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ANNEXURE-II

NOTIFICATION No. 06/2019

ANDHRA PRADESH PUBLIC SERVICE COMMISSION: VIJAYAWADA

SCHEME OF SCREENING TEST FOR RECRUITMENT TO THE POST OF FOREST SECTION OFFICERS IN A.P. FOREST SUB SERVICE

DEGREE STANDARD

WRITTEN EXAMINATION (OBJECTIVE TYPE)

Subject		No. of Questions	Duration (Minutes)	Maximum Marks
Part-A	General Studies & Mental Ability and Mathematics (SSC standard)	75	150	75
Part-B	General Forestry	75		75
Total				150

N.B.:

1. Appearance at all the above tests is compulsory. Absence at any or all of the papers will render the candidature invalid.
2. As per G.O.Ms. No.235 Finance (HR-1, Plg & Policy) Dept, Dt:06/12/2016,for each wrong answer will be penalized with 1/3rd of the marks prescribed for the question.
3. All Papers will be of **OBJECTIVE TYPE.**

SYLLABUS

Part-A

1. GENERAL STUDIES & MENTAL ABILITY

No. Of Question: 75 **Marks: 75**

i. General Science – Contemporary developments in Science and Technology and their implications including matters of every day observation and experience, as may be expected of a well-educated person who has not made a special study of any scientific discipline.

ii. Current events of national and international importance.

iii. History of India – emphasis will be on broad general understanding of the subject in its social, economic, cultural and political aspects with a focus on AP Indian National Movement.

iv. World Geography and Geography of India with a focus on AP.

v. Indian polity and Economy – including the country's political system- rural development – Planning and economic reforms in India.

vi. Mental Ability – Reasoning & Inferences.

vii. Sustainable Development and Environmental Protection

viii. Disaster Management (Source : CBSE Publications)
Concepts in disaster management and vulnerability profile of India / State of A.P.

Earth quakes / Cyclones / Tsunami / Floods / Drought – causes and effects.

Man made disasters - Prevention strategies.

Mitigation strategies / Mitigation measures

2. MATHEMATICS (SSC Standard)

i. **ARITHMETIC:** Number System-Natural numbers, Integers, Rational and Real numbers, Fundamental operations, addition, subtraction, multiplication, division, Square roots, Decimal fractions.
Unitary method-time and distance, time and work, percentages, applications to simple and compound interest, profit and loss, ratio and proportion, variation.
Elementary Number Theory – Division algorithm. Prime and composite numbers. Tests of divisibility by 2,3,4,5,9 and 11. Multiples and factors. Factorisation Thorem. H.C.F. and L.C.M. Euclidean algorithm. Logarithms to base 10, laws of logarithms, use of

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logarithmic tables.

ii. **ALGEBRA:** Basic Operations, simple factors, Remainder Theorem, H.C.F., L.C.M. Theory of polynomials, solutions of quadratic equations, relation between its roots and coefficients (Only real roots to be considered). Simultaneous linear equations in two unknowns – analytical and Graphical solutions. Simultaneous linear inequations in two variables and their solutions. Practical problems leading to two simultaneous linear equations or inequations in two variables or quadratic equations in one variable and their solutions. Set language and set notation, Rational expressions and conditional identities, laws of indices.

iii. **TRIGONOMETRY:** Sine x, Cosine x, Tangent x when $O^{o} = x = 90^{o}$ values of sin x, cos x and tan x, for x= O^{o} , 30^{o}, 45^{o}, 60^{o} and 90^{o}.
Simple trigonometric identities. Use of trigonometric tables.
Simple cases of heights and distances.

iv. **GEOMETRY:** Lines and angles, Plane and plane figures, Theorems on (i) Properties of angles at a point, (ii) Parallel lines, (iii) Sides and angles of a triangle, (iv) Congruency of triangles, (v) Similar triangles, (vi) Concurrence of medians and altitudes, (vii) Properties of angles, sides and diagonals of a parallelogram, rectangle and square, (viii) Circles and its properties including tangents and normals, (ix) Loci.

v. **MENSURATION:** Areas of squares, rectangles, parallelograms, triangle and circle. Areas of figures which can be split up into these figures (Field Book), Surface area and volume of cuboids, lateral surface and volume of right circular cones and cylinders, surface area and volume of spheres.

vi. **STATISTICS:** Collection and tabulation of statistical data, Graphical representation frequency polygons, histograms, bar charts, pie charts etc. Measures of central tendency.

Part-B

GENERAL FORESTRY

No. Of Question: 75 **Marks: 75**

1. **Plant Science:** Structure and function of plant forms from evolutionary aspects (viruses to Angiosperms including fossils_. Principles of nomenclature, classification and identification of plants. Plant Taxonomy. Recent classification of living organism into three groups (bacteria, archaea and eukarya). Vegetative, asexual and sexual methods of reproduction. Pollination and fertilization. Sexual incompatibility. Development, structure, dormancy and germination of seed. Plant Diseases, Factors affecting infections, Chemical, biological and genetic methods of disease control (including transgenic plants). Ecological adaptation. Types of vegetational zones and forests of India. Deforestation, afforestation, Wasteland reclamation.
2. **Plant Varieties:** Origin, importance, export potential, varieties, climate, soil requirements, propagation and planting and after care,
3. **Biodiversity & its conservation:** Introduction — Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Convention of Biological Diversity (CBD).
4. **Agriculture:** Principles of plant physiology with reference to plant nutrition, absorption, transactions and metabolism of nutrients. Diagnosis of nutrient deficiencies and their amelioration photosynthesis and respiration, growth and development, auxins and hormones in plant growth. Development of hybrids, composites and synthetic, important varieties, hybrids, composites and synthetic of major crops. Seeds and seed production techniques. Principles of economics as applied to agriculture. Farm planning and optimum resource-use efficiency and maximizing income and employment. Farm systems and their spatial distribution, their significant roles in regional economic development.
Agronomy, Agricultural Extension, Dairy Engineering, Land development machinery.
5. **Horticulture Science:** Importance of horticulture in terms of economy, production, employment generation, environmental protection and human resource development. Nutritional value of horticultural crops. Divisions of horticulture and their importance.
   a) Temperature, light, humidity, rainfall and soil requirements for horticultural crops. Selection of site for establishing an orchard, orchard plan, systems of planting.

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Establishment of an orchard. Objectives of orchard management culture, different methods of orchard culture. Pruning and training — objectives, methods and effects.

b) Nutrition of horticultural crops — assessment of nutritional requirements, Identification of deficiency symptoms, methods of nutrient application. Assessment of irrigation requirements for different horticultural crops, irrigation methods.

c) Flower bud initiation and formation. Factors affecting them, environmental influences, chemical, nutritional management practices. Pollination and fruit set, problems and requirements, flower and fruit drop, Unfruitfulness.

6. Plant Propagation

a) Principles and classification of plant propagation methods.

b) Sexual propagation and its importance. Factors affecting germination and pregermination treatments.

c) Sexual propagation and it's importance. Propagation of plants by cuttage, factors affecting regeneration of plants from cuttings. Types of cuttings, propagation by layerage. Factors affecting regeneration of plants by layerage. Methods of layerage.

d) Propagation by grafting, importance of graftage. Factors for successful grafting., Selection of rootstock and scion. Methods of budding and grafting Rootstocks. Stock scion relations.

7. Green House Production

a) Importance and scope, production of crops in greenhouse. Status and development of greenhouse production of crops. Establishing a greenhouse. Greenhouse and related structures location, types, size and arrangement.

b) Control of environmental factors influencing the growth.

C) Preparation of growing media requirement and its management at different stages of crop growth. Management of nutrients.

8. Soil Science: Types of soil, field identification and classification; Forest soils, classification, factors affecting soil formation; physical, chemical and biological properties; phase relationships, consistency limits, particle size distribution, classification of soil structure and clay mineralogy, Capillary water and structural water, effective stress and pore water pressure, Permeability, Seepage pressure, quick sand condition, compressibility and consolidation; 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.

9. Geology: Primary and secondary structures. Dip and strike of beds. Unconformities. Study of folds, joints, faults, foliation and lineations. Overthrusts and nappe structures. Stages of rock deformation. Construction of block diagrams, Stereographic and equal-area nets. Solutions of simple problems by stereographic net. Topographic maps and their interpretation. Use of clinometer compass in the field Measurements of bed, foliation, folds joints, faults and lineations in the field. Principles of geological mapping. Effects of topography on outcrops.

10. Water Resource Management: Surface and subsurface water resources, predicting demand for water, impurities of water and their significance, physical, chemical and bacteriological analysis, water borne diseases, standards for potable water. Pumping and gravity schemes, water treatment; Storage and balancing reservoir types, location and capacity. Distribution systems.

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

12. 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. Traditional and recent tropical silvicultural research and practices. Silvi- culture of some of the economically important species in India such as Acacia Sundra, Acacia nilotica Acacia auriculiformis, Albizzia lebbeck, Albizzia procera, Anthocephalus Cadamba, Anogeissus latifolia, Azadirachta indica, Bamboo spp, Butea monosperma, Cassia siamea,

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Casuarina equisetifolia, Dalbergia sisoo, Dipterocarpus spp., Embl!ca officinalls, Eucalyptus spp, Gmelina arborea, Hardwickia binata, Lagerstoremia lanceolata, Pterocarpus marsupium, Prosepis juliflora, Santalum album, Semi-carpus anacardium, Salmalia malabaricum, Tectona grandis, Terminalia tomentosa, Tamarindus indica.

13. **Agro-forestry, Social Forestry, Joint Forest Management:** Agroforestry: scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to soil and water conservation, water recharge, nutrient availability to crops, nature and eco-system preservation including ecological balances through pest- predator relationships and providing opportunities for enhancing biodiversity, medicinal and other flora and fauna. Agro forestry systems under different agro-ecological zones, selection of species and role of multipurpose trees and NTFPs, techniques, food, fodder and fuel security. Research and Extension needs. Social/Urban Forestry: objectives, scope and necessity; JFM — principles, objectives, methodology, scope, benefits and role of NGOs.

14. **Farm, Agri & Forest Power Tools & Machinery:** Types, Uses, maintenance and safety measures.

15. **Ecosystems & Wildlife:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries), Wildlife of India; endangered species of India; sanctuaries and national parks of India, Biological rhythms.

16. **Forest Protection And Wildlife Biology:** 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.

17. **Genetics and Breeding:** Principle of genetics, chemical nature of DNA and RNA and their models and functions. Recombinant DNA technology, transgenic animals, multiple ovulation and embryo-transfer. Cytogenetics, immunogenetics and biochemical polymorphic and their application in animal improvement. Gene actions. Systems and strategies for improvement of livestock for milk, meat, wool production and drought and poultry for eggs and meat. Breeding of animals for disease resistance. Breeds of livestock, poultry and rabbits.

18. **Nutrition:** Role of nutrition in animal health and production. Classification of feeds, Proximate composition of feeds, feeding standards, computation of rations. Ruminant nutrition. Concepts of total digestible nutrients and starch equivalent systems. Significance of energy determinations. Conservation of feeds and fodder and utilization of agro by-products. Feed supplements and additives. Nutrition deficiencies and their management.

19. **Veterinary Science:** (i) Major contagious diseases affecting cattle, buffaloes, horses, sheep and goats, pigs, poultry, rabbits and pet animals. Etiology, symptoms, pathogenicity, diagnosis, treatment and control of major bacterial, viral, rickettsial and parasitic infections. (ii) Description, symptoms, diagnosis and treatment of the following:
    a) Production diseases of milk animals, pig and poultry.
    b) Deficiency diseases of domestic livestock and birds
    c) Poisonings due to infected/contaminated foods and feeds, chemicals and drugs.

20. **Economic Zoology:** Beneficial and harmful insects including insect vectors of human diseases, Industrial fish, prawn and molluscs of India, Non-poisonous and poisonous snakes of India, Venomous animals-centipede, wasp, honey bee, Diseases caused by aberrant chromosomes/genes in man; genetic counseling; DNA as a tool for forensic investigation.

21. **Forest Economics, Legislation & Administration:** Forest economics — fundamental principles, cost-benefit analysis; estimation of demand and supply; role of private sector and cooperatives; role of corporate financing. Forest in Concurrent List, Forest

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Laws: Indian Forest Act, AP Forest Act & Rules, Wildlife Protection Act, Forest Conservation Act, Administration: Indian Forest Services, AP State Forest Services, AP State Forest Subordinate Services, AP Forest Department-Its structure and activities.

22. **Sampling Theory:** Complete enumeration vs. sampling, need for sampling, basic concepts in sampling, designing large-scale sample surveys, sampling and non-sampling errors, simple random sampling, properties of a good estimator, estimation of sample size, stratified random sampling, systematic sampling cluster sampling, ratio and regression methods of estimation ender simple and stratified random sampling.
23. **Forest Mensuration, Remote Sensing and Forest Working Plan:** Methods of measuring — diameter, girth, height and volume of trees; form-factor; volume estimation of stand, current annual increment; mean annual increment, Yield calculation, yield and stand tables: forest cover monitoring through remote sensing; Geographic information Systems for management and modeling; Forest planning, evaluation and monitoring tools and approaches for integrated planning; multipurpose development of forest resources and forest industries development; working plans. Annual Plant of Operations.
24. **Renewable and non-renewable resources:** Natural resources and associated problems.
    a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
    b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
    c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
    d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
    e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.
    f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

25. **Environmental Sciences:** Definition, scope and importance, Need for public awareness, Environmental Pollution: Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution &Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Social Issues and the Environment: From Unsustainable to Sustainable development. Urban problems related to energy, Water conservation, rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, APWALTA.

26. **Transportation Techniques:** Highway alignment, choice of layout and capacity of highways, location survey, geometric design of highways-various elements, curves, grade separation and segregation of traffic, inter-section design, highway materials and testing subgrade and pavement components, type of pavements, road drainage.

27. **Project Management:** Elements and principles of Activity on Arrow (AOA) and Activity on Node (AON) networks and work breakdown structure. Interfaces. Ladder networks. Activity time. Time computations and works. ATC and PTC trade-off. Work study and sampling. Scheduling principles-material schedules. ABC and EOQ analysis of inventory. Budgeting with bar-charts. Working capital. PERT, probability of completion.
    Elements of Engineering Economics, methods of appraisal, present worth, annual cost, benefit-cost, incremental analysis. Economy of scale and size. Choosing between alternatives including levels of investments. Project profitability.

28. **Communications :** Analog communications-AM, FM, PM modulations-Power requirements — Transmitters — Receivers — Ground wave propagation- Sky and Space propagation. Digital communications — Pulse modulations — Delta modulation, multiplexing, multiple access, Antennas, wave guides, Basics of satellite communications, optical communications. Wireless Communications, Walkie-Talkie, HAM Radio.

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SCHEME OF MAIN EXAMINATION FOR RECRUITMENT TO THE POST OF FOREST SECTION OFFICERS IN A.P. FOREST SUBORDINATE SERVICE

WRITTEN EXAMINATION DEGREE STANDARD (OBJECTIVE TYPE)

Sl No.	Subject	Maximum Marks	No. of Questions	Duration Minutes
1.	General English (50 marks) & General Telugu (50 marks) (to be Qualified in English & Telugu individually) (Objective Type)	100 Marks (Qualifying Test)	100 Questions	100 Minutes
2.	Paper-1General Studies & Mental Ability (Objective Type)	150 Marks	150 Questions	150 Minutes
3.	Paper-2 Mathematics (SSC standard) (Objective Type)	150 Marks	150 Questions	150 Minutes
4.	Paper-3 General Forestry (Objective Type)	150 Marks	150 Questions	150 Minutes
	Total	**450 Marks**		

N.B.: **1.** Candidates are required to undergo a walking test and also a Medical Examination (conducted by a Medical Board). The walking tests shall be arranged by the Forest Department, in presence of official of A.P.P.S.C. For this purpose the Commission will pick up eligible candidates in the ratio of 1:2 with reference to total number of vacancies as per General Rule 22 & 22A.

2. Appearance at all the above tests is compulsory. Absence at any or all of the papers will render the candidature invalid.

3. As per G.O.Ms. No.235 Finance (HR-1, Plg & Policy) Dept, Dt:06/12/2016, for each wrong answer will be penalized @ 1/3rd of the marks prescribed for the question in all objective type papers.

4. The minimum qualifying Marks for selection is 40% for OCs; 35% for BCs and 30% for SCs &STs.

5. For Qualified candidates, Weightage shall be given to the NCC Certificate holders having requisite qualifications. Physical measurements at the time of selection, as follows:

   NCC – "C" Certificate holder – 5 bonus marks.
   NCC – "B" Certificate holder – 3 bonus marks.
   NCC – "A" Certificate holder – 1 bonus marks.

SYLLABUS
GENERAL ENGLISH AND TELUGU
(SSC Standard)

English

a) Comprehension
b) Usage and idiom
c) Vocabulary and punctuation
d) Logical re-arrangement of sentences

Telugu

a) Synonyms & Vocabulary
b) Grammar
c) Telugu to English meanings
d) English to Telugu meanings

PAPER-1
GENERAL STUDIES & MENTAL ABILITY

1. General Science – Contemporary developments in Science and Technology and their implications including matters of every day observation and experience, as may be expected of a well-educated person who has not made a special study of any scientific discipline.

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2. Current events of national and international importance.
3. History of India – emphasis will be on broad general understanding of the subject in its social, economic, cultural and political aspects with a focus on AP Indian National Movement.
4. World Geography and Geography of India with a focus on AP.
5. Indian polity and Economy – including the country's political system- rural development – Planning and economic reforms in India.
6. Mental Ability – Reasoning & Inferences.
7. Sustainable Development and Environmental Protection
8. Disaster Management (Source : CBSE Publications)
   Concepts in disaster management and vulnerability profile of India / State of A.P.

   Earth quakes / Cyclones / Tsunami / Floods / Drought – causes and effects.

   Man made disasters - Prevention strategies.

   Mitigation strategies / Mitigation measures

PAPER-2

MATHEMATICS (SSC Standard)

1. **ARITHMETIC:** Number System-Natural numbers, Integers, Rational and Real numbers, Fundamental operations, addition, subtraction, multiplication, division, Square roots, Decimal fractions.
   Unitary method-time and distance, time and work, percentages, applications to simple and compound interest, profit and loss, ratio and proportion, variation.
   Elementary Number Theory – Division algorithm. Prime and composite numbers. Tests of divisibility by 2,3,4,5,9 and 11. Multiples and factors. Factorisation Thorem. H.C.F. and L.C.M. Euclidean algorithm. Logarithms to base 10, laws of logarithms, use of logarithmic tables.
2. **ALGEBRA:** Basic Operations, simple factors, Remainder Theorem, H.C.F., L.C.M. Theory of polynomials, solutions of quadratic equations, relation between its roots and coefficients (Only real roots to be considered). Simultaneous linear equations in two unknowns – analytical and Graphical solutions. Simultaneous linear inequations in two variables and their solutions. Practical problems leading to two simultaneous linear equations or inequations in two variables or quadratic equations in one variable and their solutions. Set language and set notation, Rational expressions and conditional identities, laws of indices.
3. **TRIGONOMETRY:** Sine x, Cosine x, Tangent x when $O^{o} = x = 90^{o}$ values of sin x, cos x and tan x, for $x= O^{o}$, 30^{o}, 45^{o}, 60^{o} and 90^{o}.
   Simple trigonometric identities. Use of trigonometric tables.
   Simple cases of heights and distances.
4. **GEOMETRY:** Lines and angles, Plane and plane figures, Theorems on (i) Properties of angles at a point, (ii) Parallel lines, (iii) Sides and angles of a triangle, (iv) Congruency of triangles, (v) Similar triangles, (vi) Concurrence of medians and altitudes, (vii) Properties of angles, sides and diagonals of a parallelogram, rectangle and square, (viii) Circles and its properties including tangents and normals, (ix) Loci.
5. **MENSURATION:** Areas of squares, rectangles, parallelograms, triangle and circle. Areas of figures which can be split up into these figures (Field Book), Surface area and volume of cuboids, lateral surface and volume of right circular cones and cylinders, surface area and volume of spheres.
6. **STATISTICS:** Collection and tabulation of statistical data, Graphical representation frequency polygons, histograms, bar charts, pie charts etc. Measures of central tendency.

PAPER - 3

GENERAL FORESTRY

1. **Plant Science:** Structure and function of plant forms from evolutionary aspects (viruses to Angiosperms including fossils_. Principles of nomenclature, classification and identification of plants. Plant Taxonomy. Recent classification of living organism into three groups (bacteria, archaea and eukarya). Vegetative, asexual and sexual methods of reproduction. Pollination and fertilization. Sexual incompatibility. Development, structure, dormancy and germination of seed. Plant Diseases, Factors affecting infections, Chemical, biological and genetic methods of disease control (including transgenic plants). Ecological adaptation. Types of vegetational zones and forests of India. Deforestation, afforestation, Wasteland reclamation.

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2. **Plant Varieties:** Origin, importance, export potential, varieties, climate, soil requirements, propagation and planting and after care,

3. **Biodiversity & its conservation:** Introduction — Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Convention of Biological Diversity (CBD).

4. **Agriculture:** Principles of plant physiology with reference to plant nutrition, absorption, transactions and metabolism of nutrients. Diagnosis of nutrient deficiencies and their amelioration photosynthesis and respiration, growth and development, auxins and hormones in plant growth. Development of hybrids, composites and synthetic, important varieties, hybrids, composites and synthetic of major crops. Seeds and seed production techniques. Principles of economics as applied to agriculture. Farm planning and optimum resource-use efficiency and maximizing income and employment. Farm systems and their spatial distribution, their significant roles in regional economic development.
Agronomy, Agricultural Extension, Dairy Engineering, Land development machinery.

5. Horticulture Science: Importance of horticulture in terms of economy, production, employment generation, environmental protection and human resource development. Nutritional value of horticultural crops. Divisions of horticulture and their importance.

d) Temperature, light, humidity, rainfall and soil requirements for horticultural crops. Selection of site for establishing an orchard, orchard plan, systems of planting. Establishment of an orchard. Objectives of orchard management culture, different methods of orchard culture. Pruning and training — objectives, methods and effects.

e) Nutrition of horticultural crops — assessment of nutritional requirements, Identification of deficiency symptoms, methods of nutrient application. Assessment of irrigation requirements for different horticultural crops, irrigation methods.

f) Flower bud initiation and formation. Factors affecting them, environmental influences, chemical, nutritional management practices. Pollination and fruit set, problems and requirements, flower and fruit drop, Unfruitfulness.

6. Plant Propagation

e) Principles and classification of plant propagation methods.

f) Sexual propagation and its importance. Factors affecting germination and pregermination treatments.

g) Sexual propagation and it's importance. Propagation of plants by cuttage, factors affecting regeneration of plants from cuttings. Types of cuttings, propagation by layerage. Factors affecting regeneration of plants by layerage. Methods of layerage.

h) Propagation by grafting, importance of graftage. Factors for successful grafting., Selection of rootstock and scion. Methods of budding and grafting Rootstocks. Stock scion relations.

7. Green House Production

a) Importance and scope, production of crops in greenhouse. Status and development of greenhouse production of crops. Establishing a greenhouse. Greenhouse and related structures location, types, size and arrangement.

b) Control of environmental factors influencing the growth.

c) Preparation of growing media requirement and its management at different stages of crop growth. Management of nutrients.

8. **Soil Science:** Types of soil, field identification and classification; Forest soils, classification, factors affecting soil formation; physical, chemical and biological properties; phase relationships, consistency limits, particle size distribution, classification of soil structure and clay mineralogy, Capillary water and structural water, effective stress and pore water pressure, Permeability, Seepage pressure, quick sand condition, compressibility and consolidation; 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.

9. **Geology:** Primary and secondary structures. Dip and strike of beds. Unconformities. Study of folds, joints, faults, foliation and lineations. Overthrusts and nappe structures. Stages of rock deformation. Construction of block diagrams, Stereographic and equal-area nets. Solutions of simple problems by stereographic net. Topographic maps and their interpretation. Use of clinometer compass in the field Measurements of bed, foliation,

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folds joints, faults and lineations in the field. Principles of geological mapping. Effects of topography on outcrops.

10. **Water Resource Management:** Surface and subsurface water resources, predicting demand for water, impurities of water and their significance, physical, chemical and bacteriological analysis, water borne diseases, standards for potable water. Pumping and gravity schemes, water treatment; Storage and balancing reservoir types, location and capacity. Distribution systems.

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

12. **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. Traditional and recent tropical silvicultural research and practices. Silvi- culture of some of the economically important species in India such as Acacia Sundra, Acacia nilotica Acacia auriculiformis, Albizzia lebbeck, Albizzia procera, Anthocephalus Cadamba, Anogeissus latifolia, Azadirachta indica, Bamboo spp, Butea monosperma, Cassia siamea, Casuarina equisetifolia, Dalbergia sisoo, Dipterocarpus spp., Embl!ca officinalls, Eucalyptus spp, Gmelina arborea, Hardwickia binata, Lagerstoremia lanceolata, Pterocarpus marsupium, Prosepis juliflora, Santalum album, Semi-carpus anacardium, Salmalia malabaricum, Tectona grandis, Terminalia tomentosa, Tamarindus indica.

13. **Agro-forestry, Social Forestry, Joint Forest Management:** Agroforestry: scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to soil and water conservation, water recharge, nutrient availability to crops, nature and eco-system preservation including ecological balances through pest- predator relationships and providing opportunities for enhancing biodiversity, medicinal and other flora and fauna. Agro forestry systems under different agro-ecological zones, selection of species and role of multipurpose trees and NTFPs, techniques, food, fodder and fuel security. Research and Extension needs. Social/Urban Forestry: objectives, scope and necessity; JFM — principles, objectives, methodology, scope, benefits and role of NGOs.

14. **Farm, Agri & Forest Power Tools & Machinery:** Types, Uses, maintenance and safety measures.

15. **Ecosystems & Wildlife:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries), Wildlife of India; endangered species of India; sanctuaries and national parks of India, Biological rhythms

16. **Forest Protection And Wildlife Biology:** 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.

17. **Genetics and Breeding:** Principle of genetics, chemical nature of DNA and RNA and their models and functions. Recombinant DNA technology, transgenic animals, multiple ovulation and embryo-transfer. Cytogenetics, immunogenetics and biochemical polymorphic and their application in animal improvement. Gene actions. Systems and strategies for improvement of livestock for milk, meat, wool production and drought and

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poultry for eggs and meat. Breeding of animals for disease resistance. Breeds of livestock, poultry and rabbits.

18. **Nutrition:** Role of nutrition in animal health and production. Classification of feeds, Proximate composition of feeds, feeding standards, computation of rations. Ruminant nutrition. Concepts of total digestible nutrients and starch equivalent systems. Significance of energy determinations. Conservation of feeds and fodder and utilization of agro by-products. Feed supplements and additives. Nutrition deficiencies and their management.

19. **Veterinary Science:** (i) Major contagious diseases affecting cattle, buffaloes, horses, sheep and goats, pigs, poultry, rabbits and pet animals. Etiology, symptoms, pathogenicity, diagnosis, treatment and control of major bacterial, viral, rickettsial and parasitic infections. (ii) Description, symptoms, diagnosis and treatment of the following:
    d) Production diseases of milk animals, pig and poultry.
    e) Deficiency diseases of domestic livestock and birds
    f) Poisonings due to infected/contaminated foods and feeds, chemicals and drugs.

20. **Economic Zoology:** Beneficial and harmful insects including insect vectors of human diseases, Industrial fish, prawn and molluscs of India, Non-poisonous and poisonous snakes of India, Venomous animals-centipede, wasp, honey bee, Diseases caused by aberrant chromosomes/genes in man; genetic counseling; DNA as a tool for forensic investigation.

21. **Forest Economics, Legislation & Administration:** Forest economics — fundamental principles, cost-benefit analysis; estimation of demand and supply; role of private sector and cooperatives; role of corporate financing. Forest in Concurrent List, Forest Laws: Indian Forest Act, AP Forest Act & Rules, Wildlife Protection Act, Forest Conservation Act, Administration: Indian Forest Services, AP State Forest Services, AP State Forest Subordinate Services, AP Forest Department-Its structure and activities.

22. **Sampling Theory:** Complete enumeration vs. sampling, need for sampling, basic concepts in sampling, designing large-scale sample surveys, sampling and non- sampling errors, simple random sampling, properties of a good estimator, estimation of sample size, stratified random sampling, systematic sampling cluster sampling, ratio and regression methods of estimation ender simple and stratified random sampling.

23. **Forest Mensuration, Remote Sensing and Forest Working Plan:** Methods of measuring — diameter, girth, height and volume of trees; form-factor; volume estimation of stand, current annual increment; mean annual increment, Yield calculation, yield and stand tables: forest cover monitoring through remote sensing; Geographic information Systems for management and modeling; Forest planning, evaluation and monitoring tools and approaches for integrated planning; multipurpose development of forest resources and forest industries development; working plans. Annual Plant of Operations.

24. **Renewable and non-renewable resources:** Natural resources and associated problems.
    a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
    b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
    c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
    d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
    e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.
    f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

25. **Environmental Sciences:** Definition, scope and importance, Need for public awareness, Environmental Pollution: Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution &Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Social Issues and the Environment: From Unsustainable to Sustainable development. Urban problems related to energy, Water conservation, rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, APWALTA.

26. **Transportation Techniques:** Highway alignment, choice of layout and capacity of highways,

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location survey, geometric design of highways-various elements, curves, grade separation and segregation of traffic, inter-section design, highway materials and testing subgrade and pavement components, type of pavements, road drainage.

27. **Project Management:** Elements and principles of Activity on Arrow (AOA) and Activity on Node (AON) networks and work breakdown structure. Interfaces. Ladder networks. Activity time. Time computations and works. ATC and PTC trade-off. Work study and sampling. Scheduling principles-material schedules. ABC and EOQ analysis of inventory. Budgeting with bar-charts. Working capital. PERT, probability of completion.
Elements of Engineering Economics, methods of appraisal, present worth, annual cost, benefit-cost, incremental analysis. Economy of scale and size. Choosing between alternatives including levels of investments. Project profitability.

28. **Communications :** Analog communications-AM, FM, PM modulations-Power requirements — Transmitters — Receivers — Ground wave propagation- Sky and Space propagation. Digital communications — Pulse modulations — Delta modulation, multiplexing, multiple access, Antennas, wave guides, Basics of satellite communications, optical communications. Wireless Communications, Walkie-Talkie, HAM Radio.

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