

**INFORMATION BULLETIN  
ON**

**ADVERTISEMENT NO.03/2023**

**FOR**

**DIRECT RECRUITMENT FOR  
VARIOUS POSTS**

**IN**

**CENTRAL PULP & PAPER  
RESEARCH INSTITUTE,  
SAHARANPUR (UP)**



## **IMPORTANT INFORMATION**

All applicants are advised to read the Information Bulletin carefully before starting the process of Online Registration and filling up of the application form.

- 1. Eligibility for the Examination:** *The Candidates applying for the examination for the recruitment of various posts should ensure that they fulfill all eligibility conditions for admission to examination. Their admission to all the stages of the examination will be purely provisional subject to satisfying the prescribed eligibility conditions. Mere issue of e-Admit Card to the candidate will not imply that his/her candidature has been finally cleared by the competent authority.*

*Candidature of the candidate is liable to be rejected at any stage of the selection process or after selection or even at the time of joining, if any information provided by the candidate is found to be false or is not found in conformity with eligibility criteria mentioned in the advertisement No. 03/2023.*

- 2. Verification of Documents:** *Verification of eligibility conditions with reference to original documents shall be taken up for shortlisted candidates only at later stage.*
- 3. Candidates are required to apply Online only.**
- 4. Start Date & Time for Online Applications: 09.10.2023 & 24:00**
- 5. Last Date & Time for Online Applications: 30.10.2023 & 23:59**
- 6. e-Admit Card:** *The eligible candidates shall be issued downloadable e-Admit Card two-three weeks before the examination. No Admit Card will be sent by post/email.*
- 7. Facilitation Counter for Guidance of Candidates:** *In case of any guidance/information/clarification regarding their applications, candidature etc, please refer Point 19 in the Information Bulletin i.e. "Contact Us".*
- 8. Mobile Phones/other electronic devices Banned:**
  - (a) Mobile phones or any other communication devices are not allowed inside the examination hall. Any infringement of these instructions shall entail disciplinary action including ban from future examinations of CPPRI*
  - (b) Candidates are advised in their own interest not to bring any of the banned items including **Mobile Phones/Bluetooth/Watches** or any valuable/costly items to the venue of the examination, as arrangement for safe-keeping cannot be assured. CPPRI will not be responsible for any loss in this regard.*

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## ***IMPORTANT DATES AT A GLANCE***

<b><i>Sl. No.</i></b>	<b><i>Activity</i></b>	<b><i>Scheduled Dates</i></b>
<b><i>1.</i></b>	<b><i>Online Applications starts on</i></b>	<b><i>09.10.2023</i></b>
<b><i>2.</i></b>	<b><i>Online Applications closes on</i></b>	<b><i>30.10.2023</i></b>
<b><i>3.</i></b>	<b><i>Downloadable-Admit Card for Online Exam</i></b>	<b><i>To be notified</i></b>
<b><i>4.</i></b>	<b><i>Date of the Examination</i></b>	<b><i>To be notified</i></b>

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## 1. INTRODUCTION

Central Pulp & Paper Research Institute, a National level Institute was established in 1980 as an autonomous body under the administrative control of Department for Promotion of Industry & Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India to promote R&D activities in the field of pulp & paper.

All affairs of the Institute are managed by its Council of Association President of which is the Secretary (DPIIT), Ministry of Commerce and Industry, Govt. of India. Planning & monitoring of research activities is looked after by the Research Advisory Committee (RAC) of the Institute. The committee is represented by Senior Executives from Pulp & Paper Industry, Associations, Research Organizations and Ministry of Commerce and Industry.

CPPRI invites applications on direct recruitment basis from dynamic, proficient and motivated candidates looking for exciting career opportunities and want to be a part of its growth journey. Interested and eligible candidates can apply for the vacancies ONLINE, through our website <https://www.cppri.res.in>.

## 2. CANDIDATES TO ENSURE THEIR ELIGIBILITY FOR THE POSTS:

Before applying, candidates should ensure that they fulfill the eligibility criteria for the applied posts. CPPRI would admit to the Examinations all the candidates applying for the post with the requisite fee/intimation charges (wherever applicable) on the basis of the information furnished in their ONLINE application and shall determine/verify their eligibility only at the final stage i.e. document verification. If at any stage, it is found that any information furnished in the ONLINE application is false/ incorrect or if according to the CPPRI, the candidate does not satisfy the eligibility criteria to the post applied for, his/ her candidature will be cancelled and even will be removed from service without notice, if he/she has already joined CPPRI.

## 3. MODE OF APPLICATION:

Candidates are required to apply ONLINE only through website <https://www.cppri.res.in>. No other mode for submission of application is available.

## 4. IMPORTANT DATES:

Events	Important Dates**
Website Link Open For Online Registration of Applications and Payment of Fees/Intimation Charges	09.10.2023 (24:00 Hours)
Last Date for Online Application	30.10.2023 (23:59 Hours)
<b>** CPPRI reserves the right to make any change in these dates.</b>	

## 5. HELP FACILITY:

In case of any problem in filling up the form, payment of fee/intimation charges or in downloading of e-Admit Card, queries may be made through e-mail at [cppri.exam@gmail.com](mailto:cppri.exam@gmail.com).

## 6. USE OF MOBILE PHONES AND OTHER ELECTRONIC DEVICES BANNED:

- The use of any mobile phone (even in switched off mode), pager or any electronic equipment or programmable device or storage media like pen drive, smart watches etc. or camera or blue tooth devices or any other equipment or related accessories either in working or switched off mode capable of being used as a communication device during the examination is strictly prohibited. Any infringement of these instructions shall entail disciplinary action including ban from future examinations.
- Candidates are advised in their own interest not to bring any of the banned items including mobile phones/pagers to the venue of the examination, as arrangement for safe-keeping cannot be assured.
- Candidates are advised not to bring any valuable/costly items to the Examination Halls, as safe-keeping of the same cannot be assured. CPPRI will not be responsible for any loss in this regard.

## 7. ADDENDUM/CORRIGENDUM:

Please note that Addendum/Corrigendum, if any, issued on the above advertisement, will be published only on the website <https://www.cppri.res.in>.

## 8. DETAILS OF POSTS

CPPRI invites applications from eligible candidates for the posts mentioned below on direct recruitment basis. The total number of vacancies shown below may vary as per administrative exigencies of the Institute:-

S.No.	Name and Group of the post	Pay Matrix Level as per 7 <sup>th</sup> CPC	Number of posts and status of the reserved vacancies
1	Sr. Scientific Assistants (SSAs) Gr. IV	PML-6 (Rs.35,400 - 58600)	17 Nos. (UR-4, SC-2, ST-2, OBC-7 EWS (UR)-2 (One post is earmarked for PwBD (HH-1)
2	Technician Group III(i)	PML-5 (Rs. 29200 – 48200)	3 Nos. UR -3
3	Technician Group II	PML-2 (21700– 69100)	6 Nos. (UR-3, SC-1, OBC-1 EWS (UR)-1)

## 9. ELIGIBILITY CRITERIA

### Citizen:-

The candidate must be

- (a) A citizen of India (either natural or by registrations), or
- (b) Such other nationals as declared eligible by the Govt. of India.

Provided that a candidate belonging to category (b) shall be a person in whose favour a certificate of eligibility has been issued by the Government.

A candidate in whose case a certificate of eligibility is necessary may be admitted to the examination but the offer of appointment may be given only after the necessary eligibility certificate has been issued to him by the Government.

### Age:

S. No.	Name and PML of vacancy	Maximum Age Limit
1	Sr. Scientific Assistant(SSA) PML-6	28 years.
2	Technician Group III(i) PML-5	25 years.
3	Technician / Group II PML-2	23 Years

### Age relaxation:

S.No.	Category	Age relaxation allowed in years
1	SC and ST	5 years
2	OBC	3 years
3	PwBD (UR)	10 years
4	PwBD (SC and ST)	15 years
5	PwBD (OBC)	13 years

**Note:** Date of birth as recorded only in the Certificate/Mark-sheet of SSC/Matric/High School/10<sup>th</sup> Class or equivalent examination will be accepted.

## 10. MINIMUM EDUCATIONAL QUALIFICATIONS / WORK EXPERIENCE :

S. No.	Name of vacancy and its PML	Qualification required
1	Sr. Scientific Assistant(SSA) PML-6	<b>12(twelve) Posts of SSA- M.Sc. (Chemistry) or recognized equivalent qualification with minimum 60% marks.</b>  Reservation in these 12 posts in as under.  UR: 5 Nos (Including 2 post EWS with horizontal reservation) SC: 1 Nos.





## 12. FEE

**A Non refundable Fee of Rs. 500/- (Rupees five hundred) only plus applicable service charges + GST** to be paid for online payment through Debit/Credit card, Net banking and UPI mode only.

Candidates belonging to SC/ST/PwBD/Women category candidates are exempted from payment of application fee of Rs. 500/-. No claim for refund of the fee will be entertained nor will it be held in reserve for any other examination.

## 13. PROCEDURE TO APPLY ONLINE

(1) Candidates are first required to go to the CPPRI's website <https://www.cppri.res.in> and click on the link 'Career' and then click on the option "CLICK HERE TO APPLY ONLINE FOR ADVERTISEMENT NO. 03/2023" to open the On-Line Application Form.

(2) Candidates will have to click on "NEW REGISTRATION" to register their application by entering their basic information in the online application form. Use of special characters while filling the form will not be allowed. After that an Application number and password will be generated by the system and displayed on the screen. Candidate should note down the Application number and password. An Email & SMS indicating the Application number and Password will also be sent. They can reopen the saved data using Application number and password and edit the particulars, if needed.

(3) Candidates are required to upload their photograph and signature as per the specifications given in the Guidelines for Scanning and Upload of Photograph and Signature.

(4) **Candidates are advised to carefully fill in the online application themselves as no change in any of the data filled in the online application will be allowed/ entertained. Prior to submission of the online application candidates are advised to use the "SAVE AND NEXT" facility to verify the details in the online application form and modify the same if required. No change is permitted after clicking on FINAL SUBMIT Button. Visually Impaired candidates are responsible for carefully verifying/ getting the details filled in, in the online application form and ensuring that the same are correct prior to submission as no change is possible after submission.**

## 14. MODE OF PAYMENT

Candidates have to make the payment of requisite fees/ intimation charges through ONLINE mode only:

- (i) Candidates should carefully fill in the details in the On-Line Application at the appropriate places very carefully and click on the "FINAL SUBMIT" button at the end of the On-Line Application format. Before pressing the "FINAL SUBMIT" button, candidates are advised to verify every field filled in the application. The name of the candidate or his /her father/husband

etc. should be spelt correctly in the application as it appears in the 10th class certificates/mark sheets. Any change/alteration found may disqualify the candidature. In case the candidate is unable to fill in the application form in one go, he/ she can save the data already entered. Once the application is filled in completely, candidate should Final Submit the data.

- (ii) The application form is integrated with the payment gateway and the payment process can be completed by following the instructions.
- (iii) The payment can be made by using Debit Cards, Credit Cards, and Internet Banking by providing information as asked on the screen.
- (iv) If the online transaction has not been successfully completed then candidates are advised to login again with their Application number and password and complete the application form or pay the Application Fees online.
- (v) On successful completion of the transaction, an e-receipt will be generated.
- (vi) Candidates are required to take a printout of the e-receipt and online application form containing fee details. Please note that if the same cannot be generated, online transaction may not have been successful.

**Note:**

- a. After submitting your payment information in the online application form, please wait for the intimation from the server, DO NOT press Back or Refresh button in order to avoid double charge
- b. For Credit Card users: All charges are listed in Indian Rupee. If you use a non-Indian credit card, your bank will convert to your local currency based on prevailing exchange rates.
- c. To ensure the security of your data, please close the browser window once your transaction is completed. After completing the procedure of applying on-line including payment of fees, the candidate should take a printout of the system generated on-line application form, ensure the particulars filled in are accurate and retain it along with Application Number and Password for future reference. They should not send this printout to the CPPRI.

Please note that all the particulars mentioned in the online application including Name of the Candidate, Category, Date of Birth, Post Applied for, Address, Mobile Number, Email ID, Centre of Examination etc. will be considered as final and no change/modifications will be allowed after submission of the online application form. Candidates are hence requested to fill in the online application form with the utmost care as no correspondence regarding change of details will be entertained. CPPRI will not be responsible for any consequences arising out of furnishing of incorrect and incomplete details in the application or omission to CPPRI Advertisement No.03/2023.

- d. An email/ SMS intimation with the Application Number and Password generated on successful registration of the application will be sent to the candidate's email ID/ Mobile Number specified in the online application form as a system generated

acknowledgement. If candidates do not receive the email and SMS intimations at the email ID/ Mobile number specified by them, they may consider that their online application has not been successfully registered.

- e. An online application which is incomplete in any respect such as without photograph and signature, inhuman / inappropriate photograph and / or signature uploaded in the online application form/ unsuccessful fee payment will not be considered as valid.
- f. Candidates are advised in their own interest to apply online much before the closing date and not to wait till the last date for depositing the fee to avoid the possibility of disconnection/ inability/ failure to log on to the CPPRI website on account of heavy load on internet/website jam.
- g. CPPRI does not assume any responsibility for the candidates not being able to submit their applications within the last date on account of the aforesaid reasons or for any other reason beyond the control of the CPPRI. Please note that the above procedure is the only valid procedure for applying. No other mode of application or incomplete steps would be accepted and such applications would be rejected. Any information submitted by an applicant in his/ her application shall be binding on the candidate personally and he/she shall be liable for prosecution/ civil consequences in case the information/ details furnished by him/ her is found to be false at a later stage.

**NOTE :** Candidates are not required to submit along with their applications any certificate in support of their claims regarding Age, Educational Qualifications, Scheduled Castes/ Scheduled Tribes/Other Backward Classes and Physically disabled etc. which will be verified at later stage only. The candidates applying for the posts should ensure that they fulfill all the eligibility conditions for admission to the Examination. Their admission at all the stages of examination for which they are admitted by CPPRI will be purely provisional, subject to their satisfying the prescribed eligibility conditions. If on verification at any time before or after the Examinations, it is found that they do not fulfill any of the eligibility conditions; their candidature for the examination will be cancelled by CPPRI. If any of their claims is found to be incorrect, they may render themselves liable to disciplinary action by CPPRI besides removal from services, if he/she has joined the services on the basis of such false/incorrect/invalid information and/or concealment of any fact.

## 15. EXAMINATION SCHEME

Post and its PML	Type of Questions	Duration	Max. marks	Total Questions
Sr. Scientific Assistant (SSA): PML-6	MCQ	2 Hours	100 Mks.	100 nos. MCQ
Technician Group III(i): PML-5	MCQ	2 Hours	100 Mks.	100 nos. MCQ

Technician / Group II:PML-2	MCQ	2.5 Hours	100 Mks.	75 nos. MCQ on theory topics + 25 nos. MCQ based on practical knowledge (Domain wise)
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## 16. SYLLABUS :-

### **FOR SR. SCIENTIFIC ASSISTANT (SSA) : PML-6**

### **– B.E.(CHEMICAL ENGINEERING) OR EQUIVALENT QUALIFICATION**

#### **Section 1- Engineering Mathematics**

Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.

Calculus: Functions of single variable, Limit, continuity and differentiability, Taylor series, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.

Complex variables: Complex number, polar form of complex number, triangle inequality. Probability and Statistics: Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions, Linear regression analysis.

#### **Section 2-Process Calculations and Thermodynamics**

Steady and unsteady state mass and energy balances including multiphase, multi-component, reacting and non-reacting systems. Use of tie components; recycle, bypass and purge calculations; Gibb's phase rule and degree of freedom analysis.

First and Second laws of thermodynamics. Applications of first law to close and open systems. Second law and Entropy. Thermodynamic properties of pure substances: Equation of State and residual properties, properties of mixtures: partial molar properties, fugacity, excess properties and activity coefficients; phase equilibria: predicting VLE of systems; chemical reaction equilibrium.

#### **Section 3- Fluid Mechanics and Mechanical Operations**

Fluid statics, surface tension, Newtonian and non-Newtonian fluids, transport properties, shell-balances including differential form of Bernoulli equation and energy balance, equation of continuity, equation of motion, equation of mechanical energy, Macroscopic friction factors, dimensional analysis and similitude, flow through pipeline systems, velocity profiles, flow meters, pumps and compressors, elementary boundary layer theory, flow past immersed

bodies including packed and fluidized beds, Turbulent flow: fluctuating velocity, universal velocity profile and pressure drop.

Particle size and shape, particle size distribution, size reduction and classification of solid particles; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, agitation and mixing; conveying of solids.

#### **Section 4- Heat Transfer**

Equation of energy, steady and unsteady heat conduction, convection and radiation, thermal boundary layer and heat transfer coefficients, boiling, condensation and evaporation; types of heat exchangers and evaporators and their process calculations; design of double pipe, shell and tube heat exchangers, and single and multiple effect evaporators.

#### **Section 5- Mass Transfer**

Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stage-wise and continuous contacting and stage efficiencies; HTU & NTU concepts; design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption, membrane separations (micro- filtration, ultra-filtration, nano-filtration and reverse osmosis).

#### **Section 6- Chemical Reaction Engineering**

Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, kinetics of enzyme reactions (Michaelis-Menten and Monod models), non-ideal reactors; residence time distribution, single parameter model; non-isothermal reactors; kinetics of heterogeneous catalytic reactions; diffusion effects in catalysis; rate and performance equations for catalyst deactivation.

#### **Section 7- Instrumentation and Process Control**

Measurement of process variables; sensors and transducers; P&ID equipment symbols; process modeling and linearization, transfer functions and dynamic responses of various systems, systems with inverse response, process reaction curve, controller modes (P, PI, and PID); control valves; transducer dynamics; analysis of closed loop systems including stability, frequency response, controller tuning, cascade and feed forward control.

#### **Section 8- Plant Design and Economics**

Principles of process economics and cost estimation including depreciation and total annualized cost, cost indices, rate of return, payback period, discounted cash flow, optimization in process design and sizing of chemical engineering equipments such as heat exchangers and multistage contactors.

#### **Section 9- Chemical Technology**

Inorganic chemical industries (sulfuric acid, phosphoric acid, chlor-alkali industry), fertilizers (Ammonia, Urea, SSP and TSP); natural products industries (Pulp and Paper, Sugar, Oil, and Fats); petroleum refining and petrochemicals; polymerization industries (polyethylene, polypropylene, PVC and polyester synthetic fibres).

#### **FOR SR. SCIENTIFIC ASSISTANT (SSA) : PML-6**

#### **-M.Sc. ( CHEMISTRY) OR EQUIVALENT QUALIFICATION**

#### **Section 1: Physical Chemistry**

Structure: Postulates of quantum mechanics. Operators. Time dependent and time independent Schrödinger equations. Born interpretation. Dirac bra-ket notation. Particle in a box: infinite and finite square wells; concept of tunnelling; particle in 1D, 2D and 3D-box; applications. Harmonic oscillator: harmonic and anharmonic potentials; hermite polynomials. Rotational motion: Angular momentum operators, Rigid rotor. Hydrogen and hydrogen-like atoms : atomic orbitals; radial distribution function. Multi-electron atoms: orbital approximation; electron spin; Pauli exclusion principle; Slater determinants. Approximation Methods: Variation method and secular determinants; first order perturbation techniques. Atomic units. Molecular structure and Chemical bonding: Born-Oppenheimer approximation; Valence bond theory and linear combination of atomic orbitals –molecular orbital (LCAO-MO) theory. Hybrid orbitals. Applications of LCAO-MO theory to  $H_2^+$ ,  $H_2$ ; molecular orbital theory (MOT) of homo- and heteronuclear diatomic molecules. Hückel approximation and its application to annular  $\pi$ - electron systems.

Group theory: Symmetry elements and operations; Point groups and character tables; Internal coordinates and vibrational modes; symmetry adapted linear combination of atomic orbitals (LCAO-MO); construction of hybrid orbitals using symmetry aspects.

**Spectroscopy:** Atomic spectroscopy; Russell-Saunders coupling; Term symbols and spectral details; origin of selection rules. Rotational, vibrational, electronic and Raman spectroscopy of diatomic and polyatomic molecules. Line broadening. Einstein's coefficients. Relationship of transition moment integral with molar extinction coefficient and oscillator strength. Basic principles of nuclear magnetic resonance: gyromagnetic ratio; chemical shift, nuclear coupling.

**Equilibrium:** Laws of thermodynamics. Standard states. Thermochemistry. Thermodynamic functions and their relationships: Gibbs-Helmholtz and Maxwell relations, Gibbs-Duhem equation, van't Hoff equation. Criteria of spontaneity and equilibrium. Absolute entropy. Partial molar quantities. Thermodynamics of mixing. Chemical potential. Fugacity, activity and activity coefficients. Ideal and Non-ideal solutions, Raoult's Law and Henry's Law, Chemical equilibria. Dependence of equilibrium constant on temperature and pressure. Ionic mobility and conductivity. Debye-Hückel limiting law. Debye-Hückel-Onsager equation. Standard electrode potentials and electrochemical cells. Nernst Equation and its application, relationship between Electrode potential and thermodynamic quantities, Potentiometric and conductometric titrations. Phase rule. Clausius- Clapeyron equation. Phase diagram of one component systems:  $CO_2$ ,  $H_2O$ , S; two component systems: liquid- vapour, liquid-liquid and solid-liquid systems. Fractional distillation. Azeotropes and eutectics. Statistical thermodynamics: microcanonical, canonical and grand canonical ensembles, Boltzmann distribution, partition functions and thermodynamic properties.

Kinetics (Topic have been rearranged): Elementary, parallel, opposing and consecutive reactions. Steady state approximation. Mechanisms of complex reactions. Unimolecular reactions. Potential energy surfaces and classical trajectories, Concept of Saddle points, Transition state theory: Eyring equation, thermodynamic aspects. Kinetics of polymerization. Catalysis concepts and enzyme catalysis. Kinetic isotope effects. Fast reaction kinetics: relaxation and flow methods. Diffusion controlled reactions. Kinetics of photochemical and photophysical processes.

Surfaces and Interfaces: Physisorption and chemisorption. Langmuir, Freundlich and Brunauer–Emmett–Teller (BET) isotherms. Surface catalysis: Langmuir-Hinshelwood mechanism. Surface tension, viscosity. Self-assembly. Physical chemistry of colloids, micelles and macromolecules.

## Section 2: Inorganic Chemistry

**Main Group Elements:** Hydrides, halides, oxides, oxoacids, nitrides, sulfides – shapes and reactivity. Structure and bonding of boranes, carboranes, silicones, silicates, boron nitride, borazines and phosphazenes. Allotropes of carbon, phosphorous and sulphur. Industrial synthesis of compounds of main group elements. Chemistry of noble gases, pseudohalogens, and interhalogen compounds. Acid-base concepts and principles (Lewis, Brønsted, HSAB and acid-base catalysis).

**Transition Elements:** Coordination chemistry – structure and isomerism, theories of bonding (VBT, CFT, and MOT). Energy level diagrams in various crystal fields, CFSE, applications of CFT, Jahn-Teller distortion. Electronic spectra of transition metal complexes: spectroscopic term symbols, selection rules, Orgel and Tanabe-Sugano diagrams, nephelauxetic effect and Racah parameter, charge-transfer spectra. Magnetic properties of transition metal complexes. Ray-Dutt and Bailar twists, Reaction mechanisms: kinetic and thermodynamic stability, substitution and redox reactions. Metal-metal multiple bond.

**Lanthanides and Actinides:** Recovery. Periodic properties, spectra and magnetic properties.

**Organometallics:** 18-Electron rule; metal-alkyl, metal-carbonyl, metal-olefin and metal-carbene complexes and metallocenes. Fluxionality in organometallic complexes. Types of organometallic reactions. Homogeneous catalysis – Hydrogenation, hydroformylation, acetic acid synthesis, metathesis and olefin oxidation. Heterogeneous catalysis – Fischer-Tropsch reaction, Ziegler-Natta polymerization.

**Radioactivity:** Detection of radioactivity, Decay processes, half-life of radioactive elements, fission and fusion processes.

**Bioinorganic Chemistry:** Ion ( $\text{Na}^+$  and  $\text{K}^+$ ) transport, oxygen binding, transport and utilization, electron transfer reactions, nitrogen fixation, metalloenzymes containing magnesium, molybdenum, iron, cobalt, copper and zinc.

**Solids:** Crystal systems and lattices, Miller planes, crystal packing, crystal defects, Bragg's law, ionic crystals, structures of AX, AX<sub>2</sub>, ABX<sub>3</sub> type compounds, spinels, band theory, metals and semiconductors.

**Instrumental Methods of Analysis:** UV-visible, fluorescence and FTIR spectrophotometry, NMR and ESR spectroscopy, mass spectrometry, atomic absorption spectroscopy, Mössbauer spectroscopy (Fe and Sn) and X-ray crystallography. Chromatography including GC and HPLC. Electroanalytical methods- polarography, cyclic voltammetry, ion-selective electrodes. Thermoanalytical methods.

## Section 3: Organic Chemistry

**Stereochemistry:** Chirality and symmetry of organic molecules with or without chiral centres and determination of their absolute configurations. Relative stereochemistry in compounds having more than one stereogenic centre. Homotopic, enantiotopic and diastereotopic atoms, groups and faces. Stereoselective and stereospecific synthesis. Conformational analysis of acyclic and cyclic compounds. Geometrical isomerism and optical isomerism. Configurational and conformational effects, atropisomerism, and neighbouring group participation on reactivity and selectivity/specificity.

Reaction Mechanisms: Basic mechanistic concepts – kinetic versus thermodynamic control, Hammond's postulate and Curtin-Hammett principle. Methods of determining reaction mechanisms through kinetics, identification of products, intermediates and isotopic labelling. Linear free-energy relationship – Hammett and Taft equations. Nucleophilic and electrophilic substitution reactions (both aromatic and aliphatic). Addition reactions to carbon-carbon and carbon-heteroatom (N and O) multiple bonds. Elimination reactions. Reactive intermediates – carbocations, carbanions, carbenes, nitrenes, arynes and free radicals. Molecular rearrangements.

**Organic Synthesis:** Synthesis, reactions, mechanisms and selectivity involving the following classes of compounds – alkenes, alkynes, arenes, alcohols, phenols, aldehydes, ketones, carboxylic acids, esters, nitriles, halides, nitro compounds, amines and amides. Uses of Mg, Li, Cu, B, Zn, P, S, Sn and Si based reagents in organic synthesis. Carbon-carbon bond formation through coupling reactions – Heck, Suzuki, Stille, Sonogoshira, Negishi, Kumada, Hiyama, Tsuji-Trost, olefin metathesis and McMurry. Concepts of multistep synthesis – retrosynthetic analysis, strategic disconnections, synthons and synthetic equivalents. Atom economy and Green Chemistry, Umpolung reactivity – formyl and acyl anion equivalents. Selectivity in organic synthesis – chemo-, regio- and stereoselectivity. Protection and deprotection of functional groups. Concepts of asymmetric synthesis – resolution (including enzymatic), desymmetrization and use of chiral auxiliaries, organocatalysis. Carbon-carbon and carbon-heteroatom bond forming reactions through enolates (including boron enolates), enamines and silyl enol ethers. Stereoselective addition to C=O groups (Cram, Prelog and Felkin-Anh models).

**Pericyclic Reactions and Photochemistry:** Electrocyclic, cycloaddition and sigmatropic reactions. Orbital correlations – FMO and PMO treatments, Woodward-Hoffmann rule. Photochemistry of alkenes, arenes and carbonyl compounds. Photooxidation and photoreduction. Di- $\pi$ -methane rearrangement, Barton-McCombie reaction, Norrish type-I and II cleavage reaction.

Heterocyclic Compounds: Structure, preparation, properties and reactions of furan, pyrrole, thiophene, pyridine, indole, quinoline and isoquinoline.

**Biomolecules:** Structure, properties and reactions of mono- and di-saccharides, physicochemical properties of amino acids, chemical synthesis of peptides, chemical structure determination of peptides and proteins, structural features of proteins, nucleic acids, lipids, steroids, terpenoids, carotenoids, and alkaloids.

**Experimental techniques in organic chemistry:**



Optical rotation (polarimetry). Applications of various chromatographic techniques such as thin-layer, column, HPLC and GC. Applications of UV-visible, IR, NMR and Mass spectrometry in the structural determination of organic molecules.

### **FOR TECHNICIAN GROUP III(I) PML-5**

#### **Part A: General Knowledge/ Aptitude/ Computer/ Basic**

##### **Science**Basic mathematics

Numbers, HCF & LCM, Decimal Fractions, Accuracy, Precision, Significant Figures, , Square And Cube Roots, Average, Problems on Numbers, Problems on Ages, Percentage, Profit And Loss, Ratio And Proportion, Time And Work, Time And Distance, Simple and Compound Interest, Introduction of Statistics; Type of Data; Classification, Tabulation and Graphical Representation of Data; Measure of Central Tendency; Measure of Dispersion; Theory of Probability; Probability Distributions (Binomial, Poisson, Normal Distributions And Their Application). Correlation (Simple) And Regression (Simple)

##### **Basic physics**

Electric Charges And Fields, Electrostatic Potential And Capacitance, Current Electricity, Electromagnetic Induction, Alternating Current, Electromagnetic Waves, Ray Optics And Optical Instruments, Wave Optics, Semiconductor Electronics: Materials, Devices And Simple Circuits

##### **Basic Biology**

The Living World, Biological Classification, Morphology of Flowering Plants, Anatomy of Flowering Plants, Structural Organisation in Animals, Cell : The Unit of Life, Biomolecules, Cell Cycle and Cell Division, Biotechnology : Principles and Processes, Biotechnology and its Applications

##### **Environmental Science**

Global warming, Greenhouse emissions, water pollution, air pollution, solid waste management, Carbon neutrality, Green footprint, Carbon footprint, Wind Energy, solar energy, geothermal energy, Hydrothermal, ocean energy and bio-energy: Introduction, Principle, advantages and disadvantages, Applications

##### **Basic computer**

History and generation of computers, Classifications of computers, Block diagram of a computer, CPU, ALU, GPU, Control unit, Computer Memory i.e. RAM, ROM, Input/output devices, computer peripherals, MS office

#### **Part B: Chemistry**

##### **General chemistry:**

Properties of Matter and their Measurement, Uncertainty in Measurement, Laws of Chemical Combinations, Dalton's Atomic Theory, Atomic and Molecular Masses, Mole Concept and Molar Masses, Percentage Composition, Stoichiometry and Stoichiometric Calculations

### Inorganic chemistry:

Classification of Elements and Periodicity in Properties, Hydrogen, s- block Elements, p- block Elements, p- block Element, f- block Element, Coordination Compounds, chemical bonding, Oxidation and reduction

### Organic Chemistry:

Hydrocarbons, Alcohols, Phenols and Ethers, Aldehydes, Ketones and Carboxylic Acids, Carbohydrates, Haloalkanes and Haloarenes, Enzymes, Vitamins

### Physical chemistry:

Structure of Atom, Solutions, Electrochemistry, Chemical Bonding and Molecular Structure, Thermodynamics, Law of Chemical Equilibrium and Equilibrium Constant, Homogeneous Equilibria, Heterogeneous Equilibria, Chemical Kinetics, Redox Reactions, Acids, Bases and Salts, Ionization of Acids and Bases, Buffer Solutions, Concept of pH scale

### Volumetric Analysis:

Definitions: Titrimetry, Volumetric titrimetry, Gravimetric titrimetry

### Instrumentation:

Basic instrumentation, Column Chromatography, High performance liquid chromatography, Adsorption chromatography, Ion- exchange chromatography, UV-Visible Spectrophotometry, IR Spectrophotometry, Flame-photometry, Atomic Spectroscopy, NMR Spectroscopy: introduction, principle, applications

### **FOR TECHNICIAN / GROUP II : PML-2**

#### **II**

Common to all trades (Fitter, Refrigeration and Air conditioning, Electric and Electrical)

1. Workshop Calculation & Science: Basic mathematical concept, classification of unit system, fundamental & derived units, measurement of unit & conversion factor, HCF & LCM problem, simple interest & compound interest problems, Fraction, Square root, Ratio and proportion, Percentage, Material science, Mass, weight, and density, Speed and velocity, Work, power and energy., Algebra, Mensuration, Trigonometry, Heat, and temperature, Indices, Quadratic equation, Electrical connections, Elasticity, Materials, Magnetism, Pressure, Heat treatment., Number system, Estimation and cost, Graph, Profit and loss, Friction, Pressure, Force and Center of gravity.
2. Engineering Drawing: Introduction to engineering drawing & drawing instrument, convention sizes and layout of drawing sheets, free hand drawing of geometric figures and block with dimension, transferring measurement from the given object

to free hand sketch, free hand drawing of hand tools, lettering and numbering, types of arrow heads, symbolic representation, different electrical symbol used in the related trades, fitter trade and electronic trade, Lines, Drawing of geometrical figures, dimensioning, Drawing sheets, Presentation of engineering drawing and symbolic representation, Construction of scales, Lettering and title block, dimensioning practice, Construction of geometrical drawing figures, Drawing of solid shapes, Freehand sketch and measuring tools, Projection and drawing details.

### **Fitter Trade**

1. Lathe machine: Basic component of lathe, basic operation of lathe machine, turning, shaping knurling, drilling, tapering, threading, etc.
2. Workshop machinery: Basic operation of drilling machine, milling machine, lathe, black smithing, wooden smithing.
3. Pumps & Pipes: Basic operation of centrifugal pumps, types of pumps, reciprocating pumps, pump casing and impeller, types of pipe joints, bends in pipes, pipe fitting, parts of pumps, general function of bearings, types of bearings.
4. Lubrication: Basic theory of lubrication, types of lubricants, oils, grease.
5. Welding operation: Basic of welding, types of weldings, arc welding, gas welding, brazing, soldering, riveting etc.

### **Refrigeration and Air conditioning Trade**

1. Refrigeration & Air Condition basics: Basics of refrigeration and air condition, basic operation of refrigerator and air conditioners, types of refrigerators, basic component of refrigerator and air conditioners.
2. Refrigeration and air conditioning tools & equipments, copper tube cutting, flaring, swaging, brazing, identification of pressure in tubes etc.
3. Compressor and condensers: Types of compressors, function of compressors, types of condensers, function of condensers, testing of compressors, testing of condensers
4. Identify the electronic component and their color code, like transmitter, capacitor, diode, amplifier, power supply, rectifier, etc
5. Electric circuit of air conditioner and refrigerator
6. Types of gases used in refrigeration & air conditioner, their identification and specification, precaution & safety measures during gas fitting.

### **Electronics trade**

Basics of electronics, Electrical Terms and Cables, AC and DC Current, Types of Meters, Cell and Battery, Semi-conductors, Ohm's Law, Kirchhoff's Law, Computer Networking, Transistor and Resistors, Soldering and De-soldering, Opto Electronic, Oscillators, Diode and Triodes, Circuits, SMD Soldering and De-soldering, Induction Motors, Communication Electronics, Sensor and Transducer, Displays, Uninterrupted Power Supply (UPS), LED Lights, LCD and LED TV, Digital Storage Oscilloscope, SMD Technology, Printed Circuit Board (PCB), Microprocessor and Microcontroller

### **Electrical Trade**

Basics of electricity, current and voltage, Conductor, semiconductors, Insulator and electric cables, Tools for an Electrician, Soldering and D.C theory, Basic Electricity, Electrical accessories, Electro- chemical effect and chemical cell, Magnetism and electromagnetism, Alternating current theory, Earthing and Basic electronics., Transistors, Amplifiers, Oscillators, Specific solid-state devices, Digital electronics, Electrical wiring, Direct current generator, Direct current motor, Transformer and Electrical measuring instruments 3-Phase induction motors, Single-phase induction motors, Alternator, Synchronous motor, Converters, D.C. machine, and short transformer winding, A.C. machine winding, Illumination, Industrial wiring, House wiring layout., Machine control panel, Electrical instrument, Electrical power generation, Electrical power transmission, Underground cables, Power distribution, Speed control and maintenance of electric machines, Electronic theory and communication Alternating current-based electrical circuit drawing, Electronic circuit and auxiliary component, Electrical wiring and earthing, Freehand sketch of D.C. machines, Domestic electrical appliances, Power production, Electric power transmission, Power distribution, Speed control and maintenance of appliances.

## **17. GENERAL INSTRUCTIONS:**

**Correspondence with CPPRI:** CPPRI will not enter into any correspondence with the candidates

(a) The e-Admit card will be made available on CPPRI website <https://www.cppri.res.in> for downloading by candidates. No e-Admit card will be sent by post. If a candidate does not receive his e-Admit card or any other communication regarding his/her

candidature for the examination he/she should at once contact the help facility mentioned under 'CONTACT US' section of this bulletin.

(b) No candidate will ordinarily be allowed to take the examination unless he/she holds an e-Admit card for the examination. On downloading of e-Admit card, check it carefully and bring discrepancies/errors, if any, to the notice of CPPRI immediately.

(c) **PROOF OF IDENTITY TO BE SUBMITTED AT THE TIME OF EXAMINATIONS:** At the time of appearing for the examination, candidates are required to produce a currently valid photo identity card in original in addition to the e-Admit card. Acceptable photo identity cards are PAN Card/ Passport/ Driving License/ Voter's Card/ Bank Passbook with photograph/ Photo identity proof issued by a Gazetted Officer on official letterhead/ Photo identity proof issued by a People's Representative on official letterhead/ valid recent Identity Card issued by a recognised college / university/ e-Aadhar card / Aadhar card with a photograph/ Employee ID/ Bar Council Identity card with photograph. The candidate's identity will be verified with respect to his/her details on the Admission Letter /Examination Call Letter, in the Attendance List and requisite documents submitted. If identity of the candidate is in doubt the candidate may not be allowed to appear for the Examination.

**Note:** Candidates have to produce in original the photo identity proof with e-Admit card while attending each shift of the examination without which they will not be allowed to take up the examination. Candidates must note that the name (provided during the process of registration) as appearing on the e-Admit card should exactly match the name as appearing on the photo identity proof, certificates, mark-sheets. Female candidates who have changed first/last/middle name post marriage must take special note of this. In case of candidates who have changed their name, will be allowed only if they produce - original Gazette Notification/their original marriage certificate/affidavit in original, together with a photocopy. If there is any mismatch between the name indicated in the Admission Letter/ Examination Call Letter and Photo Identity Proof, the candidate will not be allowed to appear for the examination.

(d) CPPRI would be analyzing the responses of a candidate with other appeared candidates to detect patterns of similarity. On the basis of such an analysis, if it is found that the responses have been shared and scores obtained are not genuine/ valid, CPPRI reserves the right to cancel his/her candidature.

(e) CPPRI does not assume any responsibility for the candidates not being able to submit their applications within the last date on account of or for any other reason beyond the control of CPPRI.

(f) The candidates should note that their admission to the examination will be purely provisional based on the information given by them in the Application Form. This will be

subject to verification of all the eligibility conditions by CPPRI. The mere fact that an Admission Letter has been issued to a candidate, will not imply that his/her candidature has been finally cleared by CPPRI or that entries made by the candidate in his/her application for the Preliminary examination have been accepted by CPPRI as true and correct. Candidates may note that CPPRI takes up the verification of eligibility conditions of a candidate, with reference to original documents, only after the candidate has qualified for the examination. Unless candidature is formally confirmed by CPPRI, it continues to be provisional. The decision of CPPRI as to the eligibility or otherwise of a candidate for admission to the Examination shall be final.

(g) Candidates should note that the name in the e-Admit card in some cases, may be abbreviated due to technical reasons.

(h) The possibility for occurrence of some problems in the administration of the examinations cannot be ruled out completely, which may impact test delivery and/ or result from being generated. In that event, every effort will be made to rectify such problem, which may include movement of candidates, delay in test. Conduct of a re-exam is at the absolute discretion of CPPRI/test conducting body. Candidates will not have any claim for a re-test. Candidates not willing to move or not willing to participate in the delayed process of test delivery shall be summarily rejected from the process.

(i) Candidates are advised to keep their e-mail ID/mobile number functional for receiving advices viz. e-Admit card etc. Candidates may check e-mails/SMS regularly. CPPRI does not send any communication through any other mode.

(j) CPPRI does not furnish the mark-sheet to candidates. Marks obtained in Examination will be made available on the CPPRI's web-site in an interactive mode only after declaration of the final result.

(k) Any canvassing by or on behalf of the candidates or to bring political or other outside influence with regard to their selection/recruitment shall be considered as disqualification.

(l) In all matters regarding eligibility, conduct of examinations, assessment, prescribing minimum qualifying standards in the Examination in relation to number of vacancies and communication of result, CPPRI 's decision shall be final and binding on the candidates and no correspondence shall be entertained in this regard.

(m) Candidates seeking reservation/ relaxation benefits available for SC/ST/OBC/EWS/PwBD must ensure that they are entitled to such reservation/ relaxation as per eligibility prescribed. They should also be in possession of all the requisite certificates in the prescribed format in support of their claim as stipulated for such benefits and these certificates should be dated earlier than the due date (closing date) of the application.

(n) No person shall be eligible for appointment who has been convicted in a Court of law for any offence involving moral turpitude.

(o) Issue of Admit Card for the Online Test does not confer any right of acceptance of candidature and should not be construed as an acknowledgment of fulfilling the eligibility criteria for the post. It does not give indefeasible right to an individual for employment with CPPRI.

(p) Candidates in their own interest are requested to keep on visiting the website <https://www.cppri.res.in> for further updates.

## **18. GUIDELINES FOR SCANNING AND UPLOAD OF PHOTOGRAPH & SIGNATURE**

Before applying online, a candidate will be required to have a scanned (digital) image of their photograph and signature as per the specifications given below.

### **Photograph Image:**

- Photograph must be a recent passport style colour picture.
- Make sure that the picture is in colour, taken against a light-coloured, preferably white, background.
- Look straight at the camera with a relaxed face
- If the picture is taken on a sunny day, have the sun behind you, or place yourself in the shade, so that you are not squinting and there are no harsh shadows
- If you have to use flash, ensure there's no "red-eye"
- If you wear glasses make sure that there are no reflections and your eyes can be clearly seen.
- Caps, hats and dark glasses are not acceptable. Religious headwear is allowed but it must not cover your face.
- Photo size should be equal to or less than 100-200 KB with 200 dpi. The Dimension should be 139 pixel (width) X 179 pixel (height)

### **Signature Image:**

- The applicant has to sign on white paper with Black Ink pen.
- The signature must be signed only by the applicant and not by any other person.
- The signature will be used to put on the Call Letter and wherever necessary.
- If the Applicant's signature on the answer script, at the time of the examination, does not match the signature on the Call Letter, the applicant will be disqualified.
- Preferred dimensions of signature are 140 x 160 pixels.
- Scanned Signature size should be equal or less than 100-200 KB with 200 dpi.
- The Dimension should be 6 cms (width) X 3 cms (height)
- Signature in CAPITAL LETTERS shall NOT be accepted.

### **Scanning the photograph & signature:**

- Set the scanner resolution to a minimum of 200 dpi (dots per inch)

- Set Colour to True Colour
- File Size as specified above
- Crop the image in the scanner to the edge of the photograph/signature, then use the upload editor to crop the image to the final size (as specified above).
- The image file should be JPG or JPEG format. An example file name is: image01.jpg or image01.jpeg Image dimensions can be checked by listing the folder files or moving the mouse over the file image icon.
- Candidates using MS Windows/MsOffice can easily obtain photo and signature in .jpeg format not exceeding 200 kb & 200 kb respectively by using MS Paint or MsOffice Picture Manager. Scanned photograph and signature in any format can be saved in .jpg format by using 'Save As' option in the File menu and size can be reduced below 200 kb (photograph) & 200 kb(signature) by using crop and then resize option (Please see point (i) & (ii) above for the pixel size) in the 'Image' menu. Similar options are available in other photo editors also.
- If the file size and format are not as prescribed, an error message will be displayed.
- While filling in the Online Application Form the candidate will be provided with a link to upload their photograph and signature.

#### **Procedure for Uploading the Photograph and Signature**



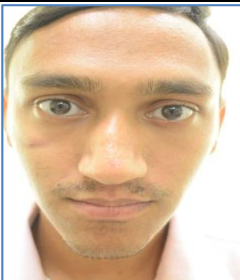







- There will be two separate links for uploading Photograph and Signature
- Click on the respective link "Upload Photograph / Signature"
- Browse and Select the location where the Scanned Photograph / Signature file has been saved.
- Select the file by clicking on it
- Click the 'Open/Upload' button



#### **Your Online Application will not be registered unless you upload your photograph and signature as specified:**

- In case the face in the photograph or signature is unclear the candidate's application may be rejected. After uploading the photograph/ signature in the online application form candidates should check that the images are clear and have been uploaded correctly. In case the photograph or signature is not prominently visible, the candidate may edit his/ her application and re-upload his/ her photograph or signature, prior to submitting the form.
- After registering online candidates are advised to take a printout of their system generated online application forms.



**THE SAMPLE PHOTOGRAPHS WHICH ARE ACEPTABLE.**

Photographs Not Acceptable	Why Photographs Is Rejected	Acceptable Photographs For The Application Form
	<p align="center">Cloth covering facial features</p>	
	<p align="center">Photo taken with mobile phone or distorted face</p>	
	<p align="center">Improper flash or improper lighting</p>	
	<p align="center">Green background</p>	
	<p align="center">Facial area is less than 50% of total</p>	

Photographs Not Acceptable	Why Photographs Is Rejected	Acceptable Photographs For The Application Form
	<p>Not looking straight into camera</p>	
	<p>Shadow on face</p>	
	<p>Too much glare on spectacles</p>	
	<p>Dark/tinted spectacles or sunglasses</p>	
	<p>Poor digital resolution</p>	

## 19. CONTACT US

The candidates are advised to carefully go through the Information Bulletin and Instructions for filling up the online application before registering provided on the website <https://www.cppri.res.in>. However, in case of any other queries pertaining to the examination please contact the Helpline provided below:



Helpline Number : 9453819324 (10 hrs. to 19 hrs. from Monday to Saturday)



Helpline Email id: [cppri.exam@gmail.com](mailto:cppri.exam@gmail.com)

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