



अखिला भारतीय आयुर्विज्ञान संस्थान ऋषिकेश (उत्तराखण्ड)

ALL INDIA INSTITUTE OF MEDICAL SCIENCES RISHIKESH (UTTARAKHAND)

(An autonomous organization under the Ministry of Health & Family Welfare, Govt. of India)

परीक्षा विभाग (Examination Section)

#AIIMS-Rishi/Exam/23/1091

Date: 31<sup>th</sup> July 2023

### Examination Notice

Subject:- **Recruitment Examination (CBT) for the posts of Assistant Stores Officer, Warden (Hostel Warden), Junior Warden (House keeper), Upper Division Clerk, Assistant Engineer (Civil), Assistant Engineer (Electrical), Assistant Engineer (Air Conditioning & Refrigeration), Junior Engineer (Electrical), Junior Engineer (Air Conditioning & Refrigeration), Senior Mechanic (Air Conditioning & Refrigeration), Mechanic (Air Conditioning & Refrigeration), Store Keeper-Cum Clerk, Electrician, Mechanic (E&M), Lineman (Electrical), Operator (E&M)/Lift Operator, Plumber, Wireman and Tailor Grade-III -reg.**

All the candidates who applied or are applying for the posts of *Assistant Stores Officer, Warden (Hostel Warden), Junior Warden (House keeper), Upper Division Clerk, Assistant Engineer (Civil), Assistant Engineer (Electrical), Assistant Engineer (Air Conditioning & Refrigeration), Junior Engineer (Electrical), Junior Engineer (Air Conditioning & Refrigeration), Senior Mechanic (Air Conditioning & Refrigeration), Mechanic (Air Conditioning & Refrigeration), Store Keeper-Cum Clerk, Electrician, Mechanic (E&M), Lineman (Electrical), Operator (E&M)/Lift Operator, Plumber, Wireman and Tailor Grade-III* against the Advt. No's: 2017/124, 2017/138, 2017/139, 2017/147, 2019/145, 2019/151, 2019/157, 2019/158, 2019/159, 2019/160, 2019/161, 2019/164, 2019/003, 2019/004, 2019/005, 2019/006, 2019/007, 2019/008, 2019/009, 2019/010 and subsequent **re-open notices dated 25<sup>th</sup> July 2023** of AIIMS Rishikesh; are hereby informed that:-

- The scheme & pattern of the recruitment examination for the said posts will be as follows: -

S.N.	Activity/ Description	Details
1	Date of Examination	TBD
2	Date of uploading admit cards	TBD
3	Venue of Exams.	TBD
4	Time duration of Examination	03 Hours (180 Minutes)
5	Type of Examination	Computer Based Test (CBT)
6	Number of Question Papers	Single (01) QP for each post
7	Scheme of Examination	<ul style="list-style-type: none"><li>CBT multiple choice questions with four answer options and one of these four options will be the correct answer.</li><li>There will be only one question paper for each post. The question paper will consist of <b>200</b> questions (MCQs) and the maximum marks will be 200.</li><li>Each question will carry <b>01 (One) Marks</b> for every correct answer.</li><li>There will be <b>0.25 negative marks</b> for each wrong answered question.</li></ul>
8	Minimum Qualifying marks	The qualifying marks in the Recruitment Examination will be <b>50%</b> for UR category candidates, <b>45%</b> for <b>OBC</b> category candidates and <b>40%</b> for <b>SC &amp; ST</b> category candidates.

9	Resolution of Tie Case	In cases where more than one candidate secures equal marks, tie will be resolved: i. First by using date of birth with older candidates placed higher. ii. If not resolved by (i) or in cases with same marks and same date of birth: number wrong answers/negative marks will be used wherein those with less wrong answers/negative marks will be placed higher.
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- Candidates are advised to visit the website of AIIMS Rishikesh regularly for all updates/corrigendum/Addendum regarding the examination/recruitment process for the above posts. They are also advised to regularly check their registered email for information sent by AIIMS regarding the examination.
- For any query or suggestion, candidates may send email to [helpdesk\\_exam@aiimsrishikesh.edu.in](mailto:helpdesk_exam@aiimsrishikesh.edu.in)
- Post-wise indicative syllabus for the examination is given herewith in **Annexure-A**.

**Examination Section  
AIIMS Rishikesh**



आरिवाल भारतीय आयुर्विज्ञान संस्थान ऋषिकेश (उत्तराखण्ड)  
ALL INDIA INSTITUTE OF MEDICAL SCIENCES RISHIKESH (UTTARAKHAND)

परीक्षा विभाग (Examination Section)

**Syllabus for recruitment Examination**

Post Name:- **Assistant Stores Officer**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

**Proposed Scheme of Examination**

**No. of Questions**

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Material Management</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person, The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angels subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.
- The questions in Part A, B, & D will be of level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard level.*
- E. Material Management: Introduction to Materials Management:** Objectives and Advantages of Materials Management. Interfaces of Materials Management: Internal and external interfaces. Organization for Material Management. **Supply Chain Management:** Concept, objectives of supply- production and distribution system, Role and Management of flow of material in supply chain management. **Material Management Linkages:** Linkages with other functional areas of Management i.e. production, Accounting and finance, Marketing, HRM, IT, TQM. A Brief discussion on the functions of each functional area of Management. Cost involved in material management: Concept of costs and cost classification, specific costs associated with Material Management. **Storekeeping:** Objectives and functions of storekeeping, location and layout of stores. Types of stores. **Receipt of Materials:** Receipt procedure, inspection and testing of materials, Rejection and Returns of materials. Forms used in receiving of materials like Material Received Note, Inspection Report and Rejection Report etc. Passing of Bills/invoices for payment. Issue procedure and documents used, store records like

bincard and store ledger→pricing of material issues- different methods like FIFO, LIFO, simple average, weighted average, standard price, Replacement/ market price etc. **Material losses:** Meaning, accounting treatment and control of different type of material losses (waste, scrap, spoilage, defectives, obsolescence etc.). **Store Handling Equipment:** Advantages of using stores handling equipment, Types of handling equipment: manual and mechanical devices. **Purchase Procedure:** Pre- purchase considerations, standard purchase procedure, post-purchase issues. Standard form used in purchasing like purchase requisition, tender/ quotation documents, schedule of quotations, purchase order, follow-up order, cancellation of order, Bill of Materials etc. **Special Purchase Systems-** Forward Purchase, Tender purchase, Blanket order zero stock, Rate contract etc. **Price Forecasting:** Price and Pricing impact, price negotiations and fixing. Purchasing under fluctuating prices, purchasing under uncertainty, Negotiations regarding quality, terms of contract, delivery, payment schedule, cash discount, quality considerations, etc. **Public Buying:** DGS&D Rate contract, GeM, GFR. **Online Purchasing:** Concept, advantages, procedure of online purchasing and current online purchase practices. **Buyer-seller Relationship:** Importance of good buyer-seller relationship, Relation with supplier-policies and issues in relationship, Ethical issues in purchasing. **Quality Control in Purchasing:** Concept of Total Quality Management (TQM), Certification, role of Material Management in TQM. Value Analysis and Value Engineering. **Business Correspondence:** Letter Writing, presentation, inviting quotations, sending quotations Placing orders, inviting tenders, Sales letters, claim & adjustment letters and social correspondence, Memorandum, Inter-office Memo, Notices, Agenda, Minutes, job application letter, preparing the Resume. **Inventories:** Meaning, types of inventories, definition as per relevant accounting standard, Need and benefit of holding inventories, objectives of inventory management. **Financial Accounting:** Nature and scope, Limitations of Financial Accounting. Basic Concepts and Conventions, Accounting Standards: Meaning Significance, Generally Accepted Accounting Principles (GAAP). **Accounting Process:** From recording of transactions to preparation of final accounts. Rectification of errors and Bank Reconciliation statement. **Depreciation Accounting:** Meaning of depreciation, causes, objects of providing depreciation, factors affecting depreciation, accounting treatment including provision for depreciation accounting. Methods of deprecation: straight line method and diminishing balance method. Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire Purchaser for large value items including Default and repossession. **Work Study:** Importance of work study- Method Study and Work Measurement- Pioneers of performance Measurement. **Method Study:** Method and Method Study- Need for Method Study- Procedure of Method Study- Principles of Motion Economy. **Work Measurement:** Techniques of Work Measurement including Estimating, Stopwatch Time Study, Predetermined Time Standards, Synthetic Estimates of Work Times, Activity Sampling. Computation of Standard Time- Elements- Types of Elements- Performance Rating- Allowances- Need for Allowances- Types of Allowances TPM: Meaning and objectives of TPM; Methodology of TPM, gains of TPM. **Material Logistics:** Concept and Importance of Material Logistics. Logistic Tasks: follow-up of Order, Transportation, Warehousing, Inventory Control, Information Monitoring. **Logistic Planning:** Major Aspects and Factors. **Transportation:** A Brief Study of different modes of transport used for movement of materials, their relative advantages, disadvantages and suitability. **Road Transport:** Consignment Note, **Rail transport:** consignment Note. **Air transport:** Air Waybill, Contract of Affreightment. **Ocean transport:** Bill of Lading and Charter party. Warehousing: Concept of (Warehousing (Warehouse, Depositor and Warehouseman), Elements and Functions of Warehousing. Role of Warehousing in Economic Development, Types of Warehousing, Advantages of a Public Warehouse, Costs Associated with Warehousing, Warehousing Corporations in India, Objectives and functions of Warehousing corporations. **Quality Management Concepts:** ISO Certification. Methods of Control: Product Process, Risk, evolution, Management Approaches, quality Management Support System. R Chart, P Chart and X Charts; Acceptance Sampling & OC Curve in production Control. **Supply Chain Management:** Supply management and organization spanning activity. How purchasing becomes supply management? Supply Management and the Bottom line. The four phase of supply management. (Generation of requirement, sourcing, pricing and post award activities). Supply management systems: B2B, Strategic Supply Management. **Enabling Concepts in Supply:** Buyer- Supplier relationship: Developing and Managing collaboration and Alliance relationship. Cross-functional teams and supply -Management Activities. Challenges and problems with cross functional approach, ERP Systems, Negotiations and Bidding, information sharing. **The Indian Contract Act, 1872:** Contract- meaning, characteristics and kinds, Essentials of valid contract- Offer and acceptance, consideration, contractual capacity, free consent, legality of objects, Void agreements, Discharge of contract- modes of discharge including breach and its remedies, Contingent contracts, Quasi contracts **The Indian Contract Act, 1872: Specific Contracts:** Contract of indemnity and Guarantee, Contract of Bailment, Contract of Agency **The Sale of Goods Act, 1930:** Contract of sale, meaning and difference between sale and agreement to sell, Conditions and warranties, Transfer of ownership in goods including sale by non-owners, performance of contract of sale, Unpaid seller- meaning and rights of and unpaid seller against the goods and the buyer. **Partnership Law the Partnership Act, 1932:** Nature and Characteristics of Partnership, Registration of Firms, Types of Partners, Rights and Duties of Partners, Implied Authority of a Partner, Incoming and outgoing Partners, Mode of Dissolution of Partnership. **The Limited Liability Partnership Act, 2008:** Salient Features of LLP, Difference between LLP and Partnership, LLP and Company, LLP Agreement, Partners and Designated Partners, Incorporation Document, Incorporation by Registration, Partners and their Relations, winding up. **The Negotiable Instruments Act-1881. Meaning and Characteristics of Negotiable Instruments:** Promissory Note, bill of exchange, Cheque, Holder and Holder in due Course, Privileges of Holder in Due Course, **Negotiation:** Types of Endorsements, Crossing of Cheque, Bouncing of Cheques **Computers in Material**

**Management:** Use of Computers in Material Planning, Purchase, Store, Issue and Inventory Control. Integrated Information System for material Management. **Evaluation of Material Management Function:** Meaning and Procedure.

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

Post Name:-

Warden (Hostel Warden)

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>50</b>
B. <b>General Awareness</b>	<b>50</b>
C. <b>Quantitative Aptitude</b>	<b>50</b>
D. <b>English Language and Comprehension</b>	<b>50</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B, & D will be of level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard level.*

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

Post Name:-

Junior Warden (House keeper)

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>50</b>
B. <b>General Awareness</b>	<b>50</b>
C. <b>Quantitative Aptitude</b>	<b>50</b>
D. <b>English Language and Comprehension</b>	<b>50</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

Post Name:-

Upper Division Clerk

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>50</b>
B. <b>General Awareness</b>	<b>50</b>
C. <b>Quantitative Aptitude</b>	<b>50</b>
D. <b>English Language and Comprehension</b>	<b>50</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

**Skill Test:-**

1. The number of candidates to be called for skill test will be 10 times of the vacancies (category wise) to be filled, but in the said range all those candidates, who secure the same percentage of marks, as may be fixed by the Institute for any lower range will be admitted to the Skill test.
2. The skill test will be of qualifying nature. Candidates allowed to take this test, will have to qualify the test at the prescribed speed on computer, to be provided by the Institute or the agency authorized by the Institute to conduct such skill test at the Centre/ Venue so notified.
3. If the candidates do not indicate the medium of skill test, the Institute will consider English as the medium of skill test for such candidates.
4. Detailed Scheme and instructions regarding Skill Test will be notified later by the Institute.



Post Name:-

**Assistant Engineer (Civil)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject Knowledge of Civil Engineering</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject Knowledge of Civil Engineering:-**

**Strength of Material and Theory of Structures Stress:-** Strain relation–Hooke's Law, Determination of forces in members of trusses pin-jointed frames, Bending Moments and shear forces. Theory of simple bending, Continuous beams and simple portals – Determination of bending moments and shear forces– methods of analysis.

**Design Principles:-** Determinations of dead, live and wind, seismic loads– Relevant I.S. Codes, Factor of Safety and Load Factor.

**Steel Design:-** Design of simple Beams and plate Girders according to Indian Standards, Design of single and built-up columns, column base connections, Design of Steel Roof Trusses.

**Reinforced Concrete:-** Basic principles of reinforced concrete, shear, bond and diagonal tension, location of reinforcement, Design of singly and doubly reinforced beams, one way and two way slabs, Theory and design of reinforced concrete columns with uni-directional bending only, Design of cantilever and simple counterfort retaining wall, Liquid retaining structures– Special requirements.

**Construction Practice:-** General details of Building construction including foundations, flooring, masonry and different type of roofs. Safety during construction, durability. General properties, standard requirements and tests for common building material such as bricks, stones, sand and aggregate, cement, lime, timber and steel. Tests for fresh and hardened concrete.

Central PWD Specifications for building works, sanitary and water supply works and road works including modes of measurements.

**Surveying:-** Use and adjustment of Surveying Instruments: Chain, Plane table and accessories magnetic compass, level and theodolite. Use of Compass and Theodolite: Alignments and adjustments. Levelling: Methods of leveling and reduced level calculations. Contour Survey: Methods of contouring, properties of contours, Curves and alignment: Setting out of simple, reverse and transition curves using different methods, Vertical curves.

**Highway Engineering:-** Road alignment in hills and plains, minimum standards for National highways. Principles of design of urban roads, their cross-sectional requirements and interactions, road drainage and maintenance. House paths, approach roads and service lanes.  
Public Health Engineering.

**Water Supply:-** Quality and quantity of water required for public water supplies. Water purification processes. Water distribution systems – valves and fittings– testing.

**Sanitation:-** Orientation, ventilation and damp proofing of buildings. Sanitary appliances Construction and testing of house drains.

**Sewage disposal-** Sewerage system: - Construction and maintenance. Types of sewage treatment– Oxidation ponds–simple sedimentation, re-circulation and filtration– plant, contact beds- percolating filters. Septic tanks.

**Soil Mechanics and Foundation Engineering:-** Properties of soils, classification, soil explorations, methods of determining bearing capacity. Foundation Engineering: Principles of selection of type of foundation for a structure, shallow and deep foundations. Compaction; Laboratory and field methods, optimum moisture content, soil stabilization.

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

Post Name:-

**Assistant Engineer (Electrical)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject Knowledge of Electrical Engineering</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject Knowledge of Electrical Engineering: -**

General Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to-date. General conditions of supply for obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices. Lift Act and Rules.

Illumination Units and Standards, Principles of indoor and outdoor lighting design. Types, characteristics and application of lamp in fittings and luminaires. Lighting calculation for indoor and outdoor applications.

Internal Electrical Installations Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing.

Earthing, Lighting Protection, Safety & Maintenance, Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment.

Sub-Station upto 33 KV and Distribution, Layout and Design for indoor and outdoor application. Specification for equipment, Sub- Station earthings, stand-by generating sets, commissioning procedures and tests.

Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings.

**Lifts:-** Design parameters, traffic analysis. Classification of Lift installations, choice of control and operation, safety, specifications for lift installation.

Fire detection, Alarm and Protection Various fire detection, alarm and fire-fighting system. Design and specification of equipment. Guidelines for provision of different types of fire alarm and fire-fighting equipment for different types of buildings.

**Water Supply:-** Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation.

Electrical Apparatus:- (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance.

(ii) Single and poly phase transformers— constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers.

(iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphaser motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application.

**Instrument Transformers, Protective Relaying, Measurements:-** Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, under voltage, Bucholz relays. Connection diagrams, settings. Electrical instruments and Measurements, principles of construction and theory of measuring instruments for direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermo couples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, Wheatstone bridge.

**Generation, Transmission, Distribution & Utilisation. Diesel Power Generation:-** General layout, Base load, peak load, choice of sets.

Power supply tariffs, economics. Insulators, types and application. Basic feature of industrial drives. Choice of electric motors for various drivers and estimation of their ratings. Behavior of motors during starting, acceleration, breaking and reversing operations. Speed control schemes for lifts cranes and machine tools. Theory, performance and application of various types of fractional horse power motors.

Production of light by different methods. Calculation and measurement of light by different methods. Calculation and measurement of illumination. Photo meters. Polar Curves. Flood lighting.

**Workshop Technology:-** Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc.

**Energy Conservation, Power Factor Improvement:-** Comparison of different types of lamps from the point of energy conservation, calculation of payback period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement.

Solar Energy Utilisation:- Solar Hot Water system, principles, constructional features, constituent parts, installation, operation & maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

**Post Name:- Assistant Engineer (Air Conditioning & Refrigeration)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject Knowledge of Air Conditioning &amp; Refrigeration Engineering</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject Knowledge of Air Conditioning & Refrigeration Engineering:-**

General Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to date. General conditions of supply obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices.

**Internal Electrical Installations:-** Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing.

**Earthing, Lighting Protection, Safety & Maintenance:-** Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment.

**Sub-Station up to 33 KV and Distribution:-** Layout and Design for indoor and outdoor application. Specification for equipment, Sub- Station earthings, stand-by generating sets, commissioning procedures and tests. Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings.

**Air-Conditioning Ventilation:-** General principles of Refrigeration, Air- Conditioning, evaporative cooling and ventilation, Heating and cooling load estimation. Classification of systems, their design and application, structural requirements, specifications for installations.

**Water Supply:-** Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation.

**Electrical Apparatus:-** (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance. (ii) Single and poly phase transformers— constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers. (iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphaser motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application.

**Instrument Transformers, Protective Relaying, Measurements:-** Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, under-voltage, Bucholz relays. Connection diagrams, settings. Electrical instruments and Measurements, principles of construction and theory of measuring instruments for direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermo couples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, wheatstone bridge.

**Internal Combustion Engines:-** Fuels and Combustion. Fuels and their properties, combustion calculations. Analysis of products of combustion. Power cycles. Vapour power cycles- Carnot and Rankine. Gas Power-Otto and Diesel cycles. Deviation of actual cycles from theoretical cycles. Internal combustion engines – Two and four stroke compression ignition and spark ignition engines. Combustion phenomena. Detonation, Knocking, scavenging of two stroke engines. Fuel injection and carburation. Lubrication and cooling system performance and testing of IC engines. Pollution control requirements/standards.

**Heating, Air Conditioning And Refrigeration:-** Refrigeration— Refrigeration and heat pump cycles. Vapour compression, absorption Cycles. Refrigerants and their characteristics. Air Conditioning— Psychrometric chart, comfort airconditioning, comfort indices, ventilation requirements. Cooling and dehumidification methods. Industrial air-conditioning processes. Different methods of electric heating. Construction and performance of Electric heating equipment.

**Workshop Technology:-** Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc.

**Energy Conservation, Power Factor Improvement:-** Comparison of different types of lamps from the point of energy conservation, calculation of pay back period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement.

**Solar Energy Utilisation:-** Solar Hot Water system, principles, constructional features, constituent parts, installation, operation & maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

**Junior Engineer (Civil)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Civil Engineering)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Civil Engineering):-**

**Building Materials:-** Physical and Chemical properties, classification, standard tests, uses and manufacture/quarrying of materials e.g. building stones, silicate based materials, cement (Portland), asbestos products, timber and wood based products, laminates, bituminous materials, paints, varnishes.

**Estimating, Costing and Valuation:-** Estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Items of work– earthwork, Brick work (Modular & Traditional bricks), RCC work, Shuttering, Timber work, Painting, Flooring, Plastering. Boundary wall, Brick building, Water Tank, Septic tank, Bar bending schedule, Centre line method, Mid-section formula, Trapezoidal formula, Simpson"s rule. Cost estimate of Septic tank, flexible pavements, Tube well, isolates and combined footings, Steel Truss, Piles and pile-caps. Valuation – Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation.

**Surveying:-** Principles of surveying, measurement of distance, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Levelling, Definition of terms used in levelling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, methods of contouring, uses of contour map, tachometric survey, curve setting, earth work calculation, advanced surveying equipment.

**Soil Mechanics:-** Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Unconfined and confined aquifers, effective stress, quick sand, consolidation of soils, Principles of consolidation, degree of consolidation, pre-consolidation pressure, normally consolidated soil, e-log p curve, computation of ultimate settlement. Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, Bearing capacity of soils, plate load test, standard penetration test.

**Hydraulics:-** Fluid properties, hydrostatics, measurements of flow, Bernoulli's theorem and its application, flow through pipes, flow in open channels, weirs, flumes, spillways, pumps and turbines.

**Irrigation Engineering:-** Definition, necessity, benefits, 2II effects of irrigation, types and methods of irrigation,

**Hydrology:-** Measurement of rainfall, run off coefficient, rain gauge, losses from precipitation – evaporation, infiltration, etc. Water requirement of crops, duty, delta and base period, Kharif and Rabi Crops, Command area, Time factor, Crop ratio, Overlap allowance, Irrigation efficiencies. Different type of canals, types of canal irrigation, loss of water in canals. Canal lining– types and advantages. Shallow and deep to wells, yield from a well. Weir and barrage, Failure of weirs and permeable foundation, Slit and Scour, Kennedy's theory of critical velocity. Lacey's theory of uniform flow. Definition of flood, causes and effects, methods of flood control, water logging, preventive measure. Land reclamation, Characteristics of affecting fertility of soils, purposes, methods, description of land and reclamation processes. Major irrigation projects in India.

**Transportation Engineering:-** Highway Engineering– cross sectional elements, geometric design, types of pavements, pavement materials – aggregates and bitumen, different tests, Design of flexible and rigid pavements – Water Bound Macadam (WBM) and Wet Mix Macadam (WMM), Gravel Road, Bituminous construction, Rigid pavement joint, pavement maintenance, Highway drainage, Railway Engineering- Components of permanent way– sleepers, ballast, fixtures and fastening, track geometry, points and crossings, track junction, stations and yards.

**Traffic Engineering:-** Different traffic survey, speed-flow-density and their interrelationships, intersections and interchanges, traffic signals, traffic operation, traffic signs and markings, road safety.

**Environmental Engineering:-** Quality of water, source of water supply, purification of water, distribution of water, need of sanitation, sewerage systems, circular sewer, oval sewer, sewer appurtenances, sewage treatments. Surface water drainage. Solid waste management – types, effects, engineered management system. Air pollution– pollutants, causes, effects, control. Noise pollution– cause, health effects, control.

**Structural Engineering Theory of structures:-** Elasticity constants, types of beams – determinate and indeterminate, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of area and moment of inertia for rectangular & circular sections, bending moment and shear stress for tee, channel and compound sections, chimneys, dams and retaining walls, eccentric loads, slope deflection of simply supported and cantilever beams, critical load and columns, Torsion of circular section.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.



Post Name:-

**Junior Engineer (Electrical)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

**Proposed Scheme of Examination**

**No. of Questions**

A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Electrical Engineering)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Electrical Engineering):-**

**Basic concepts:-** Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units. Circuit law : Kirchoff's law, Simple Circuit solution using network theorems.

**Magnetic Circuit:-** Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction.

**AC Fundamentals:-** Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system– star and delta connection, 3 phase power, DC and sinusoidal response of R-Land R-C circuit.

**Measurement and measuring instruments:-** Measurement of power (1 phase and 3 phase, both active and reactive) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving oil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection.

**Electrical Machines:-** (a) D.C. Machine– Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers– Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses.

Parallel operation of 1 phase /3 phase transformers. Auto transformers. (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics.

**Fractional Kilowatt Motors and Single Phase Induction Motors:-** Characteristics and applications.

**Synchronous Machines:-** Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors.

**Generation, Transmission and Distribution:-** Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, interconnection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults. Switchgears – rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system. Cable– Different type of cables, cable rating and derating factor.

**Estimation and costing:-** Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.

**Utilization of Electrical Energy:-** Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.

**Basic Electronics:-** Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

**Post Name:- Junior Engineer (Air Conditioning & Refrigeration)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Air Conditioning &amp; Refrigeration)</b>	<b>140</b>

**Indicative Syllabus**

**A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.

**B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.

**C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.

**D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Air Conditioning & Refrigeration):-**

**General:-** Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to date. General conditions of supply obtaining connection. CPWD General Specifications for Electrical Works, Principles of analysis of rates. General Principles in preparation of estimates, project reports, award of works and execution of works and measurement. ISI/BIS Standards and Codes of practices.

**Internal Electrical Installations:-** Systems of wiring and their design, distribution system. Apparatus for control, protection and Testing.

**Earthing, Lighting Protection, Safety & Maintenance:-** Necessity of earthing, earthing resistance, type of earthing. Lighting protection design, layout, material and installation. Safety procedures and practices, principles of equipment installation, preventive maintenance and testing of equipment.

**Sub-Station up to 33 KV and Distribution:-** Layout and Design for indoor and outdoor application. Specifications for equipment, Sub- Station earthlings, stand-by generating sets, commissioning procedures and tests. Distribution: Design of overhead line and underground distribution systems. Specification for cables, conductors, Supports etc. Cable joining and termination methods, power factor improvement, service connection to buildings.

**Air-Conditioning Ventilation:-** General principles of Refrigeration, Air-Conditioning, evaporative cooling and ventilation, Heating and cooling load estimation. Classification of systems, their design and application, structural requirements, specifications for installations.

**Water Supply:-** Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation.

**Electrical Apparatus:-** (i) Single and poly phase A.C. Circuit. Effects of resistance inductance and capacitance. (ii) Single and poly phase transformers— constructional features, equivalent circuits performance, parallel operation, phase conversion. Separation of losses and determination of efficiency by various methods. Auto transformers. (iii) Alternators, Constructional features, regulation, parallel operation and Protection. Automatic Voltage regulators, Emergency generating sets, automatic change over. (iv) Induction machines, polyphaser motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application.

**Instrument Transformers, Protective Relaying, Measurements:-** Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, undervoltage, Buchholz relays. Connection diagrams, settings. Electrical instruments and Measurements, principles of construction and theory of measuring instruments for direct and alternating currents. Commercial types. Measurement of resistance, Voltage, current, power, power factor and energy. Watt meters, energy meters. Thermocouples, Resistance Thermometers, Pyro-meters. Fault locating bridges for cables. Measurements of resistance, inductance and capacitance, Wheatstone bridge.

**Internal Combustion Engines:-** Fuels and Combustion. Fuels and their properties, combustion calculations. Analysis of products of combustion. Power cycles. Vapor power cycles- Carnot and Rankine. Gas Power-Otto and Diesel cycles. Deviation of actual cycles from theoretical cycles. Internal combustion engines – Two and four stroke compression ignition and spark ignition engines. Combustion phenomena. Detonation, Knocking, scavenging of two stroke engines. Fuel injection and carburation. Lubrication and cooling system performance and testing of IC engines. Pollution control requirements/standards.

**Heating, Air Conditioning And Refrigeration:-** Refrigeration— Refrigeration and heat pump cycles. Vapour compression, absorption Cycles. Refrigerants and their characteristics. Air Conditioning— Psychrometric chart, comfort airconditioning, comfort indices, ventilation requirements. Cooling and dehumidification methods. Industrial air-conditioning processes. Different methods of electric heating. Construction and performance of Electric heating equipment.

**Workshop Technology:-** Estimation of power and energy requirements of electric welding, different types of equipments used and their characteristics. Manufacturing and Fabricating methods and practices for various electrical and mechanical equipment such as pumps, switch boards, light fittings, AHUs etc. Energy Conservation, Power Factor Improvement:- Comparison of different types of lamps from the point of energy conservation, calculation of payback period. Power factor improvement, Reduction of load current and transformer losses due to power factor improvements. KVA requirement for power factor improvement. Solar Energy Utilisation:- Solar Hot Water system, principles, constructional features, constituent parts, installation, operation & maintenance, solar photo voltaic system, advantages/disadvantages of solar heating & solar photo voltaic system.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

## Senior Mechanic (Air Conditioning & Refrigeration)

### Pattern of examination:

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Air Conditioning &amp; Refrigeration)</b>	<b>140</b>

### Indicative Syllabus

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.
- The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*
- E. Subject knowledge of the concerned post (Air Conditioning & Refrigeration):-** *The subject based syllabus for the post will be as per the syllabus of Training Certificate/Diploma in **Refrigeration and Air Conditioning Technician** trade course, prescribed by Directorate General of Entrepreneurship Training, Ministry of Skill Development and Entrepreneurship, Government of India.. The syllabus may include the following topics:-*
- Safety measures, Fitting, Sheet metal, Welding, Basic of Electrical, Basics of Electronics, Fundamentals of Refrigeration, Different types of refrigeration system, Refrigerator ( Direct cool), Frost Free Refrigerators, Refrigerator (Inverter Technology), AC Motors, Motor starters, Electronic components, Refrigeration tools:- instruments and equipment, Compressor, Condenser, Cooling tower, Expansion valve, Evaporator, Drier, Retrofitting, Thermal Insulation , Refrigerant, Water cooler & Water dispenser, Visible cooler & Bottle cooler, Deep freezer/Dis play carbine, Ice cube machine/Softy machine, Window Air Conditioner, Installation of Window AC, Split Air Conditioner (Wall Mounted), Split Air Conditioner (Floor, Ceiling/Cassette mounted), Split Air Conditioner (Ducted), Multi split Air Conditioner, Inverter Split Air Conditioner, Car Air Conditioning, Commercial Compressor (Fixed & Variable), Compressor lubricant oil, types, properties, types of lubrication methods such as splash, forced feed, Study the Construction and working principle of different commercial compressor (Open and Sealed type), Water Cooled Condenser, Evaporative condenser Types and their function, construction and application. Liquid receiver, function. Drier, types and application, Cooling tower, types, Construction, capacity, advantage & disadvantages of different types of cooling tower, Water Treatment, Expansion Valve Types and function:- construction, working principle, & their advantage &disadvantages. Thermostatic Expansion Valves (TXV), Automatic Expansion Valves (AXV), Float valves, fixed and modulating orifice controls & electronic Expansion Valves, LMC, Selection of Expansion valves and capillaries for various Refrigeration and Air Conditioning applications.

Evaporator:- Function, types, Plate & Tube forced air DX evaporators. Types of Defrost system. Water/ Brine chillers. Types of brine used as secondary refrigerant. Accumulator, its function. Liquid:- suction-liquid Heatexchanger, their function, construction, application & advantages. Study of Accumulator and Oil separator. Water Cooler & Water Dispenser. Deep Freezer /Display Cabinet:- description, Construction, working, specifications, function, care and maintenance, faults and remedies.

Walk In Cooler & Reach In Cabinet:- Details about components, their functioning, working principle, Circuit diagram, capacity & types. Care and maintenance. Cold Storage:- Study of cold storage plant, parts, Construction, applications, controls & electrical diagram used in cold storage plant. Food preservation spoiling agents controlling of spoiling agents, preservation by refrigeration system, maintaining temperature in different places. Types of cold storage and its details. Properties of commonly used refrigerants like ammonia and its safe handling. HVAC (Plant):- Introduction to HVAC, Fundamentals of Central Air Conditioning / HVAC plant, requirements of comfort A.C, study of psychometric terms, DBT, WBT, RH, enthalpy, dew point, and specific humidity. Types of Central air conditioning (Direct and indirect system) Construction, working, components, faults, care and maintenance. Description of blowers& fans, function and types, static and velocity pressure measurements. Duct:- Function, types, materials, duct designing, duct insulation, properties of insulating materials 'K' factors, Acoustic insulation, air distribution methods, air flow, AHU, FCU, fan, blower. Air Filters:- Function of air filters, types, construction, maintenance, effect of choked Air filter, Hepa filters. Package Ac:- (with Air Cooled Condenser). Package A.C with Water Cooled Condenser. Split Package. Centralised/Industrial Air-conditioning. Temperature and pressure controls used in AC plant, its construction, working, safety devices, cooling towers, piping lines. Direct Expansion System:- Study Direct expansion system. Operation & Preventive Maintenance Schedule of central AC plant. Maintain log book for daily operation, VRF / VRV system – description and function of different parts. Details of piping have and controls system, Common reason for error code, types of ODU and IDU. Indirect/Chiller System:- Study central station AHU and FCU, Air washers used in chilled water system, understanding lay out, modulating valves for temperature control. Expansion valves & other related control – description and function, Study of Humidification & De-humidification. Humidifiers & Dehumidifier's. Humidity control. Use of hygrometer, Construction and study of commercial A.C plant, package chillers, screw chillers, reciprocating chillers, Controls used in AC system, Electromechanical, pneumatic and electronic. Detail study of heat load calculation for commercial and industrial buildings. MOBILE AC (Bus, train). Planning for Preventive maintenance and scheduling of maintenance activities in large AC and Refrigeration plant. Etc.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

## Mechanic (Air Conditioning & Refrigeration)

### Pattern of examination:

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Air Conditioning &amp; Refrigeration)</b>	<b>140</b>

### Indicative Syllabus

- A. General Intelligence & Reasoning:** It would include question of both verbal and non-verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small & Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person. The test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

### **E. Subject knowledge of the concerned post (Air Conditioning & Refrigeration):-**

Safety measures, Fitting, Sheet metal, Welding, Basic of Electrical, Basics of Electronics, Fundamentals of Refrigeration, Different types of refrigeration system, Refrigerator ( Direct cool), Frost Free Refrigerators, Refrigerator (Inverter Technology), AC Motors, Motor starters, Electronic components, Refrigeration tools:- instruments and equipment, Compressor, Condenser, Cooling tower, Expansion valve, Evaporator, Drier, Retrofitting, Thermal Insulation , Refrigerant, Water cooler & Water dispenser, Visible cooler & Bottle cooler, Deep freezer/Dis play carbine, Ice cube machine/Softy machine, Window Air Conditioner, Installation of Window AC, Split Air Conditioner (Wall Mounted), Split Air Conditioner (Floor, Ceiling/Cassette mounted), Split Air Conditioner (Ducted), Multi split Air Conditioner, Inverter Split Air Conditioner, Car Air Conditioning, Commercial Compressor (Fixed & Variable), Compressor lubricant oil, types, properties, types of lubrication methods such as splash, forced feed, Study the Construction and working principle of different commercial compressor (Open and Sealed type), Water Cooled Condenser, Evaporative condenser Types and their function, construction and application. Liquid receiver, function. Drier, types and application, Cooling tower, types, Construction, capacity, advantage & disadvantages of different types of cooling tower, Water Treatment. Expansion Valve Types and function:- construction, working principle, & their advantage &disadvantages. Thermostatic Expansion Valves (TXV), Automatic Expansion Valves (AXV), Float valves, fixed and modulating orifice controls & electronic Expansion Valves, LMC, Selection of Expansion valves and capillaries for various Refrigeration and Air Conditioning applications. Evaporator:- Function, types, Plate & Tube forced air DX evaporators. Types of Defrost system. Water/ Brine chillers. Types of brine used as secondary refrigerant. Accumulator, its function. Liquid:- suction-liquid Heatexchanger, their function, construction, application & advantages. Study of Accumulator and Oil separator. Water Cooler & Water

Dispenser. Deep Freezer /Display Cabinet:- description, Construction, working, specifications, function, care and maintenance, faults and remedies.

Walk In Cooler & Reach In Cabinet:- Details about components, their functioning, working principle, Circuit diagram, capacity & types. Care and maintenance. Cold Storage:- Study of cold storage plant, parts, Construction, applications, controls & electrical diagram used in cold storage plant. Food preservation spoiling agents controlling of spoiling agents, preservation by refrigeration system, maintaining temperature in different places. Types of cold storage and its details. Properties of commonly used refrigerants like ammonia and its safe handling. HVAC (Plant):- Introduction to HVAC, Fundamentals of Central Air Conditioning / HVAC plant, requirements of comfort A.C, study of psychometric terms, DBT, WBT, RH, enthalpy, dew point, and specific humidity. Types of Central air conditioning (Direct and indirect system) Construction, working, components, faults, care and maintenance. Description of blowers& fans, function and types, static and velocity pressure measurements. Duct:- Function, types, materials, duct designing, duct insulation, properties of insulating materials 'K' factors, Acoustic insulation, air distribution methods, air flow, AHU, FCU, fan, blower. Air Filters:- Function of air filters, types, construction, maintenance, effect of choked Air filter, Hepa filters. Package Ac:- (with Air Cooled Condenser). Package A.C with Water Cooled Condenser. Split Package. Centralised/Industrial Air-conditioning. Temperature and pressure controls used in AC plant, its construction, working, safety devices, cooling towers, piping lines. Direct Expansion System:- Study Direct expansion system. Operation & Preventive Maintenance Schedule of central AC plant. Maintain log book for daily operation, VRF / VRV system – description and function of different parts. Details of piping have and controls system, Common reason for error code, types of ODU and IDU. Indirect/Chiller System:- Study central station AHU and FCU, Air washers used in chilled water system, understanding lay out, modulating valves for temperature control. Expansion valves & other related control – description and function, Study of Humidification & De-humidification. Humidifiers & Dehumidifier's. Humidity control. Use of hygrometer, Construction and study of commercial A.C plant, package chillers, screw chillers, reciprocating chillers, Controls used in AC system, Electromechanical, pneumatic and electronic. Detail study of heat load calculation for commercial and industrial buildings. MOBILE AC (Bus, train). Planning for Preventive maintenance and scheduling of maintenance activities in large AC and Refrigeration plant. Etc.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.



Post Name:-

Store Keeper cum Clerk

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

**Proposed Scheme of Examination**

**No. of Questions**

A. <b>General Intelligence &amp; Reasoning</b>	<b>30</b>
B. <b>General Awareness.</b>	<b>25</b>
C. <b>Quantitative Aptitude</b>	<b>25</b>
D. <b>English Language and Comprehension</b>	<b>20</b>
E. <b>General Finance Rule- 2017</b>	<b>20</b>
F. <b>Material Management</b>	<b>80</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angels subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.
- The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*
- E. GFR-2017:** Questions will be based on the knowledge and applications of General Finance Rule 2017.
- F.**
- (i) Basic concept of Material management
  - (ii) Purchase Management.
  - (iii) Inventory Management
  - (iv) Logistic Management
  - (v) Packaging

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

**Electrician**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness and Financial Rules</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Electrician)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Electrician):-**

Occupational Safety and Health Basic Safety introduction, Identification, Fundamental of electricity, Wires/cable and its specification, Resistors, Types of Wires and cables, Explanation of switches, Chemical effect of electric current , Application of battery/cell, Introduction of fitting trade, Magnetism, Alternating current, Earthing, Basic electronics, Electric wirings, I.E. rules, D.C. Machines, Transformers, Electrical Measuring Instruments, Induction motor, Alternator, Synchronous Motor, Winding, Illumination, Industrial wiring, Assembly and Wiring, Domestic Appliances, Power Generation, Transmission of electrical power.

**Fundamentals of Electricity:-** Effects of electric current, fundamental terms, Definition, solder, flux, definition and properties of conductors, insulators, semi conductors, different types of insulators, types of wires and cables, specification of wires and cables- insulators, low medium and high voltage, various types of cables

Law of Resistance, Ohm's law, Kirchoff's laws- Resistance, PD, Current, specific resistance, laws of resistance, ohm's law, series and parallel circuit, kirchoff's laws, wheat stone bridge, effects of variation of temperature on resistance, work, power, energy, efficiency, heating effect of electric current.

**Cells and Batteries:-** electrolysis, Faraday's laws of electrolysis, basic principle of electro plating and electronic chemical equivalents, primary cell and secondary cell, lead acid cell, methods of charging care and maintenance of cells, grouping of cells of specified voltage and current, inverter, battery charger nickel alkali cell, efficiency of cells, power and capacity of cells.

**House Wiring and Earthing:-** Different method of earthing, IE, Pipe, plate importance of earthing, improving Earth resistance, E LC B-type of wiring and their users, IE rules wiring accessories, such as lamp holder, switch, plug, bracket, ceiling rose, cut out, ICTP, ICDP.

**Illumination:-** Construction working and application of incandescent lamp fluorescent tube cfl neon sign halogen Mercury vapour lamp sodium vapour lamp

**Magnetism:-** Classification of magnets, methods of magnetising magnetic materials, properties, care and maintenance, para and diamagnetic, and ferro magnetic, materials principle of electromagnetism, Maxwell's cork screw rule, Fleming's left hand right hand rules, magnetic field of current carrying conductor, solenoid, MF, flux density, reluctance, hysteresis, Eddy current, principle of electromagnetic induction, faraday's laws, lenz's law, electrostatics capacitor, different types of function and uses.

**Alternating Current and Poly Phase:-** Comparison and advantage AC and DC related terms, frequency, instantaneous value RMS value, average value, peak factor, form factor, sine wave, phase and phase difference, inductive and capacitive reactance, impedance power factor, active and reactive power, single phase and 3 phase system, power consumption series and parallel PF, 3 phase star Delta connection line and phase voltage, current and power in 3 phase circuits with balanced and unbalanced load.

**Basic Electronics:-** semiconductor, atomic structure, P type and N type, types of materials, PN Junction, classification diodes, reverse and forward bias, heat sync specification of diode, PIV rating, half wave, full wave, and bridge circuit, filter circuit, passive filter, LED, diode types of transistor, UJT, SCR regulator, ICS, zener diode uses and its application, IC voltage regulator JFET, and logic gate AND gate.

**DC Generator and DC Motors:-** Introduction to DC generator and working principle, parts of DC generator, classification of generator self excited and separately excited, their application types and characteristics of DC generator series, shunt and compound their application. emf equation DC motor working principle, types of motor, torque, speed back emf, characteristics speed control of DC motor, necessity of starter types of starters, 2 point, 3 point, 4 point starters, Protective device used method of speed control.

**AC Generators Motors and Starters:-** parts and construction of alternator principle of working, types of alternator, emf equation, various applications and power rating of alternator, general idea of loading and regulation of alternator, parallel operation of alternators, synchronising method AC single phase motor and types capacitors, start/run, start and run. FHP motors and their uses various application of AC single phase motors.

**Three Phase Motors:-** construction principle of operation of 3 phase induction motors squirrel Cage and slipring induction motors rotor slip, rotor frequency and motor torque starting method, speed control method, importance of phase sequence in 3 phase induction motor, single phasing preventere, starters, DOL starters, Delta starters, and auto transformer starter, rotor resistance starter.

**Transformers:-** power transformer: its construction working parallel operation of transformer their connection, cooling transformer, emf equation, transformation ratio, ideal transformer, construction of core, shell, Berry type, auxiliary parts, breather, conservator, buchholz's relay, other protective device, transformer oil testing OF load and ON load, auto transformer, its construction, working and uses CT, PT losses and efficiency.

**Measuring Instruments:-** Types of measuring instruments- MC and MI construction and working principle of ammeter, Volt metre, ohm metre, watt meter, energy meter, PF metre, megger, earth tester, CT and PT tong tester/clip on metre multi metre. generation transmission and distribution of electricity. Generation: diesel power station, steam power station, hydroelectric power station, nuclear power station. Substation: indoor, outdoor, pole mounting (EHT substation Hd substation medium and low voltage substation). UG cable. construction of cable, types, testing.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

**Mechanic (E&M)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness and Financial Rules</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Mechanic- E &amp; M)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Mechanic- E & M):-**

**Fundamentals of Electricity:-** Effects of electric current, fundamental terms, Definition, solder, flux, definition and properties of conductors, insulators, semi conductors, different types of insulators, types of wires and cables, specification of wires and cables- insulators, low medium and high voltage, various types of cables  
 Law of Resistance, Ohm's law, Kirchhoff's laws- Resistance, PD, Current, specific resistance, laws of resistance, ohm's law, series and parallel circuit, kirchhoff's laws, wheat stone bridge, effects of variation of temperature on resistance, work, power, energy, efficiency, heating effect of electric current.

**Cells and Batteries:-** electrolysis, Faraday's laws of electrolysis, basic principle of electro plating and electronic chemical equivalents, primary cell and secondary cell, lead acid cell, methods of charging care and maintenance of cells, grouping of cells of specified voltage and current, inverter, battery charger nickel alkali cell, efficiency of cells, power and capacity of cells.

**House Wiring and Earthing:-** Different method of earthing, IE, Pipe, plate importance of earthing, improving Earth resistance, E LC B-type of wiring and their users, IE rules wiring accessories, such as lamp holder, switch, plug, bracket, ceiling rose, cut out, ICTP, ICDP.

**Illumination:-** Construction working and application of incandescent lamp fluorescent tube cfl neon sign halogen Mercury vapour lamp sodium vapour lamp

**Magnetism:-** Classification of magnets, methods of magnetising magnetic materials, properties, care and maintenance, para and diamagnetic, and ferro magnetic, materials principle of electromagnetism, Maxwell's cork screw rule, Fleming's left hand right hand rules, magnetic field of current carrying conductor, solenoid, MF, flux density, reluctance, hysteresis,

Eddy current, principle of electromagnetic induction, faraday's laws, lenz's law, electrostatics capacitor, different types of function and uses.

**Alternating Current and Poly Phase:-** Comparison and advantage AC and DC related terms, frequency, instantaneous value RMS value, average value, peak factor, form factor, sine wave, phase and phase difference, inductive and capacitive reactance, impedance power factor, active and reactive power, single phase and 3 phase system, power consumption series and parallel PF, 3 phase star Delta connection line and phase voltage, current and power in 3 phase circuits with balanced and unbalanced load.

**Basic Electronics:-** semiconductor, atomic structure, P type and N type, types of materials, PN Junction, classification diodes, reverse and forward bias, heat sync specification of diode, PIV rating, half wave, full wave, and bridge circuit, filter circuit, passive filter, LED, diode types of transistor, UJT, SCR regulator, ICS, zener diode uses and its application, IC voltage regulator JFET, and logic gate AND gate.

**DC Generator and DC Motors:-** Introduction to DC generator and working principle, parts of DC generator, classification of generator self excited and separately excited, their application types and characteristics of DC generator series, shunt and compound their application. emf equation DC motor working principle, types of motor, torque, speed back emf, characteristics speed control of DC motor, necessity of starter types of starters, 2 point, 3 point, 4 point starters, Protective device used method of speed control.

**AC Generators Motors and Starters:-** parts and construction of alternator principle of working, types of alternator, emf equation, various applications and power rating of alternator, general idea of loading and regulation of alternator, parallel operation of alternators, synchronising method AC single phase motor and types capacitors, start/run, start and run. FHP motors and their uses various application of AC single phase motors.

**Three Phase Motors:-** construction principle of operation of 3 phase induction motors squirrel Cage and slipring induction motors rotor slip, rotor frequency and motor torque starting method, speed control method, importance of phase sequence in 3 phase induction motor, single phasing preventere, starters, DOL starters, Delta starters, and auto transformer starter, roter resistance starter.

**Transformers:-** power transformer: its construction working parallel operation of transformer their connection, cooling transformer, emf equation, transformation ratio, ideal transformer, construction of core, shell, Berry type, auxiliary parts, breather, conservator, buchholz's relay, other protective device, transformer oil testing OF load and ON load, auto transformer, its construction, working and uses CT, PT losses and efficiency.

**Measuring Instruments:-** Types of measuring instruments- MC and MI construction and working principle of ammeter, Volt metre, ohm metre, watt meter, energy meter, PF metre, megger, earth tester, CT and PT tong tester/clip on metre multi metre. generation transmission and distribution of electricity. Generation: diesel power station, steam power station, hydroelectric power station, nuclear power station. Substation: indoor, outdoor, pole mounting (EHT substation Hd substation medium and low voltage substation). UG cable. construction of cable, types, testing.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

**Lineman (Electrical)**

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness and Financial Rules</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Lineman- Electrical)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Lineman- Electrical):-**

**Basic Electricity:-** Fundamental Of Electricity Flux and soldering technique Property of Resistance Conductor, Insulator, Semiconductor Types of wires and cables.

**Ohm's Law:-** Ohm's law, Kirchoff's law Effects of variation of temperature on resistance Chemical effect of electric current Laws of resistance Different type of cells Grouping of cells Care and maintenance of cell Buckling, Sedimentation.

**Magnetism:-** Classification of magnetic properties Para, dia and ferromagnetic material electromagnetism, Fleming's left and right hand rule MMF, Flux density, Reluctance Faraday's laws of electromagnetic induction, Len'z law Capacitor, types and functions.

**Alternating current and Earthing:-** Alternating current, Earthing Types of wiring both domestic and industrial Grading of cable and wires Current rating, Testing of installation by megger.

**DC Machines:-** DC Generators and Type emf equation Description of series, shunt and compound Generator DC motors and type Starters 3 point, 4 point and speed control machine.

**AC Motors, single and 3 phase:-** AC motors and starters single phase and 3 phase DOL, Star delta, slip ring motor starter Auto transformer starter AC motor panel wiring phase sequence.

**Instruments and Transformers:-** Measuring Instruments, Indication type and Deflecting types Controlling torque and Damping Torque Basic principle of Transformer, emf equation of transformers parallel operation of Transformers Cooling, Protective Device.

**Illumination and Basic Electronics:-** Illumination—Laws of illumination Type of lamp, Domestic appliances Semiconductor— P type, N Type classification of Diode, Rectifier, Transistor.

**Power Generation:-** Generation Source of energy Various types of power generation.

**Transmission:-** Transmission and Distribution comparison of AC and DC transmission

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

Post Name:-

Plumber

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness and Financial Rules</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Plumber)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Plumber):-**

Safety:- Importance of safety and general precautions required for the trade. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE).

Carry out cutting of Pipes of Different Dia in different angle and Joining of pipes by gas welding:- Method of gas welding. Joining of Pipe in same dia by gas welding. Method of soldering and brazing, flux users& Type of flux. Hard & soft solders -their properties, composition and uses.

Construct Masonry brick wall and RCC casting. Brick wall cutting for concealing pipe line:- Concept of bricks, lime and cement. Preparation of mortars with various materials of varying composition. Common brick joints. Plain cement concrete, RCC and Its proportion. Grades of coarse aggregate and fine aggregate. Identify plumbing services required for each type of building according to usage.

Construct complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line:- Types of fittings for different joints & different pipes.:- CI,HCI,AC,AC Pressure, DI, GI Pipes. Joints:- Flange joint, Socket joint. Description of pipe fittings. Methods of joining and their uses.

Perform Water analysis test, Water Pressure test and Water distribution system by using Pipe line:- Sources of water. Hard & Soft water, temporary hardness & permanent hardness. Water purification stages and methods. Expansion of water on freezing and heating. Pressure of water on the sides of cistern or tank. Water hammer in pipes.



Install and maintain different Electric Pumps:- Plumber's materials Lead, tin, Zinc, solder, copper, red lead and their uses. Water supply system of a small town. Centrifugal pump. Contamination of water in a well. Types of pumps suction head.

Construct inspection chamber, manhole, gutter, septic tank, socket:- Inspection chamber, septic tank, description of drains, cesspools, soak pits. Layout of drainage system.

Perform removal of leakage pipe line:- Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing. Installation of water meters. Air lock in pipes and its removal.

Perform fitting and maintenance of Fixture at different place:- Lay out of one pipe system & Two pipe system. Method of testing leakage. Different types of traps, ventilation, antisiphonage and sinks. Fire hydrants and their fittings.

Carry out fitting, fixing & laying installation of hot & cold water pipe line:- Heat and Temperature. Method of transmission of heat. Heating system by different thermal units. Domestic hot and cold water. Repairs to service main. Domestic boilers and Geysers. Method of ventilating pipe. Precaution against air Poisoning. Fixing of solar water system.

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

Post Name:-

Wireman

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness and Financial Rules</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Wireman)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Wireman):-**

**Fundamentals of Electricity:-** Effects of electric current, fundamental terms, Definition, solder, flux, definition and properties of conductors, insulators, semi conductors, different types of insulators, types of wires and cables, specification of wires and cables- insulators, low medium and high voltage, various types of cables  
Law of Resistance, Ohm's law, Kirchhoff's laws- Resistance, PD, Current, specific resistance, laws of resistance, ohm's law, series and parallel circuit, kirchhoff's laws, wheat stone bridge, effects of variation of temperature on resistance, work, power, energy, efficiency, heating effect of electric current.

**Cells and Batteries:-** electrolysis, Faraday's laws of electrolysis, basic principle of electro plating and electronic chemical equivalents, primary cell and secondary cell, lead acid cell, methods of charging care and maintenance of cells, grouping of cells of specified voltage and current, inverter, battery charger nickel alkali cell, efficiency of cells, power and capacity of cells.

**House Wiring and Earthing:-** Different method of earthing, IE, Pipe, plate importance of earthing, improving Earth resistance, E LC B-type of wiring and their users, IE rules wiring accessories, such as lamp holder, switch, plug, bracket, ceiling rose, cut out, ICTP, ICDP.

**Illumination:-** Construction working and application of incandescent lamp fluorescent tube cfl neon sign halogen Mercury vapour lamp sodium vapour lamp

**Magnetism:-** Classification of magnets, methods of magnetising magnetic materials, properties, care and maintenance, para and diamagnetic, and ferro magnetic, materials principle of electromagnetism, Maxwell's cork screw rule, Fleming's left hand right hand rules, magnetic field of current carrying conductor, solenoid, MF, flux density, reluctance, hysteresis, Eddy

current, principle of electromagnetic induction, faraday's laws, lenz's law, electrostatics capacitor, different types of function and uses.

**Alternating Current and Poly Phase:-** Comparison and advantage AC and DC related terms, frequency, instantaneous value RMS value, average value, peak factor, form factor, sine wave, phase and phase difference, inductive and capacitive reactance, impedance power factor, active and reactive power, single phase and 3 phase system, power consumption series and parallel PF, 3 phase star Delta connection line and phase voltage, current and power in 3 phase circuits with balanced and unbalanced load.

**Basic Electronics:-** semiconductor, atomic structure, P type and N type, types of materials, PN Junction, classification diodes, reverse and forward bias, heat sync specification of diode, PIV rating, half wave, full wave, and bridge circuit, filter circuit, passive filter, LED, diode types of transistor, UJT, SCR regulator, ICS, zener diode uses and its application, IC voltage regulator JFET, and logic gate AND gate.

**DC Generator and DC Motors:-** Introduction to DC generator and working principle, parts of DC generator, classification of generator self excited and separately excited, their application types and characteristics of DC generator series, shunt and compound their application. emf equation DC motor working principle, types of motor, torque, speed back emf, characteristics speed control of DC motor, necessity of starter types of starters, 2 point, 3 point, 4 point starters, Protective device used method of speed control.

**AC Generators Motors and Starters:-** parts and construction of alternator principle of working, types of alternator, emf equation, various applications and power rating of alternator, general idea of loading and regulation of alternator, parallel operation of alternators, synchronising method AC single phase motor and types capacitors, start/run, start and run. FHP motors and their uses various application of AC single phase motors.

**Three Phase Motors:-** construction principle of operation of 3 phase induction motors squirrel Cage and slipring induction motors rotor slip, rotor frequency and motor torque starting method, speed control method, importance of phase sequence in 3 phase induction motor, single phasing preventere, starters, DOL starters, Delta starters, and auto transformer starter, rotor resistance starter.

**Transformers:-** power transformer: its construction working parallel operation of transformer their connection, cooling transformer, emf equation, transformation ratio, ideal transformer, construction of core, shell, Berry type, auxiliary parts, breather, conservator, buchholz's relay, other protective device, transformer oil testing OF load and ON load, auto transformer, its construction, working and uses CT, PT losses and efficiency.

**Measuring Instruments:-** Types of measuring instruments- MC and MI construction and working principle of ammeter, Volt metre, ohm metre, watt meter, energy meter, PF metre, megger, earth tester, CT and PT tong tester/clip on metre multi metre. generation transmission and distribution of electricity. Generation: diesel power station, steam power station, hydroelectric power station, nuclear power station. Substation: indoor, outdoor, pole mounting (EHT substation Hd substation medium and low voltage substation). UG cable. construction of cable, types, testing.

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.

Post Name:-

Tailor Grade-III

**Pattern of examination:**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>15</b>
B. <b>General Awareness and Financial Rules</b>	<b>15</b>
C. <b>Quantitative Aptitude</b>	<b>15</b>
D. <b>English Language and Comprehension</b>	<b>15</b>
E. <b>Subject knowledge of the concerned post (Tailor)</b>	<b>140</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** It would include question of both verbal and non- verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness and Financial Rules:** Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of every day observations as may be expected of any educated person. The test will also include questions relating to India especially pertaining History, Culture, Geography, Economic Scene, General Policy.
- C. Quantitative Aptitude:** The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angels subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. English Language and Comprehension:** Candidates ability to understand correct English, his basic comprehension and writing ability, etc. would be tested.

*The questions in Part A, B and D will be of a level commensurate with the essential qualification and questions in Part C will be of 10<sup>th</sup> standard.*

**E. Subject knowledge of the concerned post (Tailor):-**

**Sewing Machine Fundamentals:-** History and generation of Sewing Machine, various types and sizes of sewing machine, important parts of sewing machine and their functions, Faulty working and remedies.

**Knowledge Of Tailoring And Embroidery Tools:-** Equipment and accessories used for tailoring and embroider– Such as: Measuring tape, cutting scissors, Tailors square, Needles tracing wheel, Thimble and embroidery frames.

**Materials:-** Clothes and their characteristics, nature and uses-Such as: Cotton, Linen, Rayon, Synthetic, Silk, Woollen for various materials.

**Hand Stitches Used For Tailoring And Embroidery:-** Various kinds of hand stitches such as: Tacking, Running, Hemming, Backstitch, Buttonhole. Stemstitch. Herringbone stitch, laizy daisy, shadow stitch, chain stitch, Long and Short stitch and Satin stitch.

**Technical Terms:-** Technical terms used in Tailoring–Inlay Turning, Lapels, Bridle, Fly, Flycatch, Fork, Jetting, Mercerised, Sizing, Selvedge, Dungree, Alterations. Depth of Seye, Lace, Truebias, Plaid, Crown and Locking Opening And Fastenings.

**Different types of opening and fastenings such as:-** Facing, Binding, Hooks and eyes. Buttons and Buttonhole, press button and Edge finishes.

**Pleats And Gatherings:-** Types of pleats and gatherings such as-Knife pleat, Inverted pleat, Box pleat & Decorative gatherings(honey combing and smoking)

**Measurements:-** Process of taking measurements for all kinds of garments and their method of application- Average measurements for different ages-Theory of Eight Heads.

**Preparing And Finishing:-** Different kinds of transferring methods in fabrics(Carbon method, Pronouncing method and Direct method).Washing and Ironing of embroidery articles.

**Knitting And Crochet:-** Basic knitting such as Casting on, Casting off, knit, Pearl, Decreasing and Increasing, knitted patterns, Basic stitches for Crochet work: Chain, Single, Double, Triple.

**Note:-** *It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.*

**Post Name:- Operator (E&M)/Lift Operator**

**Pattern of examination: -**

- CBT Multiple Choice Questions with four answer options.
- Total **200** questions.
- **01** mark for each correctly answered question
- **Negative 0.25** marks for each wrong answered question.

Proposed Scheme of Examination	No. of Questions
A. <b>General Intelligence &amp; Reasoning</b>	<b>25</b>
B. <b>General Awareness</b>	<b>35</b>
C. <b>Quantitative Aptitude</b>	<b>25</b>
D. <b>Basic English Knowledge</b>	<b>15</b>
E. <b>Post-Specific based on Domain Knowledge Area/Cadre for the post of Operator (E&amp;M)/Lift Operator</b>	<b>100</b>

**Indicative Syllabus**

- A. General Intelligence & Reasoning:** - It would include question of both verbal and non-verbal type. This component may include questions on analogies, similarities and differences, space visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non-verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc. The topics are, Semantic Analogy, Symbolic/Number Analogy, Figural Analogy, Semantic Series, Number Series, Figural Series, problem Solving, Word Building, Coding & decoding Numerical Operations, symbolic Operations, Trends, Space Orientation, Space Visualization, Venn Diagrams, Drawing interfaces, Punched hole/pattern -folding & unfolding, Figural Pattern -folding and completion, Indexing, Address matching, Date & city matching, Classification of centre codes/roll numbers, Small& Capital letter/number coding, decoding and classification, Embedded Figures, Critical thinking Emotional Intelligence, Social Intelligence, other sub-topics, if any.
- B. General Awareness:** - Question in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Question will also be designed to test knowledge of current events and of such matters of every day observations and experience in their scientific aspect as may be expected of any educated person, the test will also include questions related to India and its neighbouring countries especially pertaining History, Cultural, Geography, Economic Scene, General Policy & scientific Research.
- C. Quantitative Aptitude:** - The questions will be designed to test the ability of appropriate use of number and number sense of the candidates. The scope of the test will be computation of whole number, decimals, fractions and relationship between numbers, Percentage. Ratio and Proportion, square roots, Average, Interest, profit and loss, Discounts, Partnership Business, Mixture and allegation, Time and Distance, Time and work, Basic algebraic identities of school algebra & Elementary surds, Graphs of linear Equations, Triangle and its various kind of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of circle, common tangents to two or more circles, Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular of square base Trigonometric ratio, Degree and Radian Measures, Standard Identities Complementary angle, Heights and Distance Histogram, Frequency polygon, Bar diagram & Pie Chart.
- D. Basic English Knowledge:** - Candidates' ability to understand basic English and use it in conversation will be tested.  
*The level of questions in Part A, B, C & D will be of class 10<sup>th</sup> standard.*
- E. Post-Specific based on Domain Knowledge Area/Cadre for the post of Operator (E&M)/Lift Operator:** - Carpentry tools and basic carpentry work following safety precautions. Basic fitting operations and use various instruments/ gauges to check different parameters. Electrical wire joints, carry out soldering, crimping and measure insulation resistance. Select and use AC/DC measuring instruments, measure electrical parameters and verify characteristics of electrical/ magnetic circuits. Installation, testing and maintenance of batteries. Carry out wiring, assembling of electrical accessories and earthing of electrical equipment. Simple electronic circuits and test for functioning. Basic civil/ drafting work, draw plane figures used in lifts and escalator by applying drawing instruments with proper layout. Lifting tools/ hoist equipment and perform simple welding& brazing. Industrial wiring of control panels, assemble accessories and equipment as per BIS recommendations and IE rules. Install, connect, start, run, reverse and stop AC/ DC machines including synchronous motors and carry out maintenance along with protective and controlling devices. Assemble power electronic circuits and test for functioning including digital electronic components and circuits. Perform speed control of AC and DC motors by using solid state devices. Working principle of different elevators, types of conveying equipment. Importance of personnel safety in lifts and escalators. Applications and proper use of; Hard hat, Safety belt, lifeline, Barricade, Cut resistance gloves, goggles, dust mask, head lamp, ear plug, JHA, cardinal rules. Emergency equipment of the elevator; Emergency light, Automatic rescue device, door sensor, emergency alarm. Components of elevator; Types of elevator Capacity and speed of the Elevator. Template setting. Hoist way measurement, Bracket measurement & fixing. Guide rail hoisting & plumbing. Concept of counter weight, buffer, car frame, emergency stop switch. Different types of door, landing zone, top over travel, head room, etc. Elevator safety (over speed Governor, safety circuit, overhead clearance, car bottom clearance) Common safety features of elevator - ATT, overload, ISC, fire, earth quake. Types of elevator; passenger elevator, service elevator, freight elevator. Concept of elevator well, elevator pit, pit depth. Types and procedure of fixing Guide rails, reed switch magnet. Importance of Running clearance. Types of Ropes, Coated steel belt. Types of limit switch and their application. Importance of car top Inspection. Electromagnetic brakes for lifts. Types of Drum, pulleys, guiding shoes, cam, toe guard, retiring cam, limit cam and sheave used in lift. Process of fixing Machine beam and beam support. Dead end hitch, spur gear, worm gear and Bearings. Difference between Geared and Gearless machine.

Components of Car Operating Panel. Hall fixture and lantern. Compensation chain, cage bulldog clip, governor tension weight and counter screen. Types of Doors and procedure of installation. Cage fitting, function of isolation. Concept and calculation of roping/ run by (1:1 , 2:1, 4:1) Procedure of travelling cable installation. Types scaffolding & their standards. Concept of scaffoldless installation system. Commissioning; Concept, Procedure/ steps. Procedure of getting elevator license and commissioning certificate. Procedure, Types of governor and pulley, types of Car gate, etc. Space required for the erection of lift of different capacity. Required car area according to No. of passengers. Selection of elevator speed for various types of lift. Capacity of elevator; Selection of location of Lift Machine. Selection of rope, guide rail, buffers, counters weight etc. Systematic installation. Types of Escalator arrangements; parallel, multiple parallel, cross over. Typical applications Moving walkways and applications. Selection/ Calculation of - speed, step widths, inclination Boarding and alighting areas, Pits and supports Components/ Parts of escalators. Step parts and assemblies Step chain parts and assemblies, Comb plate parts Hand rails and related parts. Motors and brake assemblies, Drive unit, drive chain and shafts. Lubrication system and other miscellaneous parts. Covers, Decking, trim plates, panels, etc. Barriers, barrier assembly and caution plates. Various control systems of lift and their utility. Rheostatic control and variable voltage control. Single speed, double speed and logic circuit control. Automatic levelling with change of load. Auxiliary motor micro drive. Electrical and control parts Automatic levelling with main motor at various speeds Automatic levelling devices. The floor selector type, hoistway switching devices. Operation without mechanical contact. Manual operation, Push bottom, Automatic operation holds in push bottom operation, fully automatic push button operation, dual operation and signal operation. Alarming system Various electrical & electronic control circuits. Logic circuits used in lifts. Test and trial of mechanical, electrical and electronic system of lift. Procedure of testing with minimum to maximum level. Carry out preventive & breakdown maintenance of lifts, escalators and moving walkways with due care and safety. Size and shape of car Clearance and allowances between car and the wall. Concept of lift maintenance. Methods/ Types of maintenance. Preparing check list. Concept of maintenance schedule. Preparing and follow-up of maintenance schedule. Preventive maintenance, running maintenance and brake-down maintenance. Spare parts used for lift and escalators maintenance. Inventory/ stocking of spare parts. Preservation of spare parts. Types of lubricants, its properties and use in lifts. Importance of lubrication. Lubrication during installation and periodical lubrication. Disadvantage of improper lubrication. Effects of faulty power supply, i.e. single phasing, loose contact, improper voltage etc. Effect of wrong brush bedding and positioning. Effects faulty and loose braking system. Different types of bearings used in lift, their specification and properties. Gear, worm and worm wheel used in lift and their function. Function of various parts of governor. Types of spring, function and use. Concept of wear and tear. System of levelling and alignment. Types of Shaft and shaft coupling. Function of emergency cut out in trip system. Necessity of electrical/ mechanical interlocks. Importance of regular cleaning, dusting and lubrication. Importance of recording parameters and other service records of lift. Explanation and function of Auto rescue device (ARD).

**Note:-** It may be noted that apart from the topics given above, questions from other topics related to the job and prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.