

Roll No.

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For Official use only

**ADDITIONAL DIRECTOR GENERAL(TRG.), CPWD
Junior Engineer(Civil & Elect.) (CPWD) Limited Departmental Competitive
Examination – 2006**

APPLICATION FORM (PART – I)

**PHOTO
(5 cms. x 7 cms.)
with signed**

1. Post for which you want to compete : _____
Write Civil or Electrical

2. Name in Block Letters as per service : _____
record

3. Postal Address in Block letters : _____

4. Date of Birth as per service record :

Day		Month		Year			

5. Community, whether SC/ST/Others : _____

6. Centre of Examination : _____
(Delhi/Chennai/Mumbai/Kolkata/Guwahati)

7. Medium of Examination : _____
Write Hindi or English

8. Date of Joining from which you : _____
are regularly appointed as JE in CPWD

Day		Month		Year			

9. Whether you are holding an Ex-cadre : _____
post and have a lien in the post of JE in CPWD

10. List of Documents attached with application : _____
(As per para 3 of Annexure 'A')

DECLARATION TO BE SIGNED BY THE CANDIDATE

I hereby declare that all statements made in this application are true, complete and correct to the best of my knowledge and belief. In event of any information being found false or incorrect or ineligibility being detected before or after the examination, the Department under Rule 6 of the Rules of the Examination can take action against me.

I have read rules in the Rules and Notice of the departmental examination carefully and I hereby undertake to abide by them.

Signature of Candidate

Date :

Place :

Application not signed by candidate will summarily be rejected.

**PART – II : To be filled in by the Head of the Department or
Office in which the candidate is serving**

Certified that the entries made by Sh./Smt. _____ in all columns have been verified with reference to his/her record and are correct and is eligible to appear to this examination as he/she has put in minimum four years qualifying service as on or before 1st January, preceding to vacancy year for which he wish to apply. It is also certified that he/she has submitted the application form to this office on _____ for onward transmission to the ADG(Trg.).

Signature :

**Designation :
with office Stamp**

Date :

Roll No.

For Official use only

**ADDITIONAL DIRECTOR GENERAL(TRG.), CPWD
Assistant Engineer (CPWD) Limited Departmental Competitive Examination – 2006**

CANDIDATES ATTENDANCE SHEET

**PHOTO
(5 cms. x 7 cms.)
with signed**

1. Name of Candidate : _____
2. Centre of Examination : _____
3. Post for which you want to compete : _____
Write Civil or Electrical
4. Schedule of Examination (To be filled in by the candidate in Examination Hall) :

Sl.No.	Date	Subject and Paper	Candidate's Signature
1.			
2.			

Signature of Invigilator

**CPWD TRAINING INSTITUTE
E-WING, NIRMAN BHAWAN
NEW DELHI - 110 011**

NOTICE

**ASSISTANT ENGINEER (CPWD) LIMITED DEPARTMENTAL COMPETITIVE
EXAMINATION - 2006**

New Delhi, the 07th Nov., 2006.

F.NO. SE(T)-I/LDCE/2006 : A Limited Departmental Competitive Examination for promotion of Junior Engineers (Civil/Electrical) to the Assistant Engineers Grade (Civil/Electrical) in the Central P.W.D. will be held by the CPWD Training Institute on **10.06.2007** at **Chennai, Delhi, Dispur (Guwahati), Kolkata, Mumbai** in accordance with the Recruitment Rules published in the Gazette of India, dated 21st June, 1997.

THE CENTRES AND THE DATE OF HOLDING THE EXAMINATION AS MENTIONED ABOVE ARE LIABLE TO BE CHANGED AT THE DISCRETION OF THE ADG (TRG.). WHILE EVERY EFFORT WILL BE MADE TO ALLOT THE CANDIDATES TO THE CENTRE OF THEIR CHOICE FOR EXAMINATION, THE ADG (TRG.) MAY, AT HIS DISCRETION, ALLOT A DIFFERENT CENTRE TO A CANDIDATE WHEN CIRCUMSTANCES SO WARRANT. CANDIDATES ADMITTED TO THE EXAMINATION WILL BE INFORMED OF THE TIME TABLE AND PLACE OR PLACES OF EXAMINATION (See Annexure 'A' - Instruction to Candidates Para 6)

2. The approximate number of year wise vacancies to be filled on the results of the examination is as follows :

Category	CIVIL					ELECTRICAL				
	2002-03	2003-04	2004-05	2005-06	2006-07	2002-03	2003-04	2004-05	2005-06	2006-07
Unreserved	58	56	17	36	26	25	29	25	27	17
SC	--	08	02	07	03	06	05	05	04	03
ST	03	09	01	04	01	03	02	03	01	02
TOTAL	61	73	20	47	30	34	36	33	32	22

(The above numbers are liable to alter)

3. Regularly appointed officers of the Grade of Junior Engineer (Civil/Electrical) of the Central Public Works Department who have joined on or before 1-1-1998 as Junior Engineers in the Department and have a minimum of four years qualifying service as on 1-1-2002 shall be eligible to appear in the examination. However, after the examination, merit list based on aggregate marks finally awarded to each candidate will be prepared separately for each year vacancies in the respective categories and discipline (i.e. SC/ST/Others & Civil/Electrical).

Cut-off date in respect of date of joining for the eligibility of a candidate for becoming due for consideration for the vacancies of the particular year will be 1st January of the year, four years preceding to the year of consideration. For example :

- (i) for filling up of vacancies for the year 2002-2003, the cut-off date is 1st January, 1998. It means those candidates who would have joined the department on or before 1st January, 1998, would be eligible for the vacancies for the year 2002-2003 and onward vacancies.
- (ii) for filling up of vacancies for the year 2003-2004, the cut-off date is 1st January, 1999. It means those candidates who would have joined the department on or before 1st January, 1999, would be eligible for the vacancies for the year 2003-2004 and onward vacancies.
- (iii) for filling up of vacancies for the year 2004-2005, the cut-off date is 1st January, 2000. It means those candidates who would have joined the department on or before 1st January, 2000, would be eligible for the vacancies for the year 2004-2005 and onward vacancies.
- (iv) for filling up of vacancies for the year 2005-2006, the cut-off date is 1st January, 2001. It means those candidates who would have joined the department on or before 1st January, 2001, would be eligible for the vacancies for the year 2005-2006 and onward vacancies.
- (v) for filling up of vacancies for the year 2006-2007, the cut-off date is 1st January, 2002. It means those candidates who would have joined the department on or before 1st January, 2002, would be eligible for the vacancies for the year 2006-2007.

NOTE (I) : The Junior Engineers(C&E) who joined CPWD from AIR through Surplus Cell of DOPT are also allowed to appear in LDCE-2006 subject to the following conditions :

- i) They have rendered requisite qualifying service of four years including All India Radio on or before 1st January, four years preceding to the year of consideration of vacancies; and
- ii) They have joined the CPWD on or before 1st day of January to which the vacancies relates

NOTE (II) : Candidates should indicate clearly in their application the Grade i.e. Assistant Engineer (Civil) or Assistant Engineer (Electrical) for which they wish to compete.

4. A candidate seeking admission to the examination must apply to the ADG (Trg.), CPWD, on the prescribed form of application. The prescribed form of application and full particulars of the examination are obtainable from the concerned Chief Engineer or on the Internet at the site www.cpwd.nic.in which can be downloaded by the candidates. Alternatively the form can also be photocopied from the sample form available with Regional Controller of Examination.

NOTE (I) : **Candidates who had already applied for LDCE-2004 for the post of AEs(C&E) in response to our notification no.SE(T)-I/JEs/Deptt.Exam dt.15.01.2004 are requested to submit fresh application. The applications earlier submitted by them shall be treated as cancelled.**

NOTE (II) : Candidate should see carefully the Annexure-‘A’ (Instructions to the candidate) and Examination Rules (Annexure ‘B’) before filling the application form.

5. The selections and appointments to be made on the basis of LDCE-2006 will be subject to the final decision in the court matter pending before the Hon’ble High Court of Delhi in W.P.(C) 21018/2006 – Krishna Murari Tripathi & Ors. Vs. Union of India and Ors. and any other relevant matter which may be sub-judice.

6. **Closing Date** : The complete application form must reach the **Section Officer, Examination Cell under ADG (Trg.), CPWD, Room No.329 `A’ Wing, Nirman Bhawan, New Delhi-110 011** by **Friday, 29th December, 2006**.

Application received after **Friday, 29th December, 2006** will not be considered.

**APPLICATION NOT COMPLYING WITH THE ABOVE REQUIREMENT
WILL BE SUMMARILY REJECTED.**

**Section Officer (Exam Cell)
For ADG (Trg.), CPWD**

ANNEXURE-‘A’

Instruction to Candidates

1. *Before filling in the application form, the candidates should consult the Notice and the Rules carefully to see if they are eligible. The conditions prescribed cannot be relaxed.*

BEFORE SUBMITTING THE APPLICATION THE CANDIDATE MUST SELECT FINALLY FROM AMONG THE CENTRES GIVEN IN PARAGRAPH-1 OF THE NOTICE THE PLACE AT WHICH HE WISHES TO APPEAR FOR THE EXAMINATION. Candidate should note that no request for change of centre once allotted will be entertained.

2. The application form must be completed in the candidate’s own handwriting in ink or with ballpoint pen. An application, which is incomplete or is wrongly filled in, will be rejected.

Candidates should note that only International form of Indian numerals are to be used while filling up the application form. Even if the date of birth in the SSLC or its equivalent certificate has been recorded in Hindi numerals, the candidate should ensure that while entering it in the Application Form he uses International form of Indian numerals only. They should take special care that the entries made in the application form should be clear and legible. In case there are any illegible or misleading entries, the candidates will be responsible for the confusion and the ambiguity caused in interpreting such entries.

Candidates should further note that no correspondence would be entertained by the ADG (Trg.) from them to change any of the entries made in the application form. They should, therefore, take special care to fill up the application form correctly.

A candidate must submit his application through the proper Channel of his Department or Office concerned, who will complete the endorsement at the end of the application form and forward it to O/o the ADG (Trg.) at the address given below:

**Shri S.N.Chauhan
Section Officer (Exam. Cell),
O/o ADG (Trg.), CPWD,
Room No.329, “A” Wing,
Nirman Bhawan, New Delhi-110011.**

3. A candidate must send the following documents with his application :-
 - i) Two identical copies of recent passport size (5 cm. x 7 cm. approx.) photographs of the candidate. – A candidate must submit two identical copies of his recent passport size (5 cm. x 7 cm. approx.) photograph, one of which should be pasted on the first page of the application form and the other copy on the Attendance sheet in the space provided therein. **Each copy of the photograph should be signed in ink on the front by the candidate.**

- ii) Attendance Sheet (attached with the Application form) duly filled in.
- iii) Two self-addressed unstamped good quality envelopes of 11.5 cm. x 27.5 cm. Candidate should write neatly his complete postal address i.e. his Name, House No., Ward No., Mohalla etc. on the envelopes. In cases where House No. is not there, the candidate should write his own full name, followed by his father's name with postal address.
- iv) One Self-addressed Post card.

NB : Candidates are warned that if an application is not accompanied with the documents mentioned under paragraph 3 above it will be rejected and no appeal against its rejection will be entertained.

- 4. Candidates are warned that they should not furnish any particulars that are false or suppress any material information in filling in the application form.

Candidates are also warned that they should in no case correct or alter or otherwise tamper with any entry in a document or its copy submitted by them nor should they submit a tampered/fabricated document.

- 5. The fact that an application form has been supplied on a certain date will not be accepted as an excuse for the late submission of an application. The supply of an application form does not *ipso facto* make the receiver eligible for admission to the examination.
- 6. Every application sent by an intending candidate through his/her Head of Office, received (including those received late) in the Examination Cell in the office of the ADG (Trg.) is scrutinized and Roll Number is issued to the eligible candidates. If a candidate does not receive Roll Number by 15th March, 2007, he should at once contact the Section Officer, Examination Cell at the address given at para 2 above. Failure to comply with this provision will deprive the candidate of any claim to consideration.
- 7. Communications regarding Applications - ALL COMMUNICATIONS IN RESPECT OF AN APPLICATION SHOULD BE ADDRESSED TO THE ADG (TRG.) AND SHOULD INVARIABLY CONTAIN THE FOLLOWING PARTICULARS :

- (1) NAME OF EXAMINATION
- (2) MONTH AND YEAR OF EXAMINATION
- (3) NAME OF CANDIDATE (IN FULL AND IN BLOCK CAPITALS)
- (4) CENTRE OF EXAMINATION, ROLL NUMBER OR THE DATE OF BIRTH OF CANDIDATE
- (5) POSTAL ADDRESS AS GIVEN IN APPLICATION.

N.B. (i) COMMUNICATIONS NOT CONTAINING THE ABOVE PARTICULARS MAY NOT BE ATTENDED TO.

N.B.(ii) IF A LETTER/COMMUNICATION IS RECEIVED FROM A CANDIDATE AFTER THE EXAMINATION IS OVER OR A CANDIDATE DOES NOT MENTIONED HIS FULL NAME AND ROLL NUMBER IT WILL BE IGNORED AND NO ACTION WILL BE TAKEN THEREON.

8. **CHANGE IN ADDRESS** : A CANDIDATE MUST SEE THAT COMMUNICATIONS SENT TO HIM AT THE ADDRESS STATED IN HIS APPLICATION ARE RE-DIRECTED, IF NECESSARY. CHANGE IN ADDRESS, IF ANY, SHOULD BE COMMUNICATED TO THE ADG (TRG.) AT THE ADDRESS GIVEN IN PARA 2 ABOVE, AT THE EARLIEST OPPORTUNITY GIVING THE PARTICULARS MENTIONED IN PARAGRAPH 7 ABOVE. ALTHOUGH THE OFFICE OF THE ADG (TRG.) WOULD MAKE EVERY EFFORT TO TAKE ACCOUNT OF SUCH CHANGES, IT CANNOT ACCEPT ANY RESPONSIBILITY IN THE MATTER.

**C.P.W.D. TRAINING INSTITUTE
E-WING : NIRMAN BHAWAN
NEW DELHI - 110 011**

New Delhi, 7th Nov., 2006

RULES

F.N0. SE(T)-I/JEs/Deptt.Exam : The rules for a limited department competitive examination for promotion from the Grade of Junior Engineer (Civil)/(Electrical) to the Grade of Assistant Engineer (Civil/Electrical) in the Central Public Works Department to be held by the ADG (Trg.), CPWD in 2007 are published for general information.

1. The number of vacancies to be filled on the results of the examination is as specified in the Notice issued. Reservations shall be made for candidates belonging to the Scheduled Castes and the Scheduled Tribe in respect of vacancies as may be fixed by the Government.
2. The examination will be conducted by the CPWD Training Institute in the manner prescribed in the Appendix to these Rules. The date on which and the places at which the examination will be held shall be fixed by ADG (Trg.), CPWD.
3. Regularly appointed officers of the Grade of Junior Engineer (Civil/Electrical) of the Central Public Works Department who have completed a minimum of four years qualifying service as on 1st January of four years preceding the year of vacancies shall be eligible to appear in the examination. However, after the examination, merit list based on aggregate marks finally awarded to each candidate will be prepared separately for each year vacancies in the respective categories and discipline (i.e. SC/ST/Others & Civil/Electrical).

Cut-off date in respect of date of joining for the eligibility of a candidate for becoming due for consideration for the vacancies of the particular year will be 1st January of the year, four years preceding to the year of consideration. For example :

- i) for filling up of vacancies for the year 2002-2003, the cut-off date is 1st January, 1998. It means those candidates who would have joined the department on or before 1st January, 1998, would be eligible for the vacancies for the year 2002-2003 and onward vacancies.
- ii) for filling up of vacancies for the year 2003-2004, the cut-off date is 1st January, 1999. It means those candidates who would have joined the department on or before 1st January, 1999, would be eligible for the vacancies for the year 2003-2004 and onward vacancies.
- iii) for filling up of vacancies for the year 2004-2005, the cut-off date is 1st January, 2000. It means those candidates who would have joined the department on or before 1st January, 2000, would be eligible for the vacancies for the year 2004-2005 and onward vacancies.

- iv) for filling up of vacancies for the year 2005-2006, the cut-off date is 1st January, 2001. It means those candidates who would have joined the department on or before 1st January, 2001, would be eligible for the vacancies for the year 2005-2006 and onward vacancies.
- v) for filling up of vacancies for the year 2006-2007, the cut-off date is 1st January, 2002. It means those candidates who would have joined the department on or before 1st January, 2002, would be eligible for the vacancies for the year 2006-2007.

NOTE : Junior Engineers of the Central P.W.D. who are on deputation to ex-cadre posts with the approval of the competent authority will be eligible to be admitted to the examination.

This, however, does not apply to a Junior Engineer of the Central P.W.D. who has been appointed to an ex-cadre post or to another Service on transfer and does not have a lien in the post of Junior Engineer of the Central P.W.D.

- 4. The decision of the ADG (Trg.), CPWD as to the eligibility or otherwise of a candidate for admission to the examination shall be final.
- 5. No candidate will be admitted to the examination unless he holds a certificate of admission from the ADG (Trg.), CPWD.
- 6. A candidate who is or has been declared by the ADG (Trg.), CPWD –
 - (i) obtaining support for his candidature by any means, or
 - (ii) Impersonating, or
 - (iii) Procuring impersonation by any person, or
 - (iv) submitting fabricated document(s) which have been tampered with, or
 - (v) making statements which are incorrect or false, or suppressing material information, or
 - (vi) resorting to any other irregular or improper means in connection with his candidature for the examination, or
 - (vii) using unfair means during the examination, or
 - (viii) writing irrelevant matter, including obscene language or pornographic matter, in the script(s); or
 - (ix) misbehaving in any other manner in the examination hall; or
 - (x) harassing or doing bodily harm to the staff employed by the ADG (Trg.), CPWD for the conduct of their examination; or
 - (xi) violating any of the instructions issued to candidates along with their Admission Certificates permitting them to take the examination; or
 - (xii) attempting to commit or as the case may be, abetting the commission of all or any of the acts specified in the foregoing clauses;

may in addition to rendering himself liable to criminal prosecution, be liable :-

- (a) to be disqualified by the ADG (Trg.), CPWD from the examination for which he is a candidate; and or
- (b) to be debarred either permanently or for a specified period –

- (i) by the ADG (Trg.), CPWD from any examination or selection held by him who may also intimate the UPSC regarding the misconduct of the Candidate.
 - (ii) by the Central Government, from any employment under them; and
- (c) to disciplinary action under the appropriate rules.

Provided that no penalty under this rule shall be imposed except after:

- (i) giving the candidate an opportunity of making such representation in writing as he may wish to make in that behalf; and
 - (ii) taking the representation, if any, submitted by the candidate, within the period allowed to him also into consideration;
7. After the examination, candidates will be arranged by the ADG (Trg.), CPWD in the order of merit based on the aggregate marks finally awarded to each candidate; (such order of merit will be prepared separately for each year vacancies in the respective categories and discipline i.e. SC/ST/Others & Civil/Electrical) and in that order so many candidates as are found by the ADG (Trg.), CPWD to be qualified by the examination shall be recommended for promotion up to the required number.

NOTE : Candidates should clearly understand that this is a competitive and not a qualifying examination. The number of persons to be promoted on the results of the examination is entirely within the competence of Government to decide. No candidate will therefore have any claim for promotion on the basis of his performance in this examination, as a matter of right.

8. All the candidates will be informed overall marks only obtained by them. No request for revaluation of papers will be entertained. However, request for recounting of marks may be entertained within one month of the declaration of the result for which candidate has to pay Rs.1000/- per paper.
9. Success in the examination confers no right to promotion unless Government is satisfied after such enquiry as may be considered necessary, that the candidate, having regard to his conduct in service, is eligible and suitable in all respects for promotion.

Provided that the decision as to ineligibility for promotion in the case of any candidate recommended for promotion by the ADG (Trg.), CPWD shall be taken in consultation with the ADG (Trg.), CPWD.

10. A candidate who after applying for admission to the examination or after appearing at it, resigns his appointment or otherwise quits the service or severs his connection with it or whose services are terminated by his Department or who is appointed to an ex-cadre post or to another Service on 'transfer' and does not have a lien in the grade of Junior Engineer (Civil/Electrical) in the Central Public Works Department will not be eligible for appointment on the results of this examination.

This, however, does not apply to a person who has been appointed on deputation to an ex-cadre post with the approval of the competent authority.

**Section Officer(Exam Cell)
For ADG (Trg.), CPWD**

APPENDIX

1. The examination shall be conducted according to the following plan: -

PART I - *Written examination* which will be job-oriented carrying a Maximum of 600 marks in the subjects as shown in para-2 below.

PART II - Evaluation of record of service of such candidates as may be decided by the ADG (Trg.) carrying a maximum of 200 marks

2. The subjects, in which the candidates competing for grades of Assistant Engineer (Civil/Electrical) will be required to take the written examination, will be as follows :

S.No.	Grade of service	Subject
1.	Assistant Engineer (Civil)	1) Engineering Design & Construction Practice (Civil) 2) General Engineering (Civil)
2.	Assistant Engineer (Electrical)	1) Engineering Design & Construction Practice (E&M) 2) General Engineering (E&M)

N.B. The papers will have both theoretical and practical content.

The question papers will be so designed as to assess the ability of the candidates to apply their technical knowledge to the solution of problems.

Each paper will carry a maximum of 300 marks and will be of 3 hours duration.

3. Syllabus for the examination will be as shown in the Schedule.

4. Candidates are allowed the option to answer the papers either in English or in Hindi (Devanagari). Question Papers will be set in English and Hindi.

Note (1) :- The option will be same for all the papers mentioned above and not for different papers or different questions in the same paper.

Note (2) :- Candidates desirous of exercising the option to answer the papers in Hindi (Devanagari), should indicate their intention to do so in Column 7 of the Application Form. Otherwise it would be assumed that they would answer all papers in English. The option once exercised shall be treated as final and no request for alteration in the said Column shall be entertained.

Note (3) :- Candidates exercising the option to answer the papers in Hindi (Devanagari) may, if they so desire, give English version within brackets of the description of the technical terms, if any, in addition to the Hindi version.

Note (4) :- If a medium other than the one indicated by the candidate in the application form is used in the examination, the paper(s) of such candidates will not be valued.

5. Candidates must write the papers in their own hand. In no circumstances they will be allowed the help of a scribe to write answers for them.
6. The ADG (Trg.), CPWD shall have the discretion to fix qualifying marks in any or all the subjects of the examination.
7. Marks will not be allotted for mere superficial knowledge.
8. Deduction up to five per cent of the maximum marks in the written subjects will be made for illegible handwriting.
9. Credit will be given for orderly, effective and exact expression, combined with due economy of words in all subjects of the examination.
10. In the question papers, wherever necessary, such as in numerical questions, the questions would be set in both the units i.e. Metric as also S.I. units of measures and weights. The candidates would not be permitted to change the system used in the same question.
11. Candidates should use only International form of Indian numerals (e.g. 1, 2, 3, 4, 5, 6 etc.) while answering question papers.
12. Candidates are permitted to bring and use battery operated pocket calculators (non-programmable) for conventional (essay) type papers. Loaning or inter-changing of calculators in the Examination Hall is not permitted.

Paper-I: ENGINEERING DESIGN AND CONSTRUCTION PRACTICE (CIVIL)

Part- A 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.

Part-B Design Principles

Determinations of dead, live and wind, seismic loads – relevant I.S. Codes, Factor of Safety and Load Factor.

Part- C 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.

Part – D 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

Part-E 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.

Paper II : GENERAL ENGINEERING (CIVIL)

Part – A 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.

Part – B 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.

Part- C 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.

Part – D 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.

PAPER I: ENGINEERING, DESIGN AND CONSTRUCTION PRACTISE (ELECTRICAL AND MECHANICAL)

PART A: General

Knowledge of Indian Electricity Act, Indian Elect. Rules as amended up-to-date. General conditions of supply and charges to be paid to licencees 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. Bombay and Delhi Lift Act and Rules.

PART B: 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.

PART C: Internal Electrical Installations

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

PART D: 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.

PART E: 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.

PART F: Lifts

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

PART G: 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.

PART H: Construction Machinery

Specification for construction machinery such as Vibrators, Road Rollers, Trucks, Concrete Mixers etc. Selection, application and maintenance, principles of calculation of hire charges for plant and machinery.

PART I: 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.

PART J: Water Supply

Types of pumps and their characteristics. Prime movers, pumping systems and application. Specification for equipment and installation.

PAPER II : General Engineering(Electrical and Mechanical)

PART A: 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, polyphase motor and its principle of operation and equivalent circuit. Torque, slip characteristics. Crawling, methods of starting, single phase motor, its theory, characteristics and application.

PART B: INSTRUMENT TRANSFORMERS, PROTECTIVE RELAYING, MEASUREMENTS.

Current, Voltage transformers. Constructional features of IDMT relays, instantaneous relays including knowledge of overload earth fault, undervoltage, 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.

PART C: 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.

PART D: 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.

PART E: 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.

PART F: 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.

PART G: 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.

PART H: 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.