



JAMMU AND KASHMIR PUBLIC SERVICE COMMISSION
RESHAMGHAR COLONY, BAKSHI NAGAR, JAMMU.

www.jkpsc.nic.in

NOTIFICATION NO. PSC/EXM/2013/102

D A T E D : 1 2 . 1 2 . 2 0 1 3

RANGE OFFICER (SOIL CONSERVATION) EXAMINATION, 2013

1. Important: The Commission have developed an electronically scannable Application Form for the posts of Range Officer in Soil Conservation Department, which can be processed on computerized machines. This Application Form, along with instructions for filling up the Application Form, Acknowledgement Card and an Envelope for submitting the Application Form, will be available at the Commission's offices at Resham Ghar Colony, Bakshi Nagar, Jammu/Polo Ground Srinagar.
2. Candidates should read all the eligibility conditions prescribed for the examination and also advised to go through the instructions before filling up the Application Form.
3. Last date for receipt of Application Forms, complete in all respects, in the Commission's offices indicated above, is **15.01.2014**.
4. Candidates are advised not to wait till the last date. They are advised to submit their Application Forms at the earliest so that it reaches the Commission's office in time.
5. The Commission will not be responsible for any postal/courier delays and any Application Form received after the above prescribed last date, shall not be entertained.
6. Schedule of Sale and Receipt of Application Forms
 1. Sale of Application Forms will commence from **16.12.2013**.
 2. Last date for receipt of Application Forms is **15.01.2014**.

1. Applications, on prescribed forms, are invited from permanent residents of the J&K State for direct recruitment to the posts of Range Officer in Soil Conservation Department, in the pay scale of Rs.6500-10500 (Pre-revised), in accordance with SRO 287 dated 28.06.1984 read with J&K Public Service Commission (Conduct of Examination) Rules, 2005.

2. Category-wise breakup of the vacancies is as under:

Open = 01
SC = 01

Note: (If the Commission considers that the number of application forms received for admission is unduly large it may direct the candidates to appear in Preliminary Type Test for shortlisting the candidates for Main Examination.)

3. **Eligibility conditions:-**

i. Qualification: -

B.Sc. with three Science subjects preferably with Botany as one of the subjects

OR

B.Sc. Agriculture

OR

B.Sc. Mechanical

ii. Age as on 01.01.2013:-

| | | | |
|---|--------------------------------|---|-----------|
| i. | Minimum | = | 18 years. |
| ii. | Maximum | = | 37 Years. |
| <u>For candidates belonging to</u> | | | |
| i) | Reserved categories | = | 40 Years. |
| ii) | Those already in Govt Service. | = | 40 Years. |
| iii) | Physically Handicapped. | = | 39 Years. |

iii. Physical Standards:-

The candidate should possess the following standards of physical fitness:-

| | | | |
|----|----------------------------|---|---------|
| a. | Height | = | 163 cm. |
| b. | Chest girth fully expanded | = | 84 cm. |
| c. | Chest expansion | = | 05 cm. |

(The physical fitness certificate with above standards should be from a Chief Medical Officer concerned)

iv. Must be a permanent resident of the J&K State.

The examination shall be conducted in the following order:

1. Written Test.
2. Viva-Voce Test.
3. Walking Test.
4. Medical Test.

The minimum marks in each subject for qualifying the written test is 40%.

4. **How to obtain the Application Form:** (i) The candidates can obtain the prescribed Application Form, instructions for filling up of the Application Form, acknowledgement card and an envelope for submitting the Application Form, from the J&K Bank branches located in the offices of the J&K Public Service Commission, Resham Ghar Colony, Bakshi Nagar, Jammu/Polo Ground, Srinagar on cash payment of Rs.500/- (excluding processing charges of Rs.10/-) for OM candidates and Rs.250/- (excluding processing charges of Rs.10/-) for reserved category candidates.

5. **How to apply:**

- i. Since the Application Form is to be electronically scanned, due care should be taken to fill up the Application Form neatly and correctly. **(While filling up the Application Form, please refer to detailed instructions given in the instruction sheet supplied with the Application Form).**
- ii. The candidates are required to fill up the Application Form and then Photostat it. Photograph, duly attested, should be firmly pasted (Not Staped in Any Case) at the space provided in the Application Form.
- iii. The candidate should also fill up the data/information at relevant spaces of the Acknowledgement Card, along with their Form Number and the name of the examination.
- iv. In case Application Form is submitted by post, the Acknowledgement Card should bear postage stamps of Rs.5/-.
- v. Application Form (Original copy & Photostat copy), duly filled up along with the documents/testimonials etc., shall have to be submitted in the Commission office at Jammu/Srinagar personally or mailed in the special envelope supplied for the purpose, by registered post on the address of the Secretary, J&K Public Service Commission, Resham Ghar Colony, Jammu/ Polo Ground Srinagar, before the last date notified for the purpose. The Application Forms, however, received late through Registered post shall be entertained only if these are dispatched three days prior to the last date of notification set for the purpose. Attested copies of documents/testimonials shall be attached with the Photostat copy of the Application Form only.
- vi. A candidate already in Govt. Service in the state shall deposit original copy and one photocopy of his/her Application Form in the Commission Office and route another Photostat copy of the Application Form through the Department. The candidate shall be personally responsible for delivery of this Proper Channel Copy (Photostat) in the Commission office within time.
- vii. In case the Commission receives an intimation withholding permission from the employer in respect of the candidate applying for appearing in the Examination his/her Application Form shall be rejected and candidature cancelled. Such a candidate may,

however, be allowed to appear in the examination as a fresh candidate subject to the condition that the candidate is otherwise eligible under rules.

Note I: The candidates are advised to write their complete postal addresses including Pin Code to facilitate quick postal deliveries.

6. Certificates to be attached with the photocopy of the Application Form

The following certificates duly attested by a Gazetted Officer shall be attached with the Application Form:-

- i. Date of Birth Certificate.
- ii. Permanent Resident Certificate.
- iii. Educational Qualification Certificate Prescribed for the Post.
- iv. Certificate of Higher/Additional Qualification if any.
- v. Valid Category Certificate as per SRO 294 dated 21.10.2005.as amended from time to time.
- vi. Marks Certificate of Prescribed Qualification.
- vii. For Physically Challenged Candidates, Disability Certificate on the prescribed format.

Incomplete or wrongly filled Application Forms or the forms without the above pre-requisites shall be rejected without notice. Further, the Application Forms, where fluid has been applied, are liable to be rejected.

7. Last date for receipt of Application Forms: -

- i. The Application Forms shall be received at the counters set up for the purpose, in the Commission's Offices located at Resham Ghar Colony, Bakshi Nagar, Jammu/ Polo Ground, Srinagar on all working days (Monday to Friday) from 10.00 A.M to 4.00 P.M up to **15.01.2014** which shall be the last date.
- ii. Application Forms received after the last date viz. **15.01.2014** will not be entertained, under any circumstances, whatsoever, and all such Application Forms will be deemed to have been rejected without notice.

Note: The candidate should, therefore, ensure that the Application Form reaches the Commission's Office on or before the prescribed last date.

8. Acknowledgement of Application Forms:

- i. Candidates, who personally submit their Application Forms at the Commission's counters, will be issued an acknowledgement card duly stamped, and signed by the counter/Receipt Assistant in token of receipt of Application Form.
- ii. In respect of Application Forms received by post, the acknowledgement card duly filled in by the candidate will be dispatched to him/her duly stamped and signed by the Receipt Assistant.

- iii. If a candidate does not receive the acknowledgement card within 15 days, he should, at once, contact the Controller of Examinations, J&K Public Service Commission quoting his/her Application Form number.

The mere fact that the Commission office has acknowledged a candidate's Application Form does not mean that the Commission has accepted his candidature for the examination.

9. **Date of Examination:**

The Main Examination will be held at Jammu & Srinagar simultaneously in the month of **August, 2014** in accordance with scheme and syllabus annexed as "A" with this notification.

10. **Centre of Examination:**

- i. The Examination will be held at different centres located in Jammu and Srinagar cities.
- ii. The allotment of centres shall be at the sole discretion of the Commission and, once a centre is allotted to a candidate, neither any request for change of centre will be entertained, nor any such communication/request will be replied by the Commission.

Note:

- i. The candidate should carefully mention about his/her choice for the centre viz Srinagar/Jammu while filling the Application Form.
- ii. While every endeavour will be made to allot the candidates the examination centres of their choice viz. Srinagar/Jammu, the Commission may, at their discretion, allot a different centre to a candidate, when circumstances so warrant.

11. **Withdrawal of candidature:** No request for withdrawal of candidature received from a candidate, fifteen days after the last date for submission of Application Form, will be entertained under any circumstances.

12. **Correspondence with the Commission:** The Commission will not enter into any correspondence with the candidates about their candidature except in the following cases:

- i. If a candidate does not receive the Admit Card or any other communication regarding his candidature for the examination 10 days before the conduct of examination, he/she should at once contact the Commission's office at Resham Ghar Colony, Bakshi Nagar, Jammu/ Polo Ground Srinagar for obtaining a duplicate copy of Admit Card.
- ii. No request for issuance of duplicate Admit Card shall be entertained unless it is received seven days prior to the date of the examination.

- iii. Change in address, if any, should be communicated to the Commission at the earliest. Although the Commission would make every effort to take account of such changes, it does not take any responsibility in this regard.

Important:- All correspondence with the Commission should, invariably, contain the following particulars:

- (a) Name and year of the examination;
- (b) Application Form number;
- (c) Full name of the candidate (in Block letters); and
- (d) Complete postal address as given in the Application Form.

GENERAL INSTRUCTIONS

- i. Candidates should fill up the Application Form carefully and in their own handwriting.
- ii. No column of Application Form should be left blank.
- iii. Incomplete or incorrectly filled Application Form shall not be entertained. No representation or correspondence regarding such rejection shall be entertained under any circumstances.
- iv. If a candidate receives an Admit Card in respect of some other candidates on account of handling error, the same should be brought to the notice of Commission immediately.
- v. No candidate will be allowed to take the examination on the basis of an Admit Card issued in respect of another candidate.
- vi. The candidate should also note that their admission at all the stages of examination will be provisional & subject to their fulfilling the prescribed eligibility condition.
- vii. If it comes to the notice of the Commission at any time before or after the Main Examination, or Interview, that a candidate does not fulfil any of the eligibility conditions and the candidate has claimed eligibility based on misrepresentation, fraud or concealment of material fact or impersonation; his/her candidature for the examination shall be cancelled and he/she shall be also liable for prosecution/disciplinary action by the Commission.
- viii. Any change of address given in the Application Form should, at once be communicated to the Controller of Examinations, J&K Public Service Commission.
- ix. Candidates are requested to arrange for the redirection of communications to their new address, if necessary.
- x. The Commission makes every effort to take account of changes in a candidate's address but cannot accept any responsibility in the matter.

- xi. Candidates must be in sound bodily health. They must, if selected, be prepared to undergo such medical examination and satisfy such medical authority, as the Government may require.
- xii. Canvassing, in any form, shall disqualify a candidate.
- xiii. ACTION AGAINST CANDIDATES FOUND GUILTY OF MISCONDUCT.

Candidates are warned that they should not furnish any particulars that are false or suppress any material information. In filling up the Application Form candidates are also warned that they should, in no case, alter or otherwise tamper with any entry in a document.

A candidate who is, or has been, declared by the Commission, to be guilty of:

- i. obtaining by wrongful support of his/her candidature by any means; impersonating;
- ii. procuring impersonation by any person;
- iii. making statements which are incorrect, or false or suppressing material information;
- iv. resorting to any other irregular or improper means in connection with his/her candidature for the selection;
- v. using unfair means during the test;
- vi. writing irrelevant matter including obscene language or pornographic matter, in the script(s);
- vii. misbehaving in any other manner in the examination hall;
- viii. harassing or doing bodily harm to the staff employed by the Commission for the conduct of their test; or
- ix. attempting to commit or, as the case may be, abetting the commission of all or any of the acts specified in the foregoing clauses may, in addition to rendering himself/herself liable to criminal prosecution, be liable:-
 - a. to be disqualified by the Commission from selection for which he/she is a candidate, and/or
 - b. to be debarred either permanently or for a specified period:-
 - i. by the Commission from any examination or selection held by them;
 - ii. by the State Government from any employment under them, and
 - c. if he/she is already in service under Government, to disciplinary action under rules.

IMPORTANT

1. Candidate must read the detailed instructions for the candidates before filling up of the Application Form. He/she must fill up the form strictly according to the instructions.

2. Candidates must ensure that no column of Application Form is left blank or wrongly filled, as information furnished therein would be used for deciding the eligibility of the candidate. Application Form not filled correctly and as per the instructions is liable to be rejected and the onus of such rejection would be on the candidate himself/herself. The Commission will not entertain any claim in respect of such rejection.
3. Application Forms should be sent/delivered to the Controller of Examination, J&K Public Service Commission, Resham Ghar Colony, Jammu/ Polo Ground Srinagar in accordance with clause 8 of this Notification.
4. For any query visit the Commission's Website www.jkpsc.nic.in or the Commission's facilitation centre at Jammu/Srinagar or dial Number 2566710 (Jammu) and 2455089 (Srinagar).

Sd/-
(Dr. T.S. Ashok Kumar) IFS
Secretary & Controller of Examinations,
J&K Public Service Commission.
Dated: - 12.12.2013

No: PSC/Exam/R.O/Soil Cons./09

Copy to: -

1. Commissioner/Secretary to Govt., Forest Department.
2. Director Information, J&K Government Jammu for favour of getting the notification published in various local leading English dailies of Srinagar/Jammu.
3. Station Director, All India Radio Jammu/Srinagar/Leh for favour of broadcasting the notification in the New Bulletin/Rozgar Samachar and special announcement for at least three consecutive days.
4. Director Doordarshan Kendra, Jammu/Srinagar for favour of broadcasting of this notification in its local news bulletins and special announcements for few days.
5. General Manager, Govt. Press, Jammu/Srinagar for favour of publication of the notification in the next issue of Govt. Gazette.
6. Deputy Secretary/Under Secretary, J&K Public Service Commission.
7. Pr. Private Secretary to Hon'ble Chairman, J&K Public Service Commission.
8. Private Secretary to Shri _____, Member, J&K Public Service Commission.
9. P. A. Secretary & Controller of Examinations J&K Public Service Commission.
10. Notice Board, J&K PSC, Jammu/Srinagar.
11. Concerned file.

ANNEXURE 'A'

SCHEME OF EXAMINATION

The examination shall be conducted in the following order: -

- i. Written Test;
- ii. Viva Voce Test;
- iii. Walking Test;
- iv. Medical Test.

(I) Written Test: -

(b) Main examination (Essay type).

There will be four subjects in the Main examination. The time allowed for each paper shall be three hours. The paper wise marks for written examination and viva voce is as under: -

| <u>Compulsory Subjects</u> | <u>Maximum Marks</u> |
|---------------------------------------|----------------------|
| 1. Gen. English. | 100 |
| 2. An essay to be written in English. | 100 |
| 3. General Knowledge | 200 |

Optional Subject (Any one of the following subjects)

| | | |
|-----------------|---|-----|
| 1. Botany | } | 200 |
| 2. Silviculture | | |
| 3. Field Crop | | |

(II) Viva Voce:-

The candidates who obtained minimum of 40% marks in each subject/paper shall be called for the viva voce test. The viva-voce test shall carry 100 marks.

Total Marks (written + viva-voce):- 700

(III) Walking Test: -

The candidate will have to undergo a walking test consisting of a walk of 25 Kms. to be completed in four hours. The date and time for the walking test will be intimated to the eligible candidates.

(IV) Medical Test: -

The successful candidates will be required to undergo a medical test before the Medical Board. The candidates shall have to pay fee to the Medical Board as may be prescribed for the said Medical examination.

NOTE

- a/ Instructions to appear before the Medical Board shall not be understood to mean that a candidate, if found fit, will necessarily be selected and appointed. Summoning

of candidates for medical examination conveys no assurance whatsoever that they will selected or appointed. A appointment orders of selected candidates will be issued by the Government in accordance with the availability of vacancies.

Syllabus for the written examination

(a) Compulsory subjects

1. **General English**

This paper will be of 10+2 standard and shall consist of a short essay, comprehension, précis writing, usage and vocabulary.

2. **Essay in English**

One essay to be written on a topic out of given topics in the paper. The essay will be of 10+2 standard.

3. **General Knowledge**

This paper will contain questions on Elementary Science, Geography and Current events etc.

Optional Papers/Subjects

The candidate may choose only one paper from amongst the three optional papers/subjects. The scope of the syllabus will be broadly of bachelor's degree level.

(b) SYLLABUS OF OPTIONAL PAPERS/SUBJECTS

(I) BOTANY

1. **Microbes and Microbiology.**

- 1.1 General account of viruses, Mycoplasma and Cynaobacteria.
- 1.2 Bacteria-Structure, Nutrition and reproduction (A general account with broad classification).
- 1.3 Economic importance of Bacteria; Bacteria as indicators of pollution; bacteria in industry and agriculture.
- 1.4 Microbiology of air, water, soil and food materials.

2. **Algae.**

- 2.1 General characteristics and classification of algae (Fritsch 1935,1945)
- 2.2 Important features of Chlorophyceae and Xanthophyceae, life histories of Chlamydomonas, Volvox, Oedogonium, Coleochaete, Chara, and Vaucheria.
- 2.3 Important features of Phaeophyceae and Rhodophyceae, Life histories of Ectocarpus, Sargassum and Polysiphonia.

- 2.4 Economic importance of algae-algae as food, feed and source of fibre; algae as indicators of pollution; algae blooms; algae toxins; algae in industry.
- 3. Fungi**
- 3.1 General characteristics and classification of fungi (Ainsworth (1971), Exonomic importance of fungi, General account of Lichens.
- 3.2 Important features of Mastigomycotina; Life histories of Pythium and Allomyces.
- 3.3 Important characteristics of Zygomycotina and Ascomycotina; Life history of Mucor, Saccharomyces, Eurotium and Peziza.
- 3.4 Important characteristics of Basidiomycotina and Deuteromycotina; life histories of Puccinia, Agaricus, Collectotrichum and Cercospora.
- 4. Bryophytes**
- 4.1 General characteristics, classification (Smith, 1955) and Alternation of Generations in Bryophytes.
- 4.2 Structure and reproduction in hepaticae with reference to Marchantia.
- 4.3 Structure and reproduction in Anthocerotales and Musci with reference to Anthoceros and Funaria.
- 4.4 Importance of bryophytes in preventing soil erosion; management of forest floors; monitoring and controlling pollution; geobotanical prospecting; in horticulture and as source of antibiotics.
- 5. Pteridophytes.**
- 5.1 General Characteristics, classification (Sporne 1975) and origin of pteridophytes (the first vascular plants); stelar system and alternation of generations in pteridophytes.
- 5.2 Important characteristics of Psilopsida and Lycopsidea; structure and reproduction in Psilotum, Rhynia, Lycopodium and Selaginella.
- 5.3 Important characteristics of sphenopsida, structure and reproduction in Equisetum.
- 5.4 Important characteristics of pteropsida, structure and reproduction in pteris and Marsilea.
- 6. Cell Structure.**
- 6.1 Cell wall; Primary cell wall, its structure, formation and function.
- 6.2 Plasma membrane; The bilayer lipid structure fluid mosaic model, its functions.
- 6.3 Cell organelles: structure and functions of E.R., Golgi bodies, Plastids and mitochondria.
- 6.4 Ultra-structure of nuclear membrane. Nucleolus: Organization and function.
- 7. Chromosome structure and multiplication.**
- 7.1 chromosome structure : physical and chemical structure and importance of centromere and telomere; sex chromosomes.
- 7.2 Organization of DNA in prokaryotica and eukaryotic genomes. Role of proteins; nucleosome model.
- 7.3 Equational division, factors triggering mitosis, various stages of mitosis.
- 7.4 Reductional division, detailed structure of pairing and crossing over.

8. Genome organization and function/Gene protein.

- 8.1 Basic unit: DNA, structure and replication; satellite and repetitive DNA.
- 8.2 Gene function: Genetic Code, transcriptions; Regulation of gene expression in prokaryotes and eukaryotes.
- 8.3 Protein synthesis: Ribosomes and tRNA, structure and function, ID, 2-D, and 3 D structure of proteins.
- 8.4 Extranuclear genome: structure and functions of mitochondrial and Plastid DNA, Plasmids.

9. Alternations on the genome.

- 9.1 Structural alterations; types, effect and detections of intra chromosomal alterations- deletions, duplications and inversions.
- 9.2 Mechanism, effect and detection of interchromosomal alterations.
- 9.3 Euploidy-type, origin and effect with suitable examples.
- 9.4 Aneuploidy -types, origin and effect with suitable examples.

10. Alterations in the basic unit of inheritance and inheritance patterns.

- 10.1 Gene/Point mutations-spontaneous and induced; mechanism of induction; uses.
- 10.2 Shift of Genes through mobile elements-transposons, mechanism and salient features, DNA damages, causes and repair mechanisms.
- 10.3 Mendelism, laws of segregation and independent assortment, allelic and non-allelic interactions.
- 10.4 Linkage and recombination; linkage in mapping of genes.

11. Seed Plants-origin evolution and characteristics.

- 11.1 Characteristics of seed plants; evolution of seed habit seed plants with and without fruit.
- 11.2 Geological time scale; fossilization-process and types; age of fossils and their importance.
- 11.3 General characteristics of gymnosperms; classification of gymnosperms by Coultter and Chamberlain.
- 11.4 Evolution and diversity of gymnosperms.

12. Morphology and Reproduction in Gymnosperms

- 12.1 Morphology, anatomy, reproduction and life cycle in Cycas.
- 12.2 Morphology, anatomy, reproduction and life cycle in Cedrus.
- 12.3 Morphology, anatomy, reproduction and life cycle in Ephedra.
- 12.4 Fossil gymnosperms : Bennettitales- History and

13. Angiosperm origin and nomenclature.

- 13.1 Origin and evolution of angiosperms, characteristics and examples of some primitive angiosperms (Magnolia). Fossil angiosperms- a general account with reference to angiosperm floras.'
- 13.2 History of angiosperm taxonomy; Aims and Fundamental components of taxonomy;- Taxonomy, omega taxonomy and holotaxonomy.
- 13.3 Taxonomic identification; taxonomic keys and literature (Floras, Monographs and reviews).

13.4 Botanical nomenclature-principles and rules; taxonomic ranks; type concept and principle of priority.

14. Classification and tools in angiosperm taxonomy

14.1 Salient features of the classification of Bentham and Hooker, merits and demerits.

14.2 Salient features of the classification of Engler and Prantl; merits and demerits.

14.3 Contribution of cytology to taxonomy.

14.4 Contribution of phytochemistry and taxometrics to taxonomy.

15. Diversity of angiosperms.

15.1 Morphological diversity of families Ranunculaceae, Brassicaceae, Malvaceae and Rutaceae.

15.2 Morphological diversity of families Fabaceae, Rosaceae, Apiaceae and Acanthaceae.

15.3 Morphological diversity of families Apocyanaceae, Solanaceae, Lamiaceae and Euphorbiaceae.

15.4 Morphological diversity of Families Liliaceae, Amaryllidaceae and Poaceae.

16. Structure, Development and Reproduction in seed bearing plants.

16.1 Basic body plan of a flowering plants; Modular type of growth.

16.2 Diversity in plant form in annuals, biennials and perennials.

16.3 Convergence of evolution of tree habit in gymnosperms monocotyledons and dicotyledons.

16.4 The largest and oldest trees of the world; canopy architecture.

17. Root and Shoot.

17.1 Apical meristem of root, its position, structure and derivatives.

17.2 Structural modifications of root for storage, respiration, reproduction and for interaction with microbes.

17.3 Apical meristem, its organization and role.

17.4 Vascularisation of primary shoot in monocotyledons and dicotyledons; formation of internodes; branching pattern; monopodial and sympodial growth.

18. Secondary and Basic structure.

18.1 Vascular cambium and its derivatives; wood structure in relation to translocation of water and minerals.

18.2 Growth rings; heart wood, sapwood, role of woody skeleton; structure and functions of secondary phloem; periderm.

18.3 Leaf, Initiation; development, arrangement and diversity in size and shape; senescence and abscission.

18.4 Internal structure of leaf in relation to photosynthesis and water loss; adaptation to water stress.

19. Flower

19.1 Flower: A modified shoot; structure, development, variety and functions of flower.

19.2 Structure of anther and Pistil; Male gametophyte and female gametophyte.

19.3 Pollination: Type, attractants and rewards for pollination; Pollen-Pistil interaction, self incompatibility.

19.4 Double fertilization : Endosperm-type cytology and function; formation of fruit.

20. Units and mechanisms of multiplication.

- 20.1 Seed formation and its significance.
- 20.2 Seed dormancy; Genetic recombination and replenishment through seed.
- 20.3 Seed dispersal strategies.
- 20.4 Vegetative propagation-grafting, layering, budding and economic aspects.

21. Physiology, Biochemistry and biotechnology.

- 21.1 Discovery and nomenclature of enzymes, characteristics of enzymes, concept of holoenzymes, apoenzyme, co-enzyme and co-factors.
- 21.2 Regulation of enzyme activity, mechanism of enzyme action.
- 21.3 Importance of water to plant life; physical properties of water .
- 21.4 Diffusion of water, Osmosis, absorption, transport of water through xylem & transpiration; physiology of opening and closing of stomata.
- 21.5 Macro and Micro elements, importance of mineral nutrients to the plant and their role, mineral uptake, deficiency and toxicity symptoms.
- 21.2 Mechanism of transport of organic substance in phloem, source sink relationship, factors affecting translocation.
- 21.7 Significances and historical aspects of photosynthesis, photosynthetic pigments, action spectra and enhancement, effect.
- 21.8 Concept of two photo systems in photosynthesis, Z- scheme, photophosphorylation, calvin cycle: C4 pathway, CAM plants, photorespiration.
- 21.9 ATP- the biological energy, currency, aerobic and anaerobic respiration, krebs cycle, electron transport mechanism (Chemi-osmotic theory).
- 21.10 Redox potential, oxidative phosphorylation, pentose phosphate pathway.
- 21.11 Biology of nitrogen fixation, importance of nitrate reductase and its requirement. ammonium assimilation.
- 21.12 Structure and function of Lipids, fatty acid and biosynthesis B- Oxidation, saturated and unsaturated fatty acids, storage and mobilization of fatty acids.
- 21.13 Definition and phases of growth, development and kinetics of growth, seed germination and factors of their regulation.
- 21.14 Plant movements- the concept of photoperiodism, physiology of flowering, florigen concept, biological clocks, physiology of senescence, fruit ripening.
- 21.15 History and discovery of plant hormones, auxins, gibberellins, cytokinins, abscisic acid and ethylene, biosynthesis and mechanism of action.
- 21.16 Photomorphogenesis: phytochromes and cryptochromes, their discovery, physiological role and mechanism of action.
- 21.17 Tool and techniques of recombinant DNA Technology, cloning vectors: genomic and DNA library.
- 21.18 Transposable elements, techniques of gene mapping and chromosome walking.
- 21.19 Functional definition of biotechnology, basic concepts for plant tissue culture, cellular totipotency, differentiation and morphogenesis.
- 21.20 Biology of Agrobacterium, vectors for gene delivery and market genes, salient achievements in crop biotechnology.

22. Plant and Environment.

- 22.1 Atmosphere-gaseous composition: water-water cycle, and its significance, global radiation, photosynthetically active radiation, temperature.

- 22.2 Soil structure; soil profiles and development, physico-chemical properties of soil and biotic components.
- 22.3 Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes) and salinity.
- 22.4 Morphological, anatomical and physiological responses of plants to light (photoperiodism, heliophytes, sciophytes) and temp. (thermoperiodically and vernalization).
- 22.5 Population ecology, growth curves: Ecotypes and ecads.
- 22.6 Community ecology: Community characteristics; frequency, density, cover, life forms, biological spectrum, ecological succession.
- 22.7 Ecosystem: structure, abiotic and biotic components, food chain, food web, ecological pyramids and energy flow.
- 22.8 Biogeochemical cycles of carbon, nitrogen and phosphorus.

23. Natural Resources and Management.

- 23.1 Biogeographical regions of India.
- 23.2 Vegetation types of India; Forests and grasslands.
- 23.3 Strategies for environmental Management.'
- 23.4 Conservation of Natural resources.
- 24. **Utilization of plants.**
- 24.1 Food Plants: origin of wheat, maize and potato and their cultivation in India.
- 24.2 Fibres : cultivation and processing of cotton and jute.
- 24.3 Beverages: Botany and processing of tea and coffee.
- 24.4 Spices: history and the parts used of Asafetida. Cumin, Fennel, Goriander, Cloves, Cinnamomum and Cardamon..

25. Utilization of Plants.

- 25.1 Veg. oils: Source of vegetable oils: Botany, Cultivation and utilization of Groundnut, mustard and coconut.
- 25.2 A general account of firewood and timber sources of J&K State and utilization of Bamboos.
- 25.3 Medicinal plants of J&K State: a general account.
- 25.4 Rubber: sources of rubber, extraction and processing of commercial rubber.

(II) SILVICULTURE

1. Principles of Silviculture

Definition of Forestry:- Stages of forestry development and its influence on forestry today. Definition of silvics and silviculture role of silviculture. Major forest types, distribution and composition in India and J&K.

Study of site factors like climatic, edaphic, physiographic and biotic in relation to forest.'

Classification of climatic factors, the role played by light, temperature, rainfall, snow, wind, humidity and evaporation in relation to forest vegetation.

Edaphic factors of biological agencies parent rock topography etc. on the soil formation. Soil profiles-physical and chemical properties, mineral nutrients, nutrient cycling, soil moisture and their influences on forest production.

Tree growth photosynthesis biotic factor-influence of plants, insects, wild animals man and domestic animals on vegetation.

Tree growth photosynthesis, respiration, translocation and transpiration. Cambial development, growth rings, effects on environment on cambial development. Shoot and crown development. Flowering, fruiting and seed production.

Root growth-distribution and biomass. Environmental effects on development silvicultural manipulation of root growth.

Stand dynamics- Plant succession, competition and tolerance stand development- basal area and yield table.

2. Practices of Silviculture

Classification of forests. Forest regeneration, natural, artificial (Plantation forests) and mixed regeneration. Natural forest types and their management. Plantation forests: planting survey, planting plan, plantation records, maps, ecological aspects for the choice of tree species, site preparation, planting tools and planting, direct seeding gap filling, afforestation of dryland, wetland and adverse sites and taungya. Enrichment planting; fertilizer, application, nursery crops, cover crops. Tending; control of climbers and undesirable trees. Weed Management. Pruning and lopping. Thinning- thinning of irregular crops, increment felling, improvement felling. Fire prescribed burning. Conflicts between afforestation and cattle ranching.

3. Silviculture of trees and shrubs (Soft wood)

The origin, distribution, general description, economic value, Phenology, silviculture characters, regeneration methods, management of soft woods such as *Cedrus deodara*, *Cupressus torrulosa*, *Pinus wallichiana*; *P. roxburghii*, *P. helpensis*, *P. gerardiana*, *Abies Pindrow*, *Picea Smethana* and Tropical Pines like *P. oocarpa*, *P. petula*, *P. inesia* *Rhododendrons*, *Pyrus passia*, and *Indigofera* species, *Juniperus*, *Aqathis robusta*.

4. Silvicultural Systems

Silvicultural system:- definition modern silviculture, classical silviculture, classification and detailed study of the following systems.

Clear felling, system (Including clear strip and alternate strip system); shelter wood system; uniform system, the group system the shelter wood system; the wedge system; the irregular shelter wood system; the coppice of two rotation system; the shelter wood coppice system; coppice selection system; coppice with standard system; coppice with reserve system; pollard system and culm selection system in bamboo

5. Silviculture of Indian trees-II

General description, growth and silviculture characters and regeneration methods of following species:-

Quercus species, Alnus nitida, Acer Spp. Acacia nilotica, A. catechu, Dalbergia Sisso, Juglans regia. Toona Ciliata Bauhinia Variegata, Fraxinus spp. Celtis australis, Grewia optiva, morus species, platanus orientalis, Eucalyptus spp, populus spp. salix species, Robinia pseudoacacia, ulmus wallichiana, catalpa bignonioides, Albizzia spp Dendroica viscosa, parrotia spp. viburnum, olea cuspidate, Aesculus indica, Ailanthus excelsa; Tectona grandis, shorea robusta Berberis spp. prosopis spp Leucaena leucocephala, Hippophae rhamnoides.

(III) **FIELD CROPS**

1. **Cereals , Millets and Pulses**

Economic importance-origin and distribution, soil climatic requirement land preparation, varieties, seed-rate/seed treatment, sowing time density growth stages, water management nutrient and weed management after cultivation, harvest and processing.

Cereals:- Rice, maize, wheat, oats, barley.

Millets:- Sorghum pearl – millet; finger millet and small millets.

Pulses:- Beans, blackgram, greengram. cowpea, soyabean, lentil and peas.

2. **Oil seeds and commercial crops.**

Economic importance-origin and distribution-soil and climatic requirement, land preparation varieties, seed rate, seed treatment, sowing density crop growth stages, integrated nutrient management- irrigation, weed management, harvest and processing cropping system and yield constraints together utilization.

Oil seeds:- Groundnut Sesamum, Sunflower, Castor, Safflower, rapeseed, mustard, niger and linseed.

Commercial Crops:- Tobacco , cotton, sugarcane, sugarbeet, saffron, zeera, potato, onion and garlic.

3. **Forages and Grasses**

Forage crops:- definition, classification of forage crops (annual and perennial): leguminous and cereal forages crops with their characteristics Quality- characteristics of forages crops: storage and preservation of forages (hay and silage) making Grassland improvement problems and prospects. Renovations of degraded grasslands; Role of grasses and legumes in soil fertility.

Brief description about the cultivation of important grasses and legumes.

Sd/-

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