

**स्किल/ट्रेड टेस्ट और लिखित परीक्षा हेतु आवश्यक अनुदेश /**  
**Important instructions for Skill/Trade & Written Test examination**  
**Post - Technical Assistant**

- 1) परीक्षा हेतु प्रवेश पत्र आपको किसी प्रकार के चयन से सम्बंधी कोई गारंटी नहीं देता है ।  
The admit card for the examination does not, in any way, guarantee the selection for the post applied for.
- 2) अभ्यर्थियों से अनुरोध है कि विज्ञापन में वर्णित अर्हता/पात्रता को पढ़ कर अपनी अर्हता स्वयं सुनिश्चित कर लें और आवेदन प्राप्त होने की अंतिम तिथि को पूर्णतया पात्र होने की दशा में ही स्किल/ट्रेड टेस्ट परीक्षा में सम्मिलित हों ।  
Candidates are advised to read carefully the eligibility criteria as mentioned in the advertisement and they should appear in the Skill/Trade Test exam only after ensuring their eligibility on the closing date of the receipt of the applications.
- 3) अभ्यर्थी यह नोट करें कि परीक्षा के सभी चरणों में उनका प्रवेश निर्धारित अर्हता मापदंड को संतुष्ट करने की शर्त पर पूर्णतया **अनंतिम** है। आगे जाँच होने पर यदि आवेदन पत्र में किया गया कोई दावा सही नहीं पाया जाता है, तो अभ्यर्थन निरस्त कर दिया जाएगा।  
Candidates should note that their admission to all stages of examination will be purely **PROVISIONAL** subject to satisfying the prescribed eligibility criteria. On further Scrutiny if, any claim made in the application is not found substantiated, the candidature will be cancelled.
- 4) अपने प्रवेश पत्र के साथ पहचान के प्रमाण के लिए अपनी नवीनतम रंगीन फोटो और आईडी जैसे ड्राइविंग लाइसेंस, मतदाता आईडी कार्ड, आधार कार्ड, पैन कार्ड, पासपोर्ट, राज्य/केन्द्रीय सरकार द्वारा जारी किया गया आईडी कार्ड इत्यादि की **मूल तथा एक** स्वप्रमाणित छायाप्रति लेकर उपस्थित हों ।  
Candidate are required to bring their recent coloured Photo and original as well as a self-attested photocopy of their ID proof e.g. Driving License, Voter ID Card, Adhaar Card, PAN Card, Passport, State/Central Government issued ID card etc.
- 5) **The Syllabus and pattern of Written examination will be as follows:-**

<b>Mode of Examination</b>	Objective Type Multiple Choice Examination
<b>Medium of Questions</b>	The questions will be set both in English and Hindi except the questions on English Language.
<b>Standard of exam</b>	Diploma/Graduation Level (Syllabus attached)
<b>Papers of Exam</b>	There will be three papers (Paper-I, Paper-II & Paper-III). The second & third paper will be evaluated only for those candidates who secure the minimum threshold marks (to be determined by the Selection Committee in the first paper).

**Paper-I (Time Allotted - 1 hour) [Timing: 10:30 A.M. to 11:30 A.M.]**

Subject	No. of questions	Maximum Marks	Negative Marks
<b>Mental Ability Test*</b>	50	100 (two marks for every correct answer)	<u>There will be no negative marking in this paper</u>

\*Mental Ability Test will be so devised so as to include General Intelligence, Quantitative Aptitude, Reasoning, Problem Solving, Situational judgement etc.

**Paper-II (Time Allotted - 30 minutes) [Timing: 12:00 Noon to 12:30 P.M.]**

Subject	No. of questions	Maximum Marks	Negative Marks
<b>General Awareness</b>	25	75 (three marks for every correct answer)	One negative mark for every wrong answer
<b>English Language</b>	25	75 (three marks for every correct answer)	One negative mark for every wrong answer

**Paper-III (Time Allotted - 90 minutes) [Timing: 1.00 P.M. to 2:30 P.M.]**

Subject	No. of questions	Maximum Marks	Negative Marks
<b>Concerned Subject</b>	100	300 (three marks for every correct answer)	One negative mark for every wrong answer

The multiple choice questions have to be answered by darkening the appropriate circle on Answer Sheet by black pen.

- 6) अभ्यर्थी उत्तर पत्र (Answer Sheet) में दिये गए निर्धारित स्थान के अलावा अपने उत्तर पत्र में किसी भी तरह का व्यक्तिगत चिन्ह, नाम, अनुक्रमांक आदि ना लिखें। ऐसा किए जाने पर उनका अभ्यर्थन निरस्त किया जा सकता है।  
Candidates should not write/make any personal symbol, name, roll number on any place in their answer sheet except for the prescribed space. In case they do so, their candidature may be cancelled.
- 7) अभ्यर्थियों से अनुरोध है कि वे परीक्षा के लिए निर्धारित समय से एक घंटे पूर्व परीक्षा स्थल पर पहुंचें। परीक्षा शुरू होने के पश्चात किसी भी परिस्थिति में परीक्षा केन्द्र में प्रवेश नहीं दिया जाएगा।  
Candidates are advised to reach examination centre **One hour before the scheduled time.** Candidates will not be permitted to enter the Examination Center in any circumstance after commencement of the examination.
- 8) अभ्यर्थियों को उनके अपने हित में सलाह दी जाती है कि वे अपने साथ संवाद के उपकरण जैसे मोबाईल फोन तथा अन्य इलेक्ट्रॉनिक गैजेट्स आदि परीक्षा स्थल पर ना लाएँ। ऐसी वस्तुएँ जैसे बैग, पुस्तक, नोट्स आदि भी परीक्षा कक्ष के अंदर लाना अनुमन्य नहीं है। अभ्यर्थियों द्वारा अपने साथ लाई हुई वस्तुओं की सुरक्षा का दायित्व स्वयं अभ्यर्थियों का होगा।  
Candidates are advised in their own interest not to bring any instruments of communication like mobile phone electronic gadgets etc to the examination venue. Items like bag, book notes etc are also not allowed inside the examination hall. Candidates themselves will be responsible for the safety of any items brought by them to the examination.
- 9) अभ्यर्थी द्वारा परीक्षा कक्ष में किसी भी सामग्री का आपस में आदान प्रदान अनुमन्य नहीं है। परीक्षा केन्द्र में किसी भी प्रकार के अनाचार/अनुचित तरीकों में रत पाया जाना अभ्यर्थी को अयोग्य कर देगा।  
Candidates are strictly prohibited to exchange anything in the examination hall. Indulging in any malpractice/unfair means in the examination centre will disqualify the candidate.
- 10) प्रवेश पत्र में दिए गए विवरणों में कोई विसंगति होने पर तुरन्त कार्यालय को सूचित करें।  
Please inform this office immediately in case of any discrepancy in details given in the admit card.
- 11) केवल ट्रेड/स्किल टेस्ट क्वालिफाई करने वाले उम्मीदवारों को ही लिखित परीक्षा में सम्मिलित होने की अनुमति दी जाएगी। मेरिट लिस्ट लिखित परीक्षा के आधार पर तैयार की जायेगी।  
Only those candidates, who will qualify in the Skill/Trade Test, will be allowed to appear in the written examination. The merit list will be prepared on the basis of written examination.
- 12) प्रवेश पत्र को भविष्य के संदर्भों हेतु संभाल कर रखें।  
Please keep admit card safely for future references.

## **SYLLABUS FOR TA ( CHEMICAL ENGINEERING )**

Knowledge and associated skills of various Chemical engineering unit operations, : Fluid Flow - Heat Transfer - Mechanical Operations - Mass Transfer - Process Instrumentation - Engineering Thermodynamics - Process Utilities - Reaction Engineering; unit processes and process instrumentation in chemical process industry

Engineering Drawing - Process Equipment Design & Drawing: Ability to read and interpret drawings related to plant layout, process equipment and components.

Knowledge of various materials used in chemical processes, their properties and specifications: Engineering Materials - Applied Chemistry

Computer Applications in Chemical / Mechanical Engineering

Knowledge in Chemical Process Industries related to Essential oils, steam distillation, fractionation of essential oils, solvent extraction of medicinal plants, Modern Extraction techniques like Supercritical fluid extraction.

## Civil Engineering

1. Civil engineering drawing.
2. Work shop practice.
3. Computer application.
4. Construction materials.
5. Building construction.
6. Concrete technology.
7. Structural machines
8. Elements o RCC design.
9. Soil & foundàtion engineering
10. Earth quake resistant building construction
11. Elements of steel structure design.
12. Estimation & costing.

**ORGANIC CHEMISTRY**

**Basics of Organic Chemistry:** Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength. Homolytic and Heterolytic fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

**Chemistry of Aliphatic Hydrocarbons:** *Carbon Carbon sigma bonds:* Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, WurtzFittig Reactions, Free radical substitutions: Halogenation relative reactivity and selectivity; *Carbon Carbon pi bonds:* Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations; Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration demercuration, hydroboration oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti hydroxylation (oxidation). 1, 2 and 1, 4 addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1butene, toluene, ethyl benzene; Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes; *Cycloalkanes and Conformational Analysis:* Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.

**Chemistry of Aromatic Hydrocarbons:** Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations /carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and FriedelCraft's alkylation/acylation with their mechanism. Directing effects of the groups.

**Chemistry of Alcohols, Phenols, Ethers and epoxide:** Alcohols: preparation, properties and relative reactivity of 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> alcohols, Bouvaelt Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol Pinacolone rearrangement; Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer – Tiemann and Kolbe's – Schmidt Reactions, Fries and Claisen rearrangements with mechanism; Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and LiAlH<sub>4</sub>

**Chemistry of Carbonyl Compounds:** Structure, reactivity and preparation; Nucleophilic additions, Nucleophilic addition elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisan Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and BenzilBenzilic acid

rearrangements, haloform reaction and Baeyer Villiger oxidation, substitution reactions, oxidations and reductions (Clemmensen, WolffKishner,  $\text{LiAlH}_4$ ,  $\text{NaBH}_4$ , MPV, PDC and PGC); Addition reactions of unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Ketoenol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate:

**Chemistry of Carboxylic Acids and their Derivatives:** Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acids; Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmannbromamide degradation and Curtius rearrangement

**Chemistry of Alkaloids:** Natural occurrence, General structural features, Isolation and their physiological action, Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine.

**Chemistry of Carbohydrates:** Occurrence, classification and their biological importance; Monosaccharides: Constitution and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani Fischer synthesis and Ruff degradation; Disaccharides – Structure elucidation of maltose, lactose and sucrose; Polysaccharides – Elementary treatment of starch, cellulose and glycogen

**Chemistry of Lipids:** Introduction to oils and fats; common fatty acids present in oils and fats, Hydrogenation of fats and oils, Saponification value, acid value, iodine number. Reversion and rancidity.

**Chemistry of Terpenes:** Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and  $\alpha$ -terpineol.

## ORGANIC SPECTROSCOPY & INSTRUMENTATION

General principles Introduction to absorption and emission spectroscopy.

**UV Spectroscopy:** Types of electronic transitions,  $\lambda_{\text{max}}$ , Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption; Application of Woodward Rules for calculation of  $\lambda_{\text{max}}$  for the following systems:  $\alpha$ ,  $\beta$  unsaturated aldehydes, ketones, carboxylic acids and esters; Conjugated dienes: alicyclic, homoannular and heteroannular; Extended conjugated systems (aldehydes, ketones and dienes); distinction between cis and trans isomers.

**IR Spectroscopy:** Fundamental and nonfundamental molecular vibrations; IR absorption

positions of O, N and S containing functional groups; Effect of H-bonding, conjugation, resonance and ring size on IR absorptions; Fingerprint region and its significance; application in functional group analysis.

**NMR Spectroscopy:** Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple compounds

Applications of IR, UV and NMR for identification of simple organic molecules.

## ANALYTICAL CHEMISTRY

**Molecular Spectro-analytical Methods of Analysis:** Colorimetry and Spectrophotometry: Introduction, theory: molecular energy levels, types of molecular transitions, Lambert-Beer's Law and limitations, types of sources, monochromators and detectors, Instrumentation of single beam and double beam instrument

**Qualitative and Quantitative aspects of analysis:** Sampling, evaluation of analytical data, errors, accuracy and precision, methods of their expression, normal law of distribution if indeterminate errors, statistical test of data; F, Q, and T test, rejection of data, and confidence intervals.

**Optical methods of analysis:** Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer Lambert's law.

*UV-Visible Spectrometry:* Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Basic principle of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, ketoenol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

*Infrared Spectrometry:* Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution.

*Flame Atomic Absorption and Emission Spectrometry:* Basic principles of instrumentation (choice of source, monochromator, detector, Choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

## Separation Techniques

*Solvent extraction:* Classification and principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous

and counter current extractions. Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and non-aqueous media.

*Chromatography*: Classification and principle and efficiency of the technique. Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms: frontal, elution and displacement methods. Qualitative and quantitative aspects of chromatographic methods of analysis: IC, GLC, TLC and HPLC.

*Stereo isomeric separation and analysis*: Measurement of optical rotation, calculation of Enantiomeric excess (ee)/ diastereomeric excess (de) ratios and determination of Enantiomeric composition using NMR, Chiral solvents and chiral shift reagents Chiral chromatographic techniques using chiral columns (GC and HPLC).



## Section A

## 1. Extension education

- Meaning, definition, objectives, principles, scope, philosophy and its distinguishing features.
- Extension teaching and learning: Teaching elements, steps in teaching, learning, learning situation. Basic principles of teaching and learning.
- Early extension efforts in India.
- Comparative study of extension service in India and USA.

## 2. Community Development

- Meaning, definition and objectives of community development.
- Organizational set up and activities of community development at state, District, block and village level.
- Extension and rural development Programme: Including T and V system, National Demonstration, IRDP, Jawahar Rojgar Yojna.

## 3. Extension programme planning, monitoring and evaluation:

- Meaning, principles and procedure of programme planning.
- Definition: purpose, types, criteria and steps involving in monitoring and evaluation.

## Section B

## Communication, diffusion of agricultural innovations

Meaning and definition of communication. Communication process, elements and models of communication process. Types of communication. Key communicator, audio visual aids, their use and effectiveness.

Extension teaching methods- classification, merits and demerits, factors affecting selection and use of extension teaching method. Mass media in extension.

Meaning and definition of innovation, diffusion, adoption, diffusion effect and rate of adoption, stages of adoption, factors affecting adoption, elements of diffusion, difference between diffusion and communication. Innovation decision process, categories of adopters, characteristics of innovations.

## Section C

## Rural sociology and educational Psychology

- Definition and scope of rural sociology.
- Basic concepts of society.
- Characteristics and differences of rural and urban communities.
- Basic rural institutions and their role in agriculture development.
- Definition and types of rural leadership and their role.
- Definition, nature and importance of psychology in the development of human behaviour.

## Syllabus for Taxonomy/Gene Bank

### Post code (T-1116)

#### Diversity of Angiosperms: Systematics, Development & Reproduction

Principles of classification, nomenclature; comparative study of different classification systems, viz. Linnaeus, Bentham & Hooker, Engler & Prantl, Hutchinson, and Cronquist. Herbarium techniques and important Botanic Gardens.

#### Taxonomic study of following families and their economic importance

*Dicots*; Nymphaeaceae, Nelumbonaceae, Ranunculaceae, Malvaceae, Bombacaceae, Brassicaceae, Cucurbitaceae, Rosaceae, Leguminosaceae, Myrtaceae, Rutaceae, Apiaceae, Apocynaceae, Solanaceae, Convolvulaceae, Cuscutaceae, Scrophulariaceae, Acanthaceae, Lamiaceae, Asteraceae, Rubiaceae, Euphorbiaceae, and Amaranthaceae.

*Monocots*: Cyperaceae, Poaceae, Arecaceae, Liliaceae.

**External morphology** of vegetative and floral parts; modifications – phyllodes, cladodes, and phylloclades. Meristems-kinds study of tissue system - epidermal, ground, and vascular. Anatomy of roots, stems, and leaves. Cambium - its function and anomalies in roots and stems.

**Structure and development** of male and female gametophytes – microsporogenesis, microgametogenesis, megasporogenesis, and megagametogenesis, embryo sac types. Double fertilization development of embryo, endosperm development and its morphological nature, apomixis and polyembryony.

#### Cytology, Genetics, Evolution & Ecology

Cell structure, cell organelles, nucleus, chromosome structure, nucleosome and solenoid model, salivary gland, lampbrush and B chromosomes. Cell division – mitosis, meiosis; their significance, chromosomal aberrations.

**Genetics**, laws of inheritance; gene interaction; linkage, cytoplasmic inheritance, sex determination.

Mutation- spontaneous, induced mutations, molecular mechanism and evolutionary significance; polyploidy-origin, kinds and role in evolution. Evidences and theories of evolution.

**Ecology**, relation with other disciplines. Plant types: Hydrophytes - Hydrilla, Eichhorina, Nymphaea, Typha. Xerophytes – Nerium, Casuarina, Saccharum, Begonia. Plant succession – xeroseres, hydroseres. Ecosystems - concept, basic types, components, & function

## Syllabus for Bio-prospection

1. Sterilization and aseptic techniques
  - a. Principles of sterilization,
  - b. Types and methods of sterilization,
  - c. Applications of different sterilization methods.
  - d. Bio-safety, its methods and guidelines.
2. Cell culture and culture conditions
  - a. Primary and continuous cell lines
  - b. Counting of cells in hemacytometer.
  - c. Trypan blue exclusion
  - d. Media preparation
3. Basics of microscopy and microscopes
  - a. Light, dark & brightfield,
  - b. Stereomicroscopy, inverted & upright,
  - c. Confocal, SEM & TEM.
4. Guidelines for animal experimentation.
5. Principles of pharmacology and toxicology
6. Chemotherapy of infectious and neoplastic diseases.
7. Metric measurements in Biology
8. Basic statistical terminologies and calculations.

# **Syllabus for Plant Protection**

**Post code (T-1316)**

## **CROP PROTECTION**

General symptoms of viral, bacterial, fungal and nematode diseases of plants. Important plant diseases caused by pathogens like viruses, bacteria, fungi and nematodes. Methods of managing plant diseases using conventional and modern tools. Disease resistance, fungicides, antibiotics, nematicides, biological control agents, botanicals in plant disease management etc. Insects as vectors of important plant diseases, Classification of insects, Important beneficial/harmful insects and their management (pesticides, pheromones, non-chemical methods, biological control, Integrated Pest management). Identification of bacteria, fungus, virus and nematodes. Koch's postulates. Autoclave and sterilization. Common Culture media

**Word Processing**

1. Setting up of page margins, paragraphs, fonts, styles, text boxes, text alignment and sorting, header, footer, page numbering.
2. Clipboard utilities, data sorting and formulas
3. Tables-styles, borders, layout, merge, cell size, rows, columns, formula
4. Illustrations, links, header, word art, signature line, equations, symbols
5. Page background, envelopes, mail merge and labels.
6. Reviewing a document, proofing , comments, tracking changes, compare document and protect document.
7. References, Table of contents and foot notes
8. Citations and Bibliography
9. Captions, index table of authorities
10. Viewing a document and printing a document

**Scientific writing**

Paragraph writing, Comprehension, Parts of speech (noun, pronoun, adjective, determiner, verb, adverb, preposition, conjunction, and interjection). Reference writing and use of softwares for reference editing.

**Photograph editing**

Cropping, Straighten, red eye reduction, sharpening, retouching, fill light, highlights shadows, colour temperature, tints, vignetting, layers, text, ratio, saturation, geotagging image, creating a movie, collage or poster. Working with RGB, CMYK, B&W.

**Syllabus for photography**

1. History of photography
2. Types of cameras
3. Types of photography
  - a. Macro photography
  - b. Landscape photography
  - c. Portrait Photography
  - d. Sports/Action Photography
  - e. Night Photography
  - f. Stage photography
4. Resolution
5. ISO
6. Aperture
7. Shutter speed
8. Focal length
9. Histogram
10. Metering
11. White balance
12. Shutter Priority
13. Aperture priority
14. Processing
15. Types of files
16. Composition
17. Lens – wide angle and telephoto
18. Light
19. Exposure or exposure triangle
20. Depth of field

Report writing and press coverage