8(d) | 10 M].
2012	• Describe the afforestation in an undulating community land situated in the catchment, of a small water reservoir [P1/6(d) | 5 M].
2011	• Explain the various applications of geo-textiles for soil conservation [P1/5(c) | 10 M]. • Write short notes on – (ii) ***Riparian Buffer*** [P1/7(c)ii | 2½ M]. • Discuss the factors to be considered for efficient ***Recycling of Harvested Water*** [P1/8(d) | 10 M]. • Discuss strategies and plans adopted for the treatment of catchment areas [*Linked Q* | P**2**/3(b) | 10 M].

AFFORESTATION OF DIFFICULT SITES

2024	• Describe in brief the types of forest soils existing under diverse ecological zones. Suggest suitable techniques for the conservation measures followed under ravines, water logged, hot deserts and coastal areas [P1/8(b) | 10 M]. • Explain the concept of soil biological fertility. Suggest a suitable plan for the restoration of soil biological fertility through the use of eco-friendly sources [P1/8(c) | 15 M]. • Briefly describe the current scenario of the ***Saline*** and ***Alkaline Soils*** in India. Draw a management plan using suitable plant species [P1/5(b) | 8 M].
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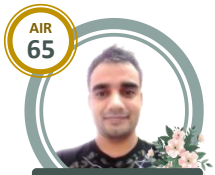

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Paper - 3

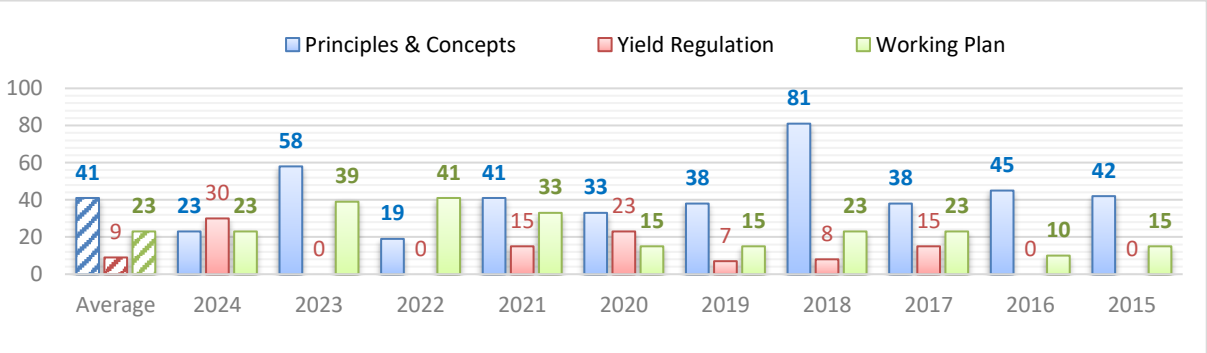
CONTENTS

CHAPTER 1

FOREST MANAGEMENT

Forest Management and Management Systems : ◈ ***Objective***, ***Principles***, and techniques; ◈ Concept of ***Sustained Yield*** (its principle, scope, and limitation); ◈ ***Rotation***, its types, and steps for reducing rotation age; ◈ ***Normal Forest***; ◈ ***Growing Stock***; ◈ ***Stand Structure*** and dynamics; ◈ ***Management of forest plantations***, commercial forests, and forest cover monitoring. Approaches viz., (i) site-specific planning, (ii) strategic planning, (iii) Approval, sanction, and expenditure. (iv) Monitoring (v) Reporting and governance; Regulation of yield. [***Covered in Module 3*** :-Details of steps involved such as formation of Village Forest Committees, Joint Forest Participatory Management]

Forest Working Plan : ◈ ***Forest Planning***, ***Evaluation***, and monitoring tools and approaches for integrated planning; ◈ Multipurpose development of forest resources and forest industries development; ◈ ***Working Plans*** and ***Working Schemes***, their role in nature conservation, bio-diversity, and other dimensions; ◈ ***Preparation*** and control. Divisional Working Plans, Annual Plan of operations.



[Part – I] PRINCIPLES & CONCEPTS

2024	• Differentiate between ***Sustained Yield Management*** (SYM) and Sustainable Forest Management (SFM) [P2/1(a) | 8 M]. • What is ***Normal Growing Stock*** (NGS)? Explain briefly the method of determination of NGS in clear felling system with formulae [P2/3(a) | 15 M].
2023	• What are the objectives and principles of forest management? [P2/1(e) | 8 M]. • Describe the methods for assessment of ***Growing Stock*** [P2/2(a) | 15 M]. • What is village forest committee? Explain its role in forest management [*Linked* Q |P2/2(c) | 10 M]. • Describe the role of **MAI** (Mean Annual Increment) and **CAI** (Current Annual Increment) to decide rotation of a forest stand [P2/3(b) | 15 M]. • Describe the importance of forest management. How will it be operated in forest plantations? [P2/4(a) | 15 M].

2022	• What is the ***Purpose of Classifying Forests***? How are the forests classified for silvicultural management? [*Linked* Q	P2/1(a)	8 M]. • Define Forest Management and write its ***Objectives***. Discuss in brief the major activities related to forest management [P2/2(a)	15 M].
2021	• "Forestry enterprise is ***Peculiar*** compared to other enterprises" Justify [**P1**/1(b)	8 M]. • Define ***Working Circle***. Mention different ***Types of Working Circles*** generally constituted in India. Explain ***Biodiversity Working Circle*** [P2/3(c)	10 M]. • Define ***Rotation of Maximum Volume Production***. Explain the methods for fixing up of rotation of maximum volume production with the help of a neat diagram [P2/4(a)	15 M]. • Differentiate Stand density and Canopy density. Mention Canopy density classification as per Forest Survey of India [P2/1(d)	8 M].
2020	• What are the recommended practices *for* ***Strategic Harvest Planning?*** [P2/1(d)	8 M]. • What are the factors that affect a ***Stand Structure***? Describe in brief the DBH distribution in even, uneven, and multi-aged normal forest stands [P2/2(a)	15 M]. • What are the Socio-ecological implications of ***Modifying Rotation Lengths*** in forestry? [P2/3(c)	10 M].
2019	• Explain the role of Normal Series of ***Age Gradation*** and ***Age Class*** in forest management [P2/1(a)	8 M]. • Describe the method for calculation of ***Normal Growing Stock*** with the help of yield table [P2/2(a)	15 M]. • What is ***Progressive Yield*** ? How is annual yield obtained in a forest worked with periodic block method? [*Linked* Q : *Yield regulation*	P2/4(a)	15 M]. • What is Compartment*?* why is its study and description required when making a working plan? (15 m) [*Linked* Q : *Working Plan*	P2/2(b)	15 M].
2018	• What is **Sustained Yield** ? Mention the positive and negative aspects related to sustained yield [P2/1(b)	8 M]. • What is **Growing Stock**? How is normal growing stock calculated in **Clear Felling System** based on final MAI? [P2/2(b)	15 M]. • Define **Rotation**. Explain different types of rotation with special reference to ecological, industrial, and economical benefits [P2/2(c)	10 M]. • What is **Increment** ? Discuss different types of increments. Discuss the graphical relationship between current annual increment and mean annual increment [P2/3(b)	15 M]. • Define forest management. Give its objectives. How does the attitude of the owner put impact on the management of forests? [P2/4(a)	15 M]. • What is sustained yield? Explain how it is achieved in practice [**P1**/1(c)	8 M]. • How is the rotation of any particular species at any particular locality practically decided? [**P1**/2(c)	10 M].

2017	• Why site-specific planning is essential for forest management? Explain different components of site-specific management [*Linked* Q : *Silviculture* | P2/1(a) | 8 M]. • How the **Forest Cover** was measured prior to and post 1980's in India? Define the various categories of forest cover [P2/1(b) | 8 M]. • Describe the different formulae used in forest trees for determining **Increment Percent** in diameter and volume [*Linked* Q : *Mensuration* | P2/3(a) | 15 M]. • Write about the concept of **Normal Forest** and the kind of abnormalities which affect the normal growing stock [P2/4(a) | 15 M].
2016	• How are the forests classified in India? Discuss its significance in forest management [*Linked* Q : *Silviculture* | P2/1(a) | 10 M]. • What is **Normal Growing Stock**? Explain the determination of NGS in clear felling system with graphical illustration and numerical examples [P2/1(b) | 10 M]. • How do you visualize the concept of **Normal Forest** in Indian context? describe the effect of silvicultural system on normality [P2/2(b) | 10 M]. • What is the **Increment Percent** ? Discuss the relationship between CAI and MAI of a forest stand [P2/2(c) | 10 M]. • Explain the concept of rotation and its application in regular and irregular forests [P2/4(b) | 10 M].
2015	• **Progressive Yield** concept differs from **Sustainable Yield**. Under the present situation, which would you suggest and why? [P2/2(a) | 15 M]. • Discuss how the **Rotation of Minimum Volume Production** differs from the **Silvicultural Rotation** [P2/2(c) | 10 M]. • Enumerate the importance of **Forest Survey of India** (FSI) in the forest management system [P2/7(c) | 10 M]. • Show by your interpretation, either graphically or theoretically, how the forest yield depends upon the **Growing Stock** [*Linked* Q : *Working Plan* | P2/2(b) | 15 M].
2014	• Define rotation and describe the various **types of Rotation** prescribed [P2/1(e) | 8 M]. • With the help of a diagram, discuss the **relationship between MAI and CAI**. What is their role in forest measurements? [P2/2(c) | 10 M]. • What are the **Peculiarities** you have observed in **Forest Management** practices? Suggest ways to overcome them [P2/4(b) | 10 M]. • Define **Growing Stock**. Explain the estimation of growing stock and density [P2/7(a) | 10 M]. • How enumeration of the **Growing Stock** is done? describe in brief the various methods of enumeration for preparing a working plan (15 m) [*Linked* Q : Working plan | P2/2(a) | 15 M].
2013	• Describe the **scope and objectives of Forest Management**. What is the impact of restrictions laid down by the Hon'ble Supreme Court on green felling in forests? [**P1**/8(a) | 10 M]. • Define the **rotation** and describe **its various types** used in Indian forestry [P2/2(a) | 20 M]. • Describe the compound interest and Schneider's formulae for calculation of **increment percentage** [*Linked* Q : Forest mensuration | P2/2(b) | 10 M].
2012	• Differentiate between – **CAI and MAI** [**P1**/3(a) *iv* | 4 M].

2012	• Describe compound interest formula for calculation of diameter increment percent [P2/1(e)|8]. • Explain **dynamics of forest vegetation** giving an example of the evolution of Sal Forest in Uttaranchal [P2/8(c) | 10 M].
2011	• Write short notes on – interrelationship between **CAI** and **MAI** [**P1**/3(b) *i* | 5 M]. • Explain the situations under which a **Forest** becomes **Abnormal** [P2/1(a) | 10 M]. • Define **Rotation** & discuss different **Types** of **Rotations** giving suitable examples [P2/3(a) | 20 M].
2010	• Discuss the significance of normality in **sustainable management of forest** [P2/1(a) | 8 M]. • How is **De-Liocourt's principle** utilized to ensure normality concept in selection forest? [P2/1(c) | 8 M]. • How do variation in density and quality of a forest influence annual yield estimation? [*Linked* Q : Yield Estimation | P2/1(d) | 8 M]. • How are yield table data used for the assessment of **normal growing stock**? [P2/1(e) | 8 M]. • What is **working circle**? How is it decided in working plan exercise? [*Linked* Q : *Working plan* | P2/1(a) | 8 M]. • Briefly discuss the relative importance of **physical and silvicultural rotations** in respect of existing forest resources of India [P2/2(d) | 8 M]. • Explain the components of **compartment description** [*Linked* Q : *Working plan* | P2/3(d) | 10 M]. • How is the **soil expectation value** helpful for deciding financial rotation ? [P2/4(a) | 10 M]. • What is **intermediate yield** ? How does it differ from final yield ? [P2/4(d) | 10 M].

[Part – II] YIELD REGULATION

2024	• What is yield regulation? What are the bases of yield regulation? Enlist different methods applicable to regular and irregular forests [P2/4(a) | 15 M]. • What are allometric growth models? Mention different types and explain their application in growth and yield management of forest stands [P2/4(b) | 15 M].
2021	• Explain the **French Method (1883)** of yield regulation in irregular forests. What are its advantages and disadvantages? [P2/3(a) | 15 M].
2020	• What are the classical methods for determining the allowable cut? [P2/2(b) | 15 M]. • What are the *key decision parameters* in an *uneven-aged forest management* [P2/1(a) | 8 M].
2019	• What is **progressive yield** ? How is annual yield obtained in a forest worked with periodic block method ? [*Linked* Q : Principles & Concepts | P2/4(a) | 15 M].
2018	• 50 *equi-productive* coups are to be worked out from 2000 hectares of forest under clear felling system with the following densities [P2/1(c) | 8 M]. *Area (ha)* – *Densities* 600 – Normal density 400 – 0·75 density 800 – 0·50 density 200 – 0·25 density Find out the number of coupes in different densities. 8

2017	• How a selection forest is managed under the **Felling Series**? Describe with suitable examples/diagrams [*Linked* Q : *Silviculture System* | P2/2(a) | 15 M].
2014	• How yield is regulated? Describe the **Von-Mantel's formula** for yield regulation in forests [P2/2(b) | 15 M]. • Describe the general principle of **yield regulation in Uneven-aged Forest** crop [P2/7(b) | 10 M]. • Give a short account on - the management of uneven-aged forests [**P1**/1(e) | 8 M].
2013	• What is the yield regulation in forest management? How can the yield regulation by **Judeich method** be used? [P2/1(e) | 8 M].
2011	• How is yield regulated in a forest which is worked under clear felling system? [P2/1(d) | 10 M]. • Discuss **Smythies Safeguarding formula** for annual harvest of timber from a selection forest (20 m) [P2/2(a) | 20 M].
2010	• Describe the procedure for allotting different **types of periodic blocks** in a forest [P2/3(b) | 10 M].

[Part - III] WORKING PLAN

2024	• What is unit of working plan in India? How does it differ with other temperate countries? Briefly explain the Annual Plan of Operations (APOs) [P2/1(e) | 8 M]. • What is the National Working Plan Code 2023? What are its salient features? Discuss its importance in sustainable forest management and biodiversity Conservation [P2/2(a) | 15 M].
2023	• Differentiate between forest working plan and forest management plan [P2/1(a) | 8 M]. • What are Maps? How are they helpful in the management of forests? [P2/1(c) | 8 M]. • Describe the role of working plan in forest conservation [P2/3(c) | 8 M]. • Describe regeneration survey in natural forest and explain the significance of regeneration stock map [P2/4(b) | 15 M].
2022	• How is the regeneration Map of Moist deciduous forest prepared [**P1**/1(c) | 8 M]. • *Maps* play a significant role in working plan preparation. Explain [P2/2(c) | 10 M]. • Describe the outline and the components of the *preliminary working plan report* [P2/3(a)| 15 M]. • "Working plan is a document of enforce systematic, obligatory and mandatory regulations for continuous management of a given forest". Discuss [P2/3(c) | 8 M].
2021	• "Working plan is a basic prerequisite for the management of forest division" Discuss [P2/1(c) | 8 M]. • What is **forest regeneration survey map**? How is it useful in the management of natural forests? [P2/3(c) | 10 M]. • Briefly explain the steps involved in **preparation of working plan** according to national working plan code, 2014 [P2/4(b) | 15 M].
2020	• A well-defined working plan is crucial for the **sustainable management of forests** and **biodiversity**. Write your answer in brief in the light of **National working plan code 2014** [P2/4(b) | 15 M].
2019	• Describe the **significance** of **working plan** and **working scheme** in conserving biodiversity

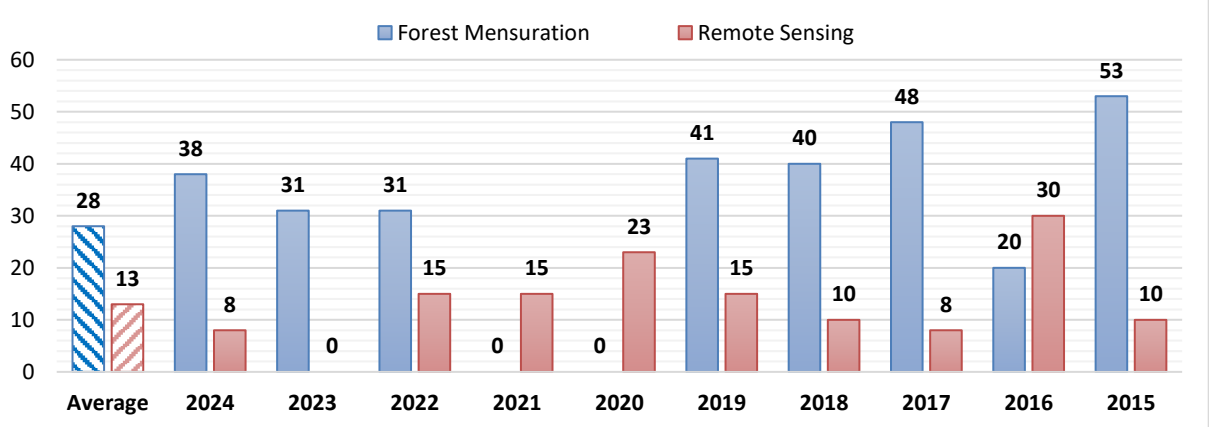
	[P2/1(b) | 8 M]. • What is Compartment? why is its study and description required when making a working plan? [*Linked* Q : *Principles & Concepts* | P2/2(b) | 15 M].
2018	• Define working plan. Discuss objectives and scope of a working plan. Describe salient features of a good working plan [P2/3(a) | 15 M]. • What are the **forest stock maps**? Discuss the details shown in stock maps for a working plan report [P2/1(e) | 8 M].
2017	• What are the objectives of working plan? How it is helpful for conservation of biodiversity and natural resource conservation of forests? [P2/1(c) | 8 M]. • Describe the Various **Kinds of Maps** prepared by the Working Plan Officer. What is their utility and purpose ? [P2/3(b) | 15 M].
2016	• Differentiate **Working Plan** and **Annual Plan** of operations. Suggest the changes needed in the working plan preparation for more effective application in forest management [P2/2(a) | 10 M].
2015	• Maps are an integral part of forest management. Give your perceptions about the kind of maps you consider important for managing a forest circle [P2/3(b) | 15 M].
2014	• Describe the following – (a) Regeneration Survey [**P1**/6(b) *iv* | 2.5 M].
2013	• What are the main contributions of Dr. D. Brandis in Indian forestry? Enumerate the various stages of working plan. What is the role of silvicultural system in the working plans? [P2/1(b) | 8 M]. • Describe a stock map. Discuss the scheme of recording crop composition (including colouring pattern used) and crop density [P2/4(a) | 8 M].
2011	• What is a **regeneration stock map**? How is it prepared? [**P1**/1(d) | 10 M]. • Explain various types of maps prepared by Working Plan Officer [P2/1(c) | 10 M].
2010	• What are the **different regeneration categories** that are observed and recorded during sal regeneration survey? [P2/1(b) | 8 M]. • What is working circle? How is it decided in working plan exercise? [*Linked* Q : Principles & Concepts | P2/2(b) | 8 M]. • Explain the components of **compartment description** [*Linked* Q : Principles & Concepts | P2/3(d) | 10 M].

CHAPTER 2

FOREST MENSURATION

Forest Mensuration : ◈ Methods of measuring – diameter, girth, height and volume of trees; ◈ Form-factor; ◈ volume estimation of stand, current annual increment; mean annual increment, ◈ Sampling methods, and sample plots. ◈ Yield calculation; yield and stand tables.

Remote Sensing : ◈ Forest cover monitoring through remote sensing, ◈ Geographic Information Systems for management and modelling.



FOREST MENSURATION

2024	• Explain (*i*) ***Crop Diameter***, (*ii*) ***Crop Height***, (*iii*) Spectral signature and (*iv*) General ***Volume Table*** [P2/1(b) | 8 M]. • What is ***Commercial Volume***? Explain different methods of volume estimation of felled logs and compare with quarter girth method [P2/2(b) | 15 M]. • Which criteria have to be considered while choosing statistically sound ***Sampling Design***? How do you estimate the sample size for forest inventories? Explain different kinds of sampling units [P2/3(b) | 15 M].
2023	• What is ***Point Sampling***? How is it used in forest enumeration? [P2/1(b) | 8 M]. • Explain briefly the reference point for measurement of diameter and girth of tree species [P2/1(d) | 8 M]. • How does the yield table differ from the ***Volume Table***? Describe the contents of yield table with justifications [P2/2(b) | 15 M].
2022	• Explain (i) Artificial Form Factor, (ii) Absolute ***Form Factor***, (iii) Normal Form Factor, and (iv) Form Quotient [P2/1(e) | 8 M].

	• Describe the tangent method used to calculate height of trees on (i) Level ground, and (ii) Sloping ground [P2/4(b) | 15 M]. • Describe the graphical method of preparation of ***Volume Table*** [P2/1(b) | 8 M].
2019	• Explain ***Metzger's Theory*** of tree form and its significance in volume calculation [P2/1(c) | 8 M] • Describe the procedure for estimating the volume of standing and felled tree [P2/1(e) | 8 M]. • Explain the principles of the height measuring instruments giving suitable examples [P2/2(c) | 10 M]. • What is ***Point Sampling***? How is it helpful to find out the basal area of a forest? [P2/3(b) |15 M]
2018	• What are the precautions required for diameter measurements with ***Calipers***? Discuss the errors that occur due to non-observation of the precautions [P2/2(a) | 15 M]. • Define ***Volume Tables*** and give their classification [P2/3(c) | 10 M]. • Define forest ***Sampling***. Give advantages of sampling Discuss different types of non-random sampling methods used in forestry [P2/4(b) | 15 M].
2017	• How ***Volume Tables*** are classified on the basis of kind of out-tum? Describe briefly [P2/1(e) | 8 M]. • How the geometrical measurements for calculating volume yield are made in (i) Buttressed tree, (ii) Leaning tree on a slope, and (iii) a tree forked at the base? Give a thematic presentation [P2/2(b) | 15 M]. • Describe the different formulae used in forest trees for determining ***Increment Percent*** in diameter and volume [*Linked* Q | P2/3(a) | 15 M]. • Write a note on kinds of enumeration and explain in brief different random ***Sampling*** techniques used in forest inventories [P2/4(c) | 10 M].
2016	• Discuss the significance of ***Stump Analysis*** in forest mensuration. How does it help in understanding the past growth of trees? [P2/1(c) | 10 M]. • *Sampling* has a very important role in ***Forest Inventory***. Discuss with the help of kinds of sampling [P2/4(c) | 10 M].
2015	• Which of the instruments has ***Wheeler's Pentaprism*** replaced and why? [P2/1(c) | 8 M]. • How important are the ***Increment Borers*** in forest health and growth analysis? Does Pressler's borer have any adverse effects on the tree sampled? Elaborate on the issue [P2/1(d) | 15 M]. • How far do ***Taper Tables*** help in measuring the volume of a tree? Discuss their types and methods of preparation [P2/4(a) | 15 M]. • Why are ***Sample Plots*** laid out in different forest species? What is their utility and how are they enumerated? [P2/4(b) | 15 M].
2014	• What is a ***Stand Table***? Give a brief description for preparation of a stand table [P2/1(a) | 8 M]. • How is ***Stump Analysis*** carried out and what kind of information does it yield? [P2/1(c) | 8 M]. • What is a *tree* ***Stem Form***? How is tree stem form calculated and what are its uses in forestry? [P2/3(b) | 15 M]. • Differentiate between ***Sample Plots*** and preservation plots. Discuss their role in

<table>
<tr><td></td><td>management [P2/3(c) | 15 M].
• "Spiegel Relaskop is an instrument of great use in forestry" justify with reasons. How is the basal area per hectare determined by this instrument? Explain [P2/4(c) | 15 M].
• In brief, but in an explanatory way describe the preparation and utility of yield tables in forestry [P2/5(a) | 8 M].
• What is an Increment Borer? Describe its role in forestry [P2/6(c) | 15 M].</td></tr>
<tr><td>2013</td><td>• Differentiate between the graphical method and the regression equation method for the preparation of general Volume Tables [P2/2(a) | 8 M].
• Differentiate between Hojer's Formula and Behre's Formula for tree form [P2/1(d) | 8 M].
• Describe the compound interest and Schneider's formulae for calculation of Increment Percentage [Linked Q | P2/2(b) | 10 M].
• Differentiate between Random Sampling and non-random sampling. Describe different methods of non-random sampling that are used in forest inventories [P2/2(c) | 10 M].
• In Stem Analysis, diameters of 30th ring (as computed on BH section) at different height sections was found as follows [P2/4(c) | 10 M].
<table>
<tr><td>Ht. of Section (m)</td><td>01.37</td><td>04.24</td><td>07.24</td><td>10.24</td><td>13.24</td><td>14.74</td></tr>
<tr><td>Diameter (cm)</td><td>29.5</td><td>25.2</td><td>21.0</td><td>16.00</td><td>10.40</td><td>06.60</td></tr>
</table>
The diameter curve of 30th ring cuts the height axis at 18.24 m
(The average seedling takes 10 years to reach 1.37 m)
Calculate the MAI at 40 years of Age of the tree.</td></tr>
<tr><td>2012</td><td>• What are the items of information available in the Volume Table in addition to the volume of tree? Briefly describe them [P2/1(a) | 8 M].
• Describe the process of Tree Height measurement by the Abney level. What are its advantages and disadvantages? [P2/1(b) | 8 M].
• Describe various formulae for calculation of the Volume Of Logs [P2/1(c) | 8 M].
• Define Stem Analysis and discuss its purpose [P2/1(d) | 8 M].
• Describe Compound Interest Formula for calculation of diameter increment percent [Linked Q | P2/1(e) | 8 M].
• Describe the indirect methods for Volume Estimation of trees [P2/2(a) | 14 M].
• If the Angle Of Elevation to the tip of the tree is 30° and 45° respectively, measured from two sides of a ravine, and width of the ravine at the top is 15" m and height of the eye of observer from the ground is 1·5 m, find the height of the tree [P2/2(b) | 8 M].
• Calculate values of – [P2/3(a) | 10 M].
(i) Bark thickness;
(ii) Log volume OB;
(iii) Log volume UB;
(iv) Volume of bark, and
(v) Bark percentage,
for a log with measurements DBH OB = 130 cm, DBH UB = 124 cm and Length = 4·8 m
• Discuss the Metzer's Theory of Stem Form [P2/3(c) | 8 M].
• A tree with elliptical c/s when measured at BH by a Calipers gives two values as 71 cm and</td></tr>
</table>

	65 cm. Girth of the tree at BH by tape is 1·82 m. Calculate the basal area by three different methods, listing the methods clearly, and discuss which method is the correct one [P2/3(d) | 12 M]. • Estimation of ***Crown Volume*** depends on which factors and what are the different geometrical shapes of crowns? Write down the various formulae for measurement of crown volume [P2/2(c) | 10 M]. • Briefly explain the ***Monteith Formula*** for biomass estimation of plants [P2/7(e) | 5 M].
2011	• Describe reference point of ***Diameter/Girth Measurement*** on a standing tree [**P1**/1(b) | 10 M]. • Explain principles of ***Height Measuring*** instruments [P2/2(b) | 10 M]. • What is ***Quarter Girth Formula***? Why is it preferred for calculation of log volume? [P2/2(c) | 10 M]. • What is ***Yield Table***? How contents of yield table is utilized in forestry? [P2/3(c) | 10 M].
2010	• Comment on the comparative significance of ***Calliper*** and ***Tape*** for D.B.H. Measurement [P2/2(a) | 8 M]. • Write down the methods for laying out ***Sample Plots*** for periodic recording of growth data [P2/2(c) | 8 M]. • Explain the principle and use of ***Abney's Level*** [P2/3(c) | 10 M]. • Write principle of ***Christen Hypsometer*** and its use [P2/4(c) | 10 M].

[Part-II] REMOTE SENSING & GIS

2024	• What is **GPS**? Briefly explain its segments and its applications in forest inventories and monitoring [P2/1(c) | 8 M].
2022	• "Application of ***Remote Sensing*** and **GIS** helps in continuous forest cover monitoring and efficient forest management activities". Explain with Examples [P2/4(a) | 15 M].
2021	• Define ***Gioinformatics***. What are its elements? Explain its role in management and monitoring of forest resources [P2/2(a) | 15 M].
2020	• Why should **GIS** be considered as a 'Pure Science'? [P2/1(b) | 8 M]. • What are the application of ***Remote Sensing*** in forestry? [P2/3(a) | 15 M].
2019	• Describe the role of ***Remote Sensing*** and **GIS** in monitoring forest resources [P2/4(b) | 15 M].
2018	• Define ***Remote Sensing***. Discuss its *application in forest management* along with GIS applications [P2/4(c) | 10 M].
2017	• What are the applications of ***Remote Sensing*** and **GIS** in the field of forestry and wildlife? [P2/1(d) | 8 M].
2016	• Define ***Photogrammetry***. Discuss in detail its application in forest management [P2/1(d) | 10 M] • Thermal ***Remote Sensing*** has specific application in forest management, Describe [P2/3(b)|10 M]

	• The recent developments in **GIS** ***and Digital Image*** *Processing* make forest cover assessment and mapping more easier and accurate. Explain your views [P2/4(d) | 10 M].
2015	• Discuss how the microwave ***Remote Sensing*** has been found to be more useful in forestry than other satellite imageries [P2/4(c) | 10 M].
2014	• Differentiate between ***Geostationary*** and ***Sun Synchronous Satellite***; and satellite imagery and remote sensing [P2/1(b) | 8 M].
2012	• What are the advantages and disadvantages of **LANDSAT** images? [P2/2(d) | 8 M].
2011	• How is ***Remote Sensing*** advantageous as compared to ground surveys? [P2/1(e) | 10 M].
2010	• What are the ***Pictorial Elements*** used of interpretation of aerial photo graphs [P2/3(a) | 10 M]. • How does the ***Flying Height*** influence the scale of aerial photo graphs in hilly areas [P2/4(b) | 10 M].

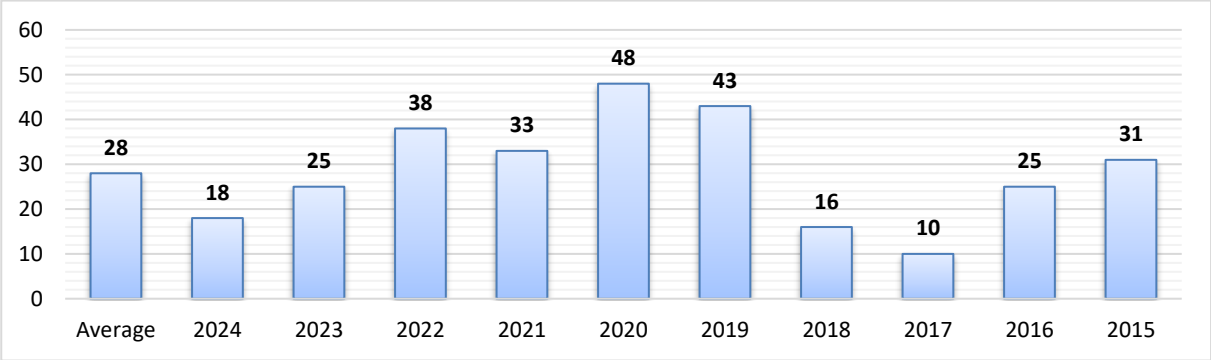
Primary Reference Resources

- Forest mensuration by Chaturvedi AN & Khanna LS, IBD publication Dehradun.
- Forest mensuration by Anthonie VL and Alparslan A, Springer publication.
- Forest mensuration by Kershaw JA et. al, Wiley Blackwell publication (5th edition).
- Forest inventory, Methodology and application by Annika k & Mattis M, Springer publication.
- Remote sensing and GIS by Basudeb Bhatta, Oxford University press (3rd Edition, 2020).

CHAPTER 3

FOREST SURVEYING & ENGINEERING

Surveying and Forest Engineering : ◈ ***Forest surveying*** - different methods of surveying, maps and map reading. ◈ Basic principles of ***forest engineering*** - Building materials and construction. ◈ ***Roads and Bridges*** - General principles, objects, types, simple design and construction of timber bridges.



2024	• Differentiate between ***Traverse Surveying*** and ***Chain Surveying*** [P2/1(d) | 8 M]. • Differentiate amongst ***Contour Line***, ***Contour Gradient*** and ***Contour Interval***. Describe the characteristics of contours [P2/4(c) | 10 M].
2023	• What do you understand by ***Bridges*** and ***Culverts***? Write the types of any two bridges with sketches [P2/4(c) | 10 M]. • Give a list of materials used in ***Construction of Building*** and describe the characteristics of any two materials [P2/3(a) | 15 M].
2022	• Write the general ***Principles of Surveying***. Describe (i) direct methods of chaining on sloping ground, and (ii) chaining when vision is obstructed, but chaining is free [P2/2(b) | 15 M]. • Explain the ***Single-Line*** and ***Double-Line*** Field Books with neat sketches. Mention the steps followed in the field work of Chain Survey [P2/3(b) | 15 M]. • Describe the major considerations of ***Road Alignment*** in the plains. Explain the terms (i) Gradient, (ii) Camber, and (iii) Drainage related to roads in the hills [P2/1(c) | 8 M].
2021	• Explain the term (i) True meridian, (ii) Magnetic meridian, (iii) ***Reduced Bearing***, and (iv) Fore and back bearing [P2/1(e) | 8 M]. • What are the advantages and disadvantages of ***Plane Table Surveying***? Describe Radiation, Intersection, Traversing and Resection methods of plane table surveying [P2/2(b) | 15 M]. • Describe structure of ***Suspension Bridge*** and Cantilever bridge. [P2/4(c) | 10 M].
2020	• Construction and maintenance of ***Forest Roads*** can be considered as an essential investment of forest growth. Comment [P2/1(e) | 8 M].

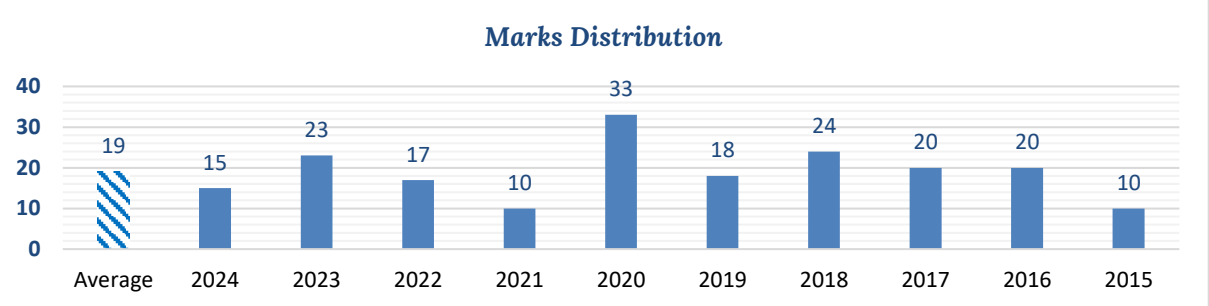
	• What are the factors that cause foundation failure during construction of a ***Forest Building***? [P2/2(c) | 10 M]. • What are the basic details of an engineering design of a ***Timber Bridge***? What steps should be taken to ensure its durability? [P2/3(b) | 15 M]. • What are the objectives of forest surveying? How does topographic survey aid in forest planning and management? [P2/4(a) | 15 M].
2019	• Define ***Bridge*** and explain different types of bridge with sketches. [P2/1(d) | 8 M]. • Give a list of ***Survey Methods*** adopted in Forest. Describe the survey of forest when a river comes in the way of Survey line. [P2/3(a) | 15 M]. • Explain concrete and write the characteristics of good ***Concrete Mixture*** [P2/3(c) | 10 M]. • What is ***Brick*** ? Describe different types of bricks giving their characteristics [P2/4(c) | 10 M].
2018	• What is the importance of surveying in forestry? Discuss different methods of surveying to solve the forestry field problems. [P2/1(a) | 8 M]. • Give the ***Classification of Forest Roads***. What features are required for a reconnaissance for forest roads? [P2/1(d) | 8 M].
2017	• Describe the ***Dead*** and ***Live Loads*** and how they are calculated on the roof trusses over buildings? [P2/3(c) | 10 M].
2016	• Enumerate the methods of direct ***Linear Measurements***. Discuss in brief the application of prismatic compass in forest survey [P2/2(d) | 10 M]. • Distinguish the ***Irish Bridge***, Simple ***Wooden Bridge*** and ***Suspension Bridge*** with details and neat sketches [P2/3(c) | 15 M].
2015	• ***Topographic Surveys*** are found useful in forest management. Discuss [P2/1(b) | 8 M]. • Which are the basic factors you have to look for before running out a survey lines in chain survey? [P2/1(e) | 8 M]. • How will you fined the reduced levels of the given points by height of collimation methods and rise and fall method and then check arithmetically? [P2/3(a) | 15 M]. • In a forest survey, you are provided a ***Prismatic Compass***. How will you accomplish the bearings of line AB? [P2/3(c) | 10 M].
2014	• How is ***Compass Survey*** done? what are the advantages of compass surveying? [P2/4(a) | 15 M].
2013	• Define the ***Arches*** used in construction. What are the different characteristics required in an arch? [P2/3(b) | 10 M]. • Describe all the ***5 Kinds of Chains*** used in survey and advantages and disadvantages of chain surveys [P2/3(c) | 8 M]. • Write down the ***Chemical Constituents*** of earth (chemical formula and percentage range of contents) for manufacture of good quality of *bricks*. [P2/3(d) | 7 M]. • Find out the maximum and minimum pressures of a wall which is 60 ft long and 4.5 ft wide at the base of its footing, carrying loads at the following distances from the left hand side : 20 tons at 10 ft, 30 tons at 25 ft, 40 tons at 28 ft, 48 tons at 50 ft and 12 tons at 55 ft. [P2/4(d) | 15 M].

2012	• Describe the structure of ***Dumpy Level*** through a well labelled diagram. [P2/3(b) | 10 M]. • Discuss the "***Two-Point Problem***" - the special case of resection in Plain Table Survey. [P2/4(a) | 12 M]. • Describe the limitations and advantages of ***Plane Table Survey***. [P2/4(b) | 8 M].
2011	• Describe how you would continue the line with the chain only, When (20 m) [P2/4(a) | 20 M]. (i) A large river interrupts the chain line, and (ii) A forest area comes across the chain line • Explain the term [P2/4(b) | 10 M]. (*i*) Whole circle bearing, and (*ii*) Quadrantal bearing • Describe, with sketches of ***Suspension Bridge***. [P2/4(c) | 10 M].
2010	• Describe methods of using ***Prismatic Compass*** in forest surveys. [P2/1(f) | 8 M]. • Distinguish between ***Irish Bridge***, ***Suspension Bridge*** and ***Cantilever Bridge***. [P2/2(e) | 8 M].

CHAPTER 4

FOREST ECOLOGY

Forest Ecology : ◈ ***Biotic*** and ***Abiotic Components***, forest ecosystems; forest community concepts; vegetation concepts, ecological succession and climax, primary productivity, nutrient cycling and water relations. ◈ ***Physiology in Stress Environments*** (drought, water logging salinity and alkalinity). ◈ ***Forest Types*** in India, identification of species, composition and associations. ◈ ***Conservation Of Forest Ecosystems***. ◈ ***Clonal Parks***.



2024	• Describe in brief the importance of ***Biogeochemical Cycles***. Compare between carbon cycle and nitrogen cycling [P2/6(a) | 15 M].
2023	• Describe the major attributes of forest ecosystem [P2/5(a) | 8 M]. • Explain different types of ***Biodiversity*** and describe various methods for its management [P2/6(b) | 15 M].
2022	• Discuss the components of a desert ecosystem. Write steps to control shifting of sand dunes [*Linked Q : Wasteland management* | P2/6(b) | 15 M]. • What are Commensalism, Amensalism, Mutualism and Symbiosis? Write the functions of an ecosystem [*Linked Q : Silviculture* | P2/8(c) | 10 M].
2021	• Justify the statement "Wild animals are one of the biotic components of the forest ecosystem" How do they help in forest regeneration? [P2/6(c) | 10 M].
2020	• Why is carbon cycle important? How do human activities affect ***Carbon Cycle***? [P2/6(c) | 10 M]. • Describe the ***In-Situ*** biodiversity conservation with reference to Biosphere Reserves [P2/5(e) | 8 M]. • What do you mean by ***Population Diversity***? What are the different methods to measure biodiversity? [P2/6(a) | 15 M].
2019	• What are ***Ecological Pyramids***? Explain different types. Mention the implications of concepts of ecological pyramids in understanding forest ecosystems [P2/7(c) | 10 M]. • Describe the features and importance of ***Clonal Parks*** in forest conservation [P2/5(a) | 8 M].
2018	• What is ***Carbon Sink*** *?* How do forest soils act as important carbon sinks? [P2/5(b) | 8 M].

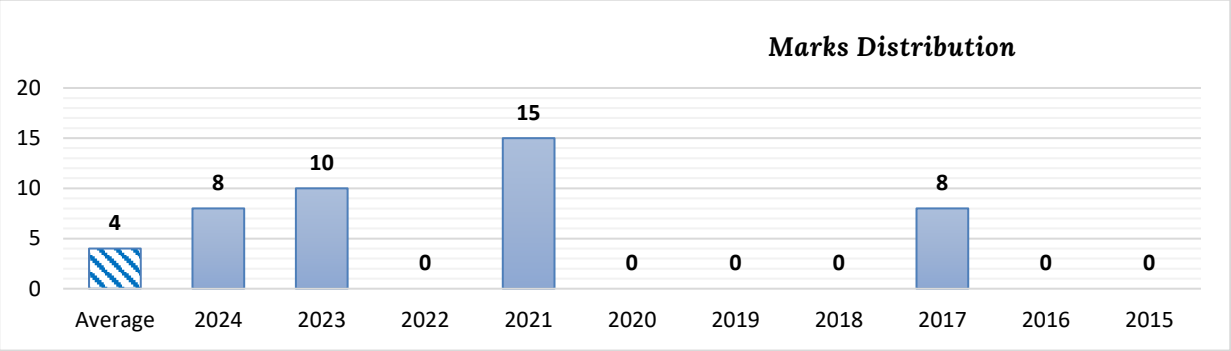
	• Forest ecology is the study of complex interactions between organic and inorganic components of the forest ecosystem. Explain organic and inorganic components providing two examples of each as they relate to the forest ecosystem [P2/5(c) | 8 M]. • What is the ecological and economical importance of ***Biodiversity***? Mention the salient measures for conservation of biodiversity [P2/5(d) | 8 M].
2017	• Discuss the term ***Biodiversity***. Explain the levels in which it can be studied. What are the different measures employed to measure biological diversity? Elaborate [**P1**/6(a) | 20 M].
2016	• Garg (1988) described the ***Ecological Pyramid*** as a graphical representation of relationship between the trophic levels of an ecosystem. Explain with the help of neat diagrams [P2/5(a) | 10 M]. • Define ***Ecological Amplitude***. Describe the classification and characters of plant communities [P2/8(d) | 10 M].
2015	• Why is ***Carbon Recycling*** important? What are its influences on climate? Discuss your points for or against [P2/6(a) | 10 M].
2014	• Which are the six major attributes of an ecosystem-explain in detail [P2/5(b) | 8 M].
2013	• Describe the ***Qualitative Characteristics*** of plant community [P2/8(e) | 5 M]. • Discuss about the different kinds of ***Food Chains*** in different habitats and ecosystems [P2/5(d) |8]
2012	• What is the role of different techniques involved in connection with conservation and multiplication of threatened species? [**P1**/6(g) | 5 M]. • Describe Raunkier's life forms [P2/5(e) | 8 M]. • Discuss "ecological amplitude" and the law of tolerance" in the context in which they are generally used [P2/6(d) | 6 M]. • Discuss the phytosociological analysis describing formulae for calculation of [P2/7(a) | 15 M]. (i) Frequency and relative frequency, (ii) Density and relative density (iii) Abundance (iv) Relative dominance, and (v) Importance value index (IVI) • Explain with the help of suitable examples the various kinds of Population Interactions during their growth period and give difference between ***Commensalism*** and ***Amensalism*** of plant relationship [*Linked Q : Silviculture* | P2/7(a) | 10 M]. • Write short notes on – [**P1**/8 (a, e, f) | 5 × 3 = 15 M]. (1) Source-sink relationship with respect to carbon cycle (5 m). (2) Energy flow model in ecosystem (5 m). (3) ***Ex-situ*** and ***in-situ*** conservation (5 m). • Describe the mathematical expression for Biotic Potential and Environmental resistance [*Linked Q : Wildlife* | P2/6(c) | 6 M].
2011	• Discuss the direct use ***Value of Biodiversity*** [**P1**/5(d) | 10 M]. • Name the biodiversity **Hot Spots** in India. Discuss the major threats to biodiversity [**P1**/7(d) | 10 M]

2010	• "Tropical regions are rich in floral biodiversity as compared to temperate regions" Do you agree? [**P1**/1(f) | 5 M]. • Differentiate between the following – (iv) ***Net Primary Production*** and ***Yield*** [**P1**/3(a) iv | 5 M]. • What do you understand by the term ***'Hot Spot'*** in relation to floral biodiversity? Explain methods of ***Ex-Situ*** and ***In-Situ*** conservation [**P1**/7(a) | 10 M]. • How are different parameters used in System Ecology? [P2/8(b) | 10 M].

CHAPTER 5

DENDROLOGY

Dendrology : ◈ ***Taxonomic Classification***, principles and establishment of herbaria and arboreta

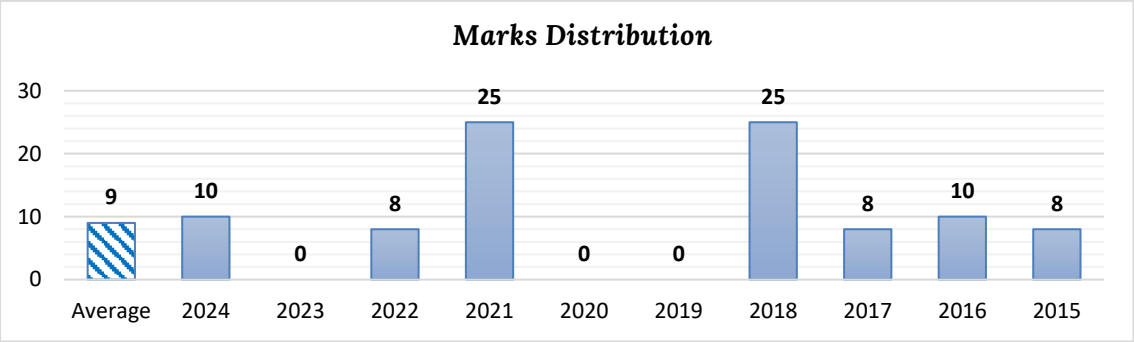


2024	• What are the different steps for preparation of ***Herbarium Specimens***? [P2/5(b) | 8 M].
2023	• What are the different types of ***Plant Classification Systems***? Name the one which is mostly followed in Indian herbaria [P2/8(c) | 10 M].
2021	• What are holotype, neotype, lectotype and syntype of plant science? Describe the role of arboreta and ***Clonal Parks*** in conservation of biodiversity [P2/8(b) | 15 M].
2017	• Define ***Herbarium*** and write its significance. What are the steps in establishing herbarium and which method of plant classification is followed in herbarium arrangement? [P2/5(a) | 8 M].
2010	• List merits of ***Bentham*** and ***Hooker*** system of plant classification used in dendrology [P2/5(d) | 8 M].

CHAPTER 6

ETHNOBOTANY

Ethnobotany : ◈ ***Role of Ethnobotany*** in Indian Systems of Medicine; Ayurveda and Unani. ◈ Introduction, nomenclature, habitat, distribution and botanical features of ***Medicinal*** and ***Aromatic Plants***. ◈ Factors affecting action and ***Toxicity of Drug Plants*** and their chemical constituents.



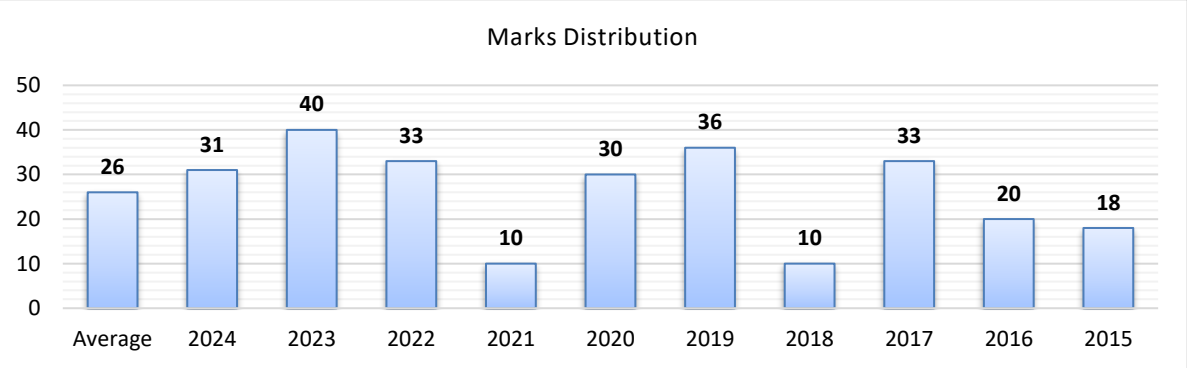
2024	• How does the knowledge of Ethnobotany contribute in the ***Indian System of Medicines***? [P2/7(c) | 10 M].
2022	• Describe the principles of ***Ayurvedic System*** of treatment. Write scientific names of five common tree species used in Ayurveda [P2/5(d) | 8 M].
2021	• Discuss the role of ***Tree Domestication*** in biodiversity conservation [**P1**/8(c) | 10 M]. • Write the scientific name of ***10 Medicinal Plants*** and their uses [P2/7(a) | 15 M].
2018	• Define ethnobotany. Write in detail about the role of ethnobotany in ***Modern Medicine*** and its approaches to the drug industry [P2/7(a) | 15 M]. • Enlist the common and scientific names of trees and shrubs (seven each) having medicinal importance in ethnobotany [P2/7(c) | 10 M].
2017	• What is ethnobotany and describe the role of ethnobotany in the ***Indian Systems of Medicine*** [P2/5(e) | 8 M].
2016	• The knowledge of ethnobotany helps to identify viable medicinal plants for ***Pharmaceutical Industries***. Explain [P2/5(b) | 10 M].
2015	• Give the scientific names of at least five drug yielding plants with their use in ***pharmaceutical industry*** [P2/5(e) | 8 M].
2013	• Write short notes on the following medicinal plants [P2/7(d) | 4 × 2.5 M]. (i) Aconitum heterophyllum (ii) Orchis latifolia (iii) Podophyllum emodii (iv) Morchella esculanta

	• Write critical notes on any four of the following – [P2/8(b) *iii* | 3 × 2.5 M]. (*iii*) ***Siddha system*** of medicines (2.5 m). (*iv*) Drugs of Alkaloids (*v*) Biological evaluation of Drugs
2012	• Describe the economic importance of *Acacia nilotica*, *Terminalia belerica*, *Vitex negundo* and *Madhuca latifolia* in detail [**P1**/7(d) | 10 M].

CHAPTER 7

FOREST PROTECTION

Forest Protection: ◈ ***Injuries To Forest*** – abiotic and biotic, destructive agencies, insect-pests and disease, effects of air pollution on forests and forest die back. ◈ ***Susceptibility of Forests*** to damage, nature of damage, cause, prevention, protective measures and benefits due to chemical and biological control. ◈ ***General Forest Protection*** against fire, equipment and methods, controlled use of fire, economic and environmental costs; ◈ ***Timber Salvage Operations*** after natural disasters. ◈ ***Role of Afforestation*** and forest regeneration in absorption of CO_2. ◈ Rotational and controlled grazing, different methods of control against grazing and browsing animals; ◈ ***Effect of Wild Animals*** on forest regeneration, ◈ ***Human Impacts*** – encroachment, poaching, grazing, live fencing, theft, shifting cultivation and control.



2024	• Discuss the ***Effect of Wild Animals*** on forest regeneration [P2/5(d) | 8 M]. • Explain different methods for prevention and control of ***Insect-Pests*** in forests, plantations and nurseries. Mention the major insect-pests in *Teak*, *Deodar*, *Sal* and *Shisham* [P2/6(b) | 15 M]. • What are ***Forest Rights***? Which general principles may be applied for ***Protecting Forests Against Misuse*** of rights and concessions? [*Linked* Q | P2/8(a) | 15 M].
2023	• What constitute ***Fire Environment*** in a forest? Describe different types of forest fires and write the significance of fire line [P2/7(a) | 15 M]. • Explain ***Rotational Grazing*** and discuss its significance to restore natural regeneration [P2/7(c) | 10 M]. • What is deforestation? Discuss the impact of deforestation on the environment [**P1**/6(c) | 15 M].
2022	• What are the ***Biotic*** and ***Abiotic Stresses*** on trees? Explain the responses of trees to these stresses [*Linked* Q | P2/5(a) | 8 M]. • Describe the ***Adverse Climatic Factors*** causing damage to forests [P2/8(b) | 15 M]. • Explain the ***Salvage Operations*** for plantation trees after natural disasters [P2/6(c) | 10 M].
2021	• What is ***Controlled Burning***? How does it help in improving forest regeneration? [P2/8(c) | 10 M].

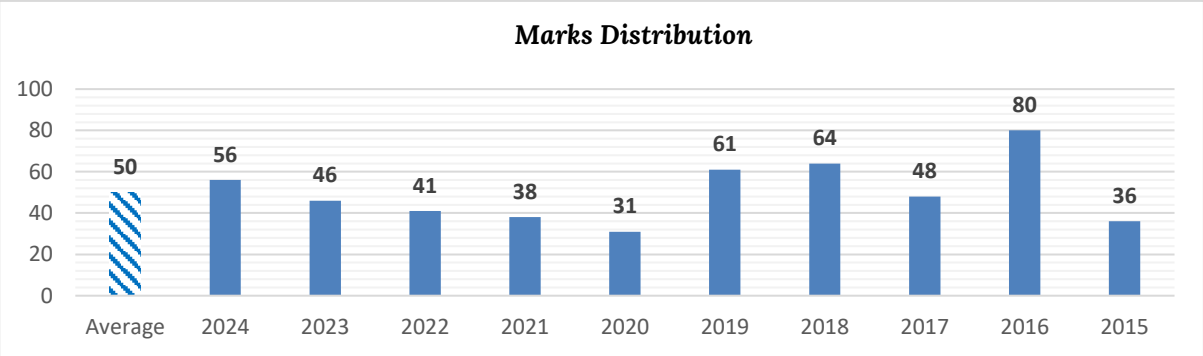
2020	• What is the need to protect the forests? Enumerate the ***major threats responsible for forest injuries***. Suggest suitable preventive and protective measures to safeguard the forest wealth [P2/6(b) | 15 M]. • What is the ***significance of afforestation and reforestation*** to the ecosystem? How are the National Afforestation programme, Green India Mission and Forest Fire Prevention and Management Scheme helping in restoration of forests? [*Linked* Q | P2/7(a) | 15 M].
2019	• Describe how ***Controlled Fire*** can be used as a tool in forest management [P2/5(d) | 8 M]. • What is ***Controlled Grazing***? Describe how it helps in the better management of forest pasture land [P2/6(c) | 10 M]. • Describe the ***Causes*** *of* ***Deforestation***. What are the measures to be taken for the control of deforestation? [P2/8(c) | 10 M]. • What do you mean by ***Deforestation***? Explain the major causes of deforestation [P1/5(d) | 8 M].
2018	• What are the causes of ***Forest Fire***? What measures are taken to protect forests against damage by fire? [P1/7(c) | 10 M].
2017	• Discuss briefly the ***Impacts*** *of* ***humans*** *on* ***Forest Health***. Explain different measures to check forest encroachment [P2/6(c) | 10 M]. • Describe ***Types*** *of* ***Forest Fires***, their ill-effects and preventive measures. Briefly discuss the role of forest fire on forest ecosystems [P2/8(a) | 15 M]. • What are the major ***Grazing Systems*** *and* ***grazing regions*** in India? Describe briefly, methods to prevent pressure from grazing in forests [P2/5(c) | 8 M].
2016	• ***Forest Fire*** still remains a major threat to forest ecosystems across the globe. How do you address this issue? [P2/5(d) | 10 M]. • Describe the benefits and limitations of ***Chemical*** *and* ***Biological Control Of Diseases*** in forest nurseries and plantations [P2/7(d) | 10 M].
2015	• There are measures which are taken to protect the forests from ***Fire Damage***. Which are those and how effective have they been? [P2/5(d) | 8 M]. • Does ***Rotational Grazing*** have an advantage over ***Controlled Grazing*** in the smooth management of forest ecosystems? Give your reasons for and against, both. [P2/6(c) | 10 M].
2014	• Do you think that the ***Controlled Fire*** is beneficial to forest vegetation? Discuss [P1/4(c) | 10 M].
2013	• Discuss different ***Methods of Disease Control*** in forest nursery with examples [P2/6(c) | 8 M]. • Describe the ***Anthropogenic Causes of Forest Destruction***. How can these be checked? [P1/7(a) | 10 M].
2012	• Briefly discuss – ***Lopping*** management. [P1/2(c) *ii* | 4 M]. • Comment on the view that after deforestation ***Forest Fires*** are most important cause of forest destruction. Also give different types of forest fires and their causes, and preventive measures for forest fires. [P1/3(c) | 8 M]. • Describe the extent, method of cultivation and effects of ***Shifting Cultivation***. Suggest some suitable alternatives to shifting cultivation. [P1/5(d) | 5 M]. • What are the main reasons for ***Decline*** *of the* ***Forest Cover*** in our country? [P1/6(a) | 5 M].

	• Distinction between Potential and Deferred Grazing [**P1**/6(e) | 5 M]. • What are the causes of ***Forest Fire*****?** Discuss in brief the damage caused to forest by fire along with its control [**P1**/6(h) | 5 M]. • Describe the prevention and control of termite damages in timber [P2/7(b) | 5 M]. • State what are the plant parasitic nematodes associated with nursery forest plant species. [P2/7(d) | 5 M]. • Describe various ***Types*** *of* ***Grasslands*** mentioning the associations of grasses and their environmental locations in the different regions of India [as described by Whyte (1957)]. [P2/5(c) | 8 M].
2011	• Write short notes on – ***Forest Decline*** (2.5 m) [**P1**/7(c) ii | 2.5 M]. • How severe is the damage of ***Ganoderma*** in Indian Forests? Discuss with some case history [P2/6(c) | 10 M]. • How grazing is managed for the ***Browsing Animals***? Discuss various management options for *sustainable grazing* in forest. [P2/7(c) | 10 M].
2010	• Write short notes on – ***Lopping Management*** [**P1**/5(d) | 5 M]. • What are ***Fire-Prone Areas***? How are these detected? What precautionary measures need to be taken to overcome this problem? [P2/5(f) | 8 M]. • How is damage due to ***Teak Defoliator*** and stem borer managed in the plantations? [P2/6(b) | 10 M]. • Write causal pathogens of important diseases of ***Poplar*** *and* ***Gmelina arborea***. Write integrated management of any one disease in each species [P2/8(a) | 10 M].

CHAPTER 8

FOREST UTILIZATION

Forest Resources & Utilization : Environmentally sound forest harvesting practices; logging and extraction techniques and principles, transportation systems, storage and sale. Anatomical structure of wood, defects and abnormalities of wood, timber identification – general principles. ◈ Need and importance of ***Wood Seasoning and Preservation***; general principles of seasoning, air and kiln seasoning, solar dehumidification, steam heated and electrical kilns. ◈ ***Composite Wood*** – adhesives -manufacture, properties, uses, plywood manufacture-properties, uses, fibre boards-manufacture properties, uses; particle boards manufacture; properties, uses. Present status of composite wood industry in India and future expansion plans. ◈ ***Non-Timber Forest Products*** (NTFPs) – definition and scope; gums, resins, oleoresins, fibres, oil seeds nuts, rubber, canes, bamboos, medicinal plants, charcoal, lac and shellac, Katha and Bidi leaves, collection; processing and disposal. ◈ ***Pulp Paper*** and ***Rayon*** – present position of supply of raw material to industry, wood substitution, utilization of plantation wood; problems and possibilities.



2024	• Explain (i) tensile stress, (ii) shear strain, (iii) compressive stress, (iv) Young's modulus of elasticity and (v) rigidity modulus [P2/2(c) | 10 M]. • Explain the ***Anatomical Features*** of hardwoods [P2/5(a) | 8 M]. • Describe the ***Classification of Timbers*** based on the air-dry weight method with example of tree species [P2/5(e) | 8 M]. • What are the different types of ***Composite Woods***? Differentiate between fibre board and particle board [P2/7(a) | 15 M]. • Explain the importance of ***Wood Preservatives***. Differentiate between water soluble type and organic solvent type of wood preservatives [P2/8(b) | 15 M].
2023	• What are ***Gums***? How do they differ from resins? Write the botanical names of two plants of each. [P2/5(b) | 8 M]. • Write the botanical names of six tree species yielding ***Essential Oil***. [P2/5(d) | 8 M]. • Compare different types of ***Composite Wood***. Name the tree species which are mainly preferred for it. Write the future prospects of composite wood industry in the country [P2/7(b) | 15 M]. • Explain the present status, scope and constraints of ***Biofuel Production*** in India. Write the

	botanical names of five tree-borne oilseeds [P2/8(b) | 15 M].
2022	• Mention any eight ***Specialized Uses of Wood*** with examples [P2/5(b) | 8 M]. • Explain the role of renewable energy sources like solar energy in ***Wood Seasoning*** [P2/5(c) | 8 M]. • Trace the ***History of Logging*** in India. Explain how mechanization in harvesting and extraction helps in reducing the wastage and improving efficacy of logging [P2/6(a) | 15 M]. • "Increasing usage of ***Composite Woods*** necessitates the needs for increased raw material from plantations for short rotation trees" Explain [P2/7(c) | 10 M].
2021	• Write the general principles of ***Wood Seasoning***. How is electrical kiln seasoning advantageous over air seasoning? (15m) [P2/6(a) | 15 M]. • What are ***Gums***, ***Resins***, ***Oleoresings*** and ***Gum Resings***? Classify and give at least two examples under each group [P2/8(a) | 15 M]. • Unscientific harvesting of **NTFPs** has led to depletion of NTFP resources. Discuss [P2/5(d) | 8 M].
2020	• What are the recommended practices for ***Strategic Harvest Planning***? [P2/1(d) | 8 M]. • What are the rules laid down for ***Efficient Felling***? Classify the timbers based on industrial use [P2/5(d) | 8 M]. • Describe the process of ***Wood Formation***. Write in details about the physical, chemical and mechanical properties of wood [P2/8(a) | 15 M].
2019	• What is ***Reduce Impact Logging*** (RIL) ? What is its composition? Explain the benefits of RIL. [P2/5(b) | 8 M]. • Define ***Non-Timber Forest Products*** (NTFPs). Explain their importance to human societies and economy. [P2/5(c) | 8 M]. • Define wood. Explain the microscopic/***Anatomical Features*** which aid in identification of timber species in details. [P2/6(a) | 15 M].
2019	• What are ***Particle Boards***? Explain the features of different types of particle boards. [P2/7(b) | 15 M]. • List different system and methods of ***Sale of Forest Produces***. What are the different methods of sales adopted in state forest department? [P2/8(b) | 15 M].
2018	• What are the industrial uses of ***Gums*** *and* ***Resins***? Discuss the factors affecting the production and supply of gums and resins [P2/5(a) | 8 M]. • Write down four advantages of timber ***Seasoning*** and suggest which one is commercially suitable over other methods, with suitable examples. [P2/5(e) | 8 M]. • List out ***Different Types*** *of* ***Preservatives*** used for protection of timber against fungi and insects and classify them based on solvent used. [P2/6(a) | 15 M]. • What are the key elements of the wood industry and paper industry strategies? Explain [P2/8(a) | 15 M]. • Describe the ***Defects*** *that Appear* ***During Seasoning*** in timbers [P2/8(c) | 10 M].
2017	• Briefly write about the ***Natural Defects*** observed in wood. [P2/5(b) | 8 M]. • What is ***Wood Seasoning***? Write in detail the aims of wood seasoning and explain salient steps in manufacturing of plywood. [P2/6(b) | 15 M]. • What is ***Logging***? What are the objects of felling? Briefly write the general rules of felling and

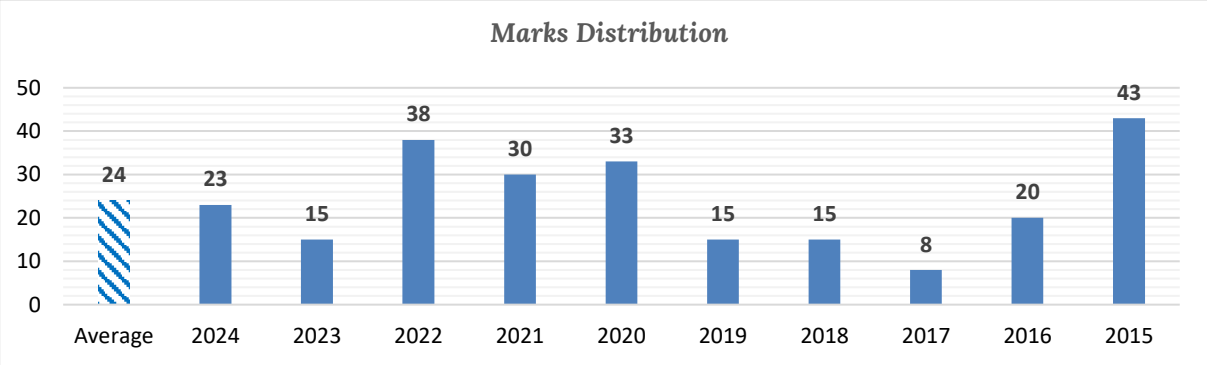
	basic cuts of tree felling. [P2/7(a) | 15 M]. • What are the differences between ***Gums*** and ***Resins***? How are gums and resins classified? Enlist different methods of tapping resins. [P2/8(c) | 10 M].
2016	• ***Clonal Forestry*** approach proved successful in meeting the industrial wood demand particularly pulpwood. Substantiate your view and perception in this regard [P2/4(a) | 10 M]. • Dry deciduous forests are rich in ***Non-Timber Forest Products*** (NTFPs). Justify the statement with examples [P2/5(c) | 10 M]. • Give an account of ***Mechanical Properties*** of wood and suggest the standard tests for the same [P2/6(c) | 10 M]. • ***Bamboos*** become the major raw material for many cottages as well as corporate industries. Explain [P2/7(a) | 10 M]. • What are the general principles and ***Advantages of Wood Seasoning***? Describe the solar kiln seasoning with neat sketches [P2/7(b) | 10 M]. • Write critical notes on the following [P2/7(c) | 10 M]. (a) *Gums* (b) *Oilseeds* (c) *Katha* (d) Bidi leaves • Give an account of ***Composite Wood*** products and their utilities [P2/8(b) | 10 M]. • Explain the recent developments in mechanization of ***Logging Operations*** and their impact on the efficiency and wastage [P2/8(c) | 10 M].
2015	• There are various processes involved in the expression and ***Extraction*** *of* ***Oilseeds*** available in forests. Elaborate on the processes involved and their utilization [P2/5(a) | 8 M]. • Timber encounters many different problems during the process of ***Drying***. What are those problems and how are they overcome? [P2/5(b) | 8 M]. • Indian forests are found to be rich in ***Different*** *kinds of* ***Non-Timber Forest Products*** (NTFPs). Can you list at least 10 NTFPs? [P2/6(b) | 10 M]. • What are the major ***Fibres*** and ***Flosses*** which are obtained from forests in India? Citing at least ten species, discuss their commercial importance [P2/8(d) | 10 M].
2014	• Write in detail the processing and uses of ***Tannins*** in India [P2/5(d) | 8 M]. • Explain the term ***Logging***, its purposes and stages [P2/5(e) | 8 M]. • What is wood preservation? Why is ***Preservation*** *of* ***Wood*** necessary? Mention main types of wood preservation methods [P2/6(b) | 15 M].
2013	• What are advantages of ***Wood Seasoning***? Describe the various methods of wood seasoning and mention classification of timbers for seasoning [P2/6(a) | 15 M]. • Give the ***Classification of Timbers*** based on air dry weight with suitable examples [P2/8(d) | 7 M].
2012	• Explain properties of good ***Wood Preservatives*** and classify the various Wood Preservatives with the help of a flowchart [P2/6(a) | 12 M]. • Describe the ***Boucherie Process*** of Wood preservation with its advantages [P2/6(b) | 6 M]. • Briefly comment on the extent of ***Wastage*** (in approximate percentage of total timber content) from harvesting to marketing stages and give the reasons for such wastages [P2/8(d) | 5 M]. • What are the set of tools used in ***Rill Method***? Briefly highlight their features [P2/4(d) | 10 M]. • Differentiate between the following – **NTFPs** and **MPTs** [**P1**/3(a) *iii* | 4 M]. • Write short notes on – (g) ***Heartwood*** and ***Sapwood*** [**P1**/8(g) | 5 M].

2011	• List 10 bamboo species of commerce in India with their scientific name & state of origin [P2/5(a) | 10 M]. • Write Common and scientific names of 10 tree species yielding resins and Oleo-resigns (10 m). [P2/5(e) | 10 M]. • What are the ***Wood Composites***? How they are prepared? What are the common gluing agents used in wood composites? [P2/7(a) | 20 M]. • Discuss the various ***Common Defects*** encountered after harvesting of the wood during stacking [P2/8(c) | 10 M].
2010	• What are the ***Keys*** *to* ***Identify Timbers*** *for* ***Construction Purpose***? [P2/5(a) | 8 M]. • Name five important tree species used for axle and wheels of different carts. In which regions of country is this sort of transportation more prevalent? State the reasons [P2/5(c) | 8 M]. • Name five ***Aromatic Grasses*** with their uses and methods of extraction [P2/8(c) | 10 M]. • There is no replacement for ***Rattans*** in forest-based industry" Justify this statement and list five important species reported from different parts of the country [P2/8(d) | 10 M]. • What are the different types of water-soluble ***Wood Preservatives***? [P2/7(b) | 10 M].

CHAPTER 9

FOREST LEGISLATION

Forest Policy : ◈ ***History*** of forest development ◈ Indian ***Forest Policy*** of 1894, 1952 and 1988. National Forest Policy 1988 of People's involvement, Joint Forest Management, Involvement of women; Forestry policies and issues related to land use, timber and non-timber products, sustainable forest management; industrialisation policies; institutional and structural changes. ◈ ***Decentralization*** and Forestry Public Administration. ◈ **Forest Laws** : necessity, general principles, Indian Forest Act 1927; Forest Conservation Act, 1980; Wildlife Protection Act 1972 and their amendments ◈ Application of ***Indian Penal Code*** to Forestry.



2024	• Explain, as per the ***Indian Forest Act, 1927***, (*i*) reserved forests, (*ii*) protected forests, (*iii*) unclassed forests and (*iv*) village forests [P2/5(c) | 8 M]. • What are ***Forest Rights***? Which general principles may be applied for protecting forests against misuse of rights and concessions? [P2/8(a) | 15 M].
2023	• Discuss the salient features of the ***Wildlife (Protection) Act, 1972*** and write its significance in dealing with wildlife offences [P2/8(a) | 15 M].
2022	• Write the provisions of the ***Indian Forest Act, 1927***, applied to declare village forests and protected forests [P2/5(e) | 8 M]. • Write the salient features of India's ***National Forest Policy, 1998***. Justify the statement "India needs a revision of Forest Policy" [P2/7(b) | 15 M]. • Describe the provision of the ***Forest (Conservation) Act, 1980*** on (i) restriction on the de-reservation of forest land for non-forest purpose, and (ii) diversion of forest land for regularisation of encroachment [P2/8(a) | 15 M].
2021	• Write the provisions of sections 35, 37 and 38 under the ***Indian Forest Act, 1927***, applied to control over forests and land not being the property of the government. [P2/6(b) | 15 M].

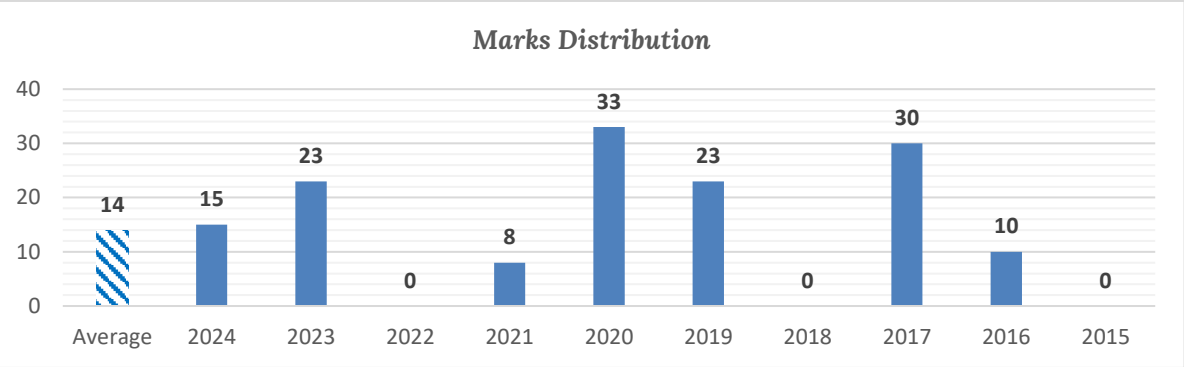
	• Describe the provisions of sections (3 – 27) of the ***Indian Forest Act, 1927*** applied to declare any forest land or wasteland as a Reserve Forest over which the government has proprietary rights. [P2/7(b) | 15 M].
2020	• What are the direct roles of the ***Biodiversity Act, 2002*** in conservation of wildlife? [P2/5(b) | 8 M]. • Write in details about the historical background of forest policies in India and their aims. Describe in brief about the organization of forest sector in India. [P2/8(b) | 15 M]. • How has the ***National Forest Policy*** *of* **1988** changed the national scenario? Describe in brief. Highlight some major achievements in relation to the above policy. [P2/8(c) | 10 M].
2019	• Write in detail regarding the appointment of authorities and restrictions of hunting of wild animals under the ***Wildlife (Protection) Act*** *of* **1972**. [P2/8(a) | 15 M].
2018	• What are the main differences between forest policy and forest laws? Give *salient* points of the National Forest ***Policy*** *of* **1952** and **1988**. [P2/8(b) | 15 M].
2017	• Narrate the ***Background*** and ***Objectives*** of implementation of national ***Forest Policies*** of India. [P2/5(d) | 8 M].
2016	• Compare and contrast the ***Indian Forest Act, 1927*** and the ***Forest Conservation Act, 1980***. [P2/6(a) | 10 M]. • How are "Environment", Environmental pollutant" and "Hazardous substance" narrated in environment (protection) act, 1986? [**P1**/7(b) | 10 M].
2015	• Give a comparative and appropriate statement on the Natural Forest ***Policy of 1988*** with that of **1952**. [P2/7(a) | 15 M]. • Describe the ***role*** *of* ***Permanent Forest Policy*** after its enactment for the regulation of forestry management in India. [P2/8(b) | 10 M]. • Discuss the important role of The ***Wildlife Protection Act, 1972*** in forest management. Give salient points only [P2/8(a) | 10 M]. • What is the penalty prescribed in Section 15 of the Environment (Protection) Act, 1986 for contravention of the provisions of the Environment Act rules and orders? [**P1**/5(c) | 8 M].
2014	• Describe the salient features of ***National Forest Policy 1988***. How does it differ from the 1952 Forest Policy? [P2/8(c) | 10 M].
2013	• Discuss the procedure for declaration of reserved forests in the backdrop of important sections of the Indian Forest Act, 1927 [P2/5(a) | 8 M]. • What are the factors responsible affecting forest policy? Discuss (8 m). [P2/5(e) | 8 M]. • Mention the salient features of ***National Forest Policy, 1988***, and discuss its advantages over ***N.F.P. 1894***. [P2/6(b) | 10 M].

	• Describe the salient features mentioned in the ***New Draft Forest Bill, 1994***. [P2/7(b) | 10 M]. • Briefly describe the national legislation on biodiversity. Name the activities for which States can seek funds from the Central Government [**P1**/7(c) | 10 M].
2012	• Bring out the ***Background*** and ***Need*** for ***Forest Policy Of 1988*** with its basic objectives [P2/8(a) | 15 M]. • Attempt the following, keeping your answers brief and to the point : (a) "Describe Section (2) of Forest Conservation Act of 1980" [P2/5(a) | 8 M].
2011	• Write the constitution of ***National Board of Wildlife***. Explain the provisions of the Sections of wildlife (Protection) Act 1972, Used to declare an area as 'Sanctuary' [P2/8(a) | 20 M].
2010	• What are the functions of ***Indian Board For Wildlife*** with regard to conservation of wildlife? [P2/7(d) | 10 M].

CHAPTER 10

FOREST ECONOMICS

Forest Economics : ◈ ***Fundamental Principles***, Cost-benefit analyses; Estimation of demand and supply; ◈ Analysis of ***Trends*** *in the* ***National*** *and* ***International Market*** and changes in production and consumption patterns; assessment and projection of market structures ◈ Role of ***Private Sector*** and ***Co-Operatives***; role of corporate financing. Socio-economic analysis of forest productivity and attitudes ◈ ***Valuation*** of forest goods and service.



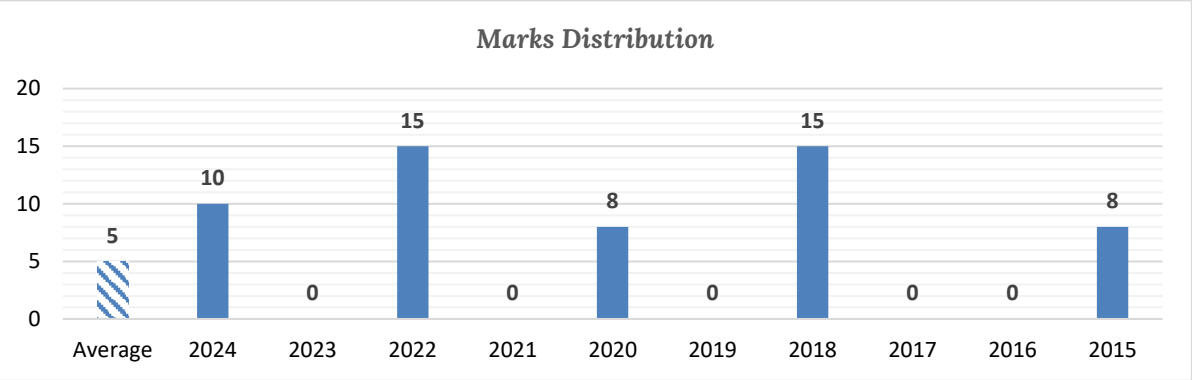
2024	• What are ***Ecosystem Services***? Differentiate between use values and non-use values. Explain different methods of valuation of ecosystem services [P2/7(b) | 15 M].
2023	• Explain the ***Fundamental Principles*** involved in forest economics [P2/5(e) | 8 M]. • What is ***Cost-Benefit***? Explain demand and supply with respect to forestry [P2/6(a) | 15 M].
2021	• Mention different ***Methods of Valuation*** of intangible services from forest ecosystem and explain any one [P2/5(e) | 8 M].
2020	• How does inflation influence forest goods? Briefly explain the ***Types*** *of* ***Inflation*** that directly influence the price of forest goods. [P2/5(c) | 8 M]. • Discuss the role of forest resources in the Indian economy. Suggest suitable storage methods for wood or other forest produce and their management strategies [P2/6(a) | 15 M]. • What do you understand by ***Forest Valuation***? Discuss in brief. Describe various valuation techniques for forests. [P2/7(c) | 10 M].
2019	• Discuss various ***Channels*** *for* ***Marketing*** of forest products [P2/5(e) | 8 M]. • What is ***Forest Valuation***? Write its objective and briefly explain the methods of forest valuation. [P2/7(a) | 15 M].

2017	• Explain the ***Discounting Measures*** *in* ***Forest Business Management*** with different formulae used in forest economics. [P2/7(b) | 15 M]. • Discuss in detail the roles and interventions of Government and Private agencies in marketing of forest produce. [P2/8(b) | 15 M].
2016	• Explain the ***Concept*** *of* ***Demand*** with the help of demand curve and its application in forest trade. [P2/6(b) | 10 M].
2013	• Give the important features of ***Demand*** *and* ***Supply Curves***. What are the factors responsible for demand and supply of forest produce? [P2/6(d) | 7 M].

CHAPTER 11

WILDLIFE BIOLOGY

Wildlife Biology : There is virtually no syllabus other than mentioning the subject title + Few things linked with wildlife are scattered over the entire syllabus.



2024	• What are the different five main ***Conservation Categories*** under IUCN? [P2/8(c) | 10 M].
2022	• What do you understand by ***Human-Wildlife Conflict***? Explain with examples [P2/7(a) | 15 M].
2020	• What is the ***Significance*** *of* ***Wildlife*** in today's perspective? Discuss in brief about the components of wildlife ecology [P2/5(e) | 8 M].
2018	• How is ***Enumeration*** *of* ***Animal Population*** in natural forests carried out in general? Also specify the method(s) adopted in the case of tigers. [P2/6(b) | 15 M].
2015	• To protect the wild animals venturing out from their core areas, some administrative and management arrangements are made. What are those? Discuss. [P2/5(c) | 8 M].
2014	• Discuss in detail the importance, success and limitations of the '***Project Tiger***' [P2/5(c) | 8 M]. • Discuss the role of National Parks in conservation of biodiversity [P2/6(a) | 10 M].
2013	• What do you understand by ***Wildlife Census***? Write different methods of census in brief [P2/7(c) | 10 M].
2012	• Describe the mathematical expression for ***Biotic Potential*** and ***Environmental Resistance***. [*Linked* Q | P2/6(c) | 6 M]. • Describe the importance of ***Pug Marks*** and illustrate sex differentiation based on pug marks. How do these help in Forest management system? [P2/6(e) | 10 M]. • What is the role of different techniques involved in connection with conservation and multiplication of threatened species? [**P1**/6(g) | 5 M].

2010	• List five each of the important resident and ***Migratory Birds*** noticed in Indian forests [P2/5(b) | 8 M].

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10. Dwivedi A.P (2021), Forests : The Non-wood resources, International Book Distributors, Dehradun
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AIR 36

Javed Ahmad Khan

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Shruti Chaudhary

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