

ANSWER KEY

Question Number	Answer	Reference
1 (i)	(a) Regional Load Despatch Centre	Electricity Act 2003/P26
(ii)	(a) 30,000	Code of Tech Instructions /P195
(iii)	(b) 10 KA	Code of Tech Instructions /P 204
(iv)	(a) 15 ohms	Code of Tech Instructions /P325
(v)	(b) 48 hours	Tender Rules, 2000/P35
(vi)	(d) 25 to 30 volts	Code of Tech Instructions /P318
(vii)	(b) Central transmission utility	Electricity Act 2003/P10
(viii)	(c) 90 days	Tender Rules, 2000/P32
(ix)	(a) 5 years	Supply Code/P31
(x)	(c) 4 feet	Code of Tech Instructions /P393
(xi)	(a) 1 Lakh	Revised Delegation of Powers/Item 3
(xii)	(b) Delhi	Electricity Act 2003/P46
(xiii)	(d) all the above	Electricity Act 2003/P80
(xiv)	(b) 10%	Tender rules, 2000/P33
(xv)	(b) Carbon-dioxide	Code of Tech Instructions /P342
(xvi)	(a) 255KV to 210 KV	Grid Code/P46
(xvii)	(c) 3 years	Electricity Act 2003/P73
(xviii)	(a) Appellate Tribunal	Electricity Act 2003/P61
(xix)	(b) 60 days	Standards of performance regulations/P3
(xx)	(a) one hour	Distribution code/P11
2 (i)	(a) Trip	Code of Tech Instructions /P63
(ii)	(c) 20	Supply Code/P14
(iii)	(b) Regional load despatch centre	Electricity Act 2003/P26
(iv)	(d) 2 Lakhs	Revised delegation of powers/Item 21
(v)	(a) Three months	Standards of performance regulations/P4
(vi)	(c) 1.5 metre	Code of Tech Instructions /P 410
(vii)	(a) 180 days	Standards of performance regulations/P8
(viii)	(d) 3 HP	Supply Code/P5
(ix)	(a) 60 days	Standards of performance regulations/P4
(x)	(b) 1 MW	Distribution Code/P7
(xi)	(a) a chairperson and three other members	Electricity Act 2003/P62
(xii)	(c) Two times	Supply Code/P11
(xiii)	(a) Rs.2000/-	Standards of performance regulations/P11
(xiv)	(b) 10	TR 1991/P9
(xv)	(a) 1, 500/-	Supply Code/P25
(xvi)	(d) 0.85 lagging & 0.95 leading	Grid Code/p26
(xvii)	(a) 4 months	Supply Code/P21
(xviii)	(d) 1.8 to 2.2 N/mm ²	Code of Tech Instructions /P269
(xix)	(b) Rs.50/-	Standards of performance regulations/P11
(xx)	(b) 100 milli seconds	Grid Code/P 39

3 (a)	<p>Under what circumstances, the Earnest Money Deposit made by the contractor will be forfeited? (Tender Regulations 1991 – P18) (4)</p> <p>The Earnest Money Deposit made by the tenderer will be forfeited if:</p> <ul style="list-style-type: none"> (i) He withdraws his tender after acceptance, (ii) He withdraws his tender before the date referred to in Regulation 10.8 or, (iii) He violates any of the provisions of these Regulations or the conditions of tender issued by the Competent Authority. (iv) Samples are not furnished within the time limit prescribed.
(b)	<p>Write the function of Tamilnadu Electricity Regulatory Commission with relevance to Tamilnadu Electricity Grid Code? (Grid Code – P15) (4)</p> <p>The functions of TNERC with relevance to Tamilnadu Electricity Grid Code are:</p> <ul style="list-style-type: none"> i. To determine the rate, charges and terms for the use of the transmission facilities of Licensees ii. To specify the fees and charges payable to SLDC iii. To issue directions on matters of non compliance of TNEGC or to take decisions on any dispute referred to them iv. To issue transmission licenses v. To issue amendments to the TNEGC as and when required.
(c)	<p>Define quality of service and service reliability of supply? (Tamilnadu electricity standards of performance regulation – P2 & P13) (4)</p> <p>Quality of Service Quality of service means providing uninterrupted, reliable electric supply at stipulated voltage and frequency, which will be the end result of its planning, designing of network, operation and service management to ensure stability in supply and prompt compliance of consumers' complaints on metering and billing. The supply with frequent power failure, fuse of calls, voltage fluctuations will not ensure continuity in supply. These factors determine the degree of satisfaction of the consumers.</p> <p>Service Reliability Reliability of the distribution system operated by the distribution Licensee shall be computed on the basis of number and duration of interruptions in a year. Reliability standards shall be judged by two indices namely Consumer's average interruption frequency index (CAIFI), Consumer's average interruption duration index (CAIDI)</p> <p>Each Distribution Licensee shall formulate a suitable model on the basis of his geographical spread of the network to reveal the reality of the situation on the above two indices and set standards of performance. The model shall be got approved by the Commission and can be distinct for each Licensee.</p>

(d)

In which terms the competent authority has powers for deviations before acceptance of Tender? (Tender Regulations 1991 – P27) (4)

The authority competent to decide the tender has powers to decide the following terms at the time of acceptance of tender;

- (i) Price variation
- (ii) Responsibility for loss or damage
- (iii) Delivery schedule
- (iv) Insurance
- (v) Security Deposit
- (vi) Despatch
- (vii) Guarantee
- (viii) Inspection
- (ix) Production of Income Tax and Sales Tax Clearance Certificate
- (x) Institution of suits
- (xi) Terms of Payment (except advance payment for which specific powers are delegated).

(e)

What are the objectives of grid connectivity condition?(Grid Code – P28) (4)

The objectives of the grid connectivity conditions are to ensure that

- (a) the basic rules for connections are complied with to treat all agencies in a non-discriminatory manner
- (b) any new or modified connections, when established, shall neither suffer unacceptable effects due to its connection to the transmission system nor impose unacceptable effects on the system of any other connected agency
- (c) the ownership and responsibility for all the equipments, shall be clearly specified in a schedule (Site Responsibility Schedule) and
- (d) a prospective user is well informed, in advance, of the standards and conditions his system has to meet, for being integrated into the existing power system, the standards and parameters of the existing system with which his system has to be interfaced and the electrical environment in which his system has to operate.

4 (a)

What are the guidelines to be followed to specify the terms and conditions for determination of tariff? (Electricity Act 2003/P39) (5)

The guidelines to be followed to specify the terms and conditions for determination of tariff are,

- (a) the principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission licensees;
- (b) the generation, transmission, distribution and supply of electricity are conducted on commercial principles;

- (c) the factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;
- (d) safeguarding of consumers interest and at the same time, recovery of the cost of electricity in a reasonable manner;
- (e) the principles rewarding efficiency in performance;
- (f) multiyear tariff principles;
- (g) that the tariff progressively, reflects the cost of supply of electricity, and also, reduces and eliminates cross-subsidies within the period to be specified by the Appropriate Commission;
- (h) the promotion of co-generation and generation of electricity from renewable sources of energy;
- (i) the National Electricity Policy and tariff policy.

(b)

Write in detail the actions should be taken when the meter is inaccessible for reading? (Supply Code – P20) (5)

1. When a Low Tension consumer leaves his installation connected to the Licensee's mains but makes it inaccessible for reading by the employees of the Licensee, the consumer shall, for the first occasion of such inaccessibility, be charged provisionally on the basis of the amount charged on the previous assessment. The employee of the Licensee will leave an assessment slip in the premises, wherever possible.
2. If, on the next occasion, the meter is accessible for reading, the consumer will be charged for the actual consumption less the amount already charged, subject to the minimum monthly charges for both the period. If, on the other hand, the meter remains inaccessible on the second occasion also, the consumer will be served with a 24 hours notice to open his premises at a fixed time and date to enable an employee of the Licensee to read the meter. If the meter is now made accessible for reading, the consumer will be charged the actual consumption less the provisional amount charged and paid for the first period of inaccessibility subject to the minimum monthly charges for both the periods. If the meter remains inaccessible even after the 24 hours notice, the supply to the premises will be disconnected and for that period also provisional amount as in the case of previous occasion will be charged.
3. If the meter is made accessible, subsequent to the disconnection, for purpose of reading the meter and settling accounts or for reconnection of the service as the case may be, the consumer will be charged the actual consumption subject to the minimum monthly charges payable for both periods less the two provisional amounts levied and paid for the two periods of inaccessibility. Reconnection charges, if any, shall also be levied. Any excess amount collected will be adjusted in future current consumption charges.
4. When a High Tension consumer leaves his installation connected to the Licensee's mains but makes the meter inaccessible for reading by the employees of the Licensee, the employees of the Licensee will serve the consumer with a 24 hours notice to open his premises for reading of the

meter at a fixed time. If the meter is now made available for reading, the readings will be taken. If the meter remains inaccessible even after the 24 hours notice, the supply to the premises will be disconnected and the consumer will be charged provisionally on the basis of the amount charged for the previous month. If the meter is made accessible subsequent to the disconnection, the consumer will be charged the actual consumption less the provisional amount charged subject to minimum monthly charges. All reconnections shall attract reconnection charges over and above the other charges as are applicable.

- 5. Serving of notices to the consumers with regard to the provisions under the sections above, can be executed by pasting the same at a conspicuous place at the premises.

(c) What are the actions to be taken in case of the buchholz relay acts during service conditions ? (Code of Technical instructions / P 66) (5)

In the case the Buchholz relay acts during service conditions, action must be taken as follows:

- (a) Immediately on actuation of the Buchholz relay the transformer should be isolated and tested in detail. Any gas available in the Buchholz chamber should be subjected to the chemical tests as per instructions.
- (b) Whether gas collection is observed or not the transformer should be tested by the territorial MRT staff and specific comments of the MRT got recorded. The MRT staff should analyse their observations with reference to the pre-commissioning test results and furnish their comments. All the prescribed tests must be conducted by the MRT staff.
- (c) The special Maintenance staff should immediately arrange for testing the oil. All the test results must be properly recorded with specific comments.
- (d) Every power Transformer should have its History Register available in the sub-stations where it is in service.
Relevant Test reports and the corresponding comments as and when furnished by MRT, GRT, Special maintenance or Transformer Erection Staff should form part of the History Register.
- (e) Buchholz relay action should not go without proper intimation and recording. Every occurrence should be recorded in a separate register and maintained properly. Immediate intimation about the occurrence should be given to all concerned.
- (f) For every Buchholz action in a Power Transformer, the oil must be got tested for "Dissolved Gas Analysis" and the test values recorded.
- (g) Similarly for every Buchholz action, arrangements must be made for the chemical test of the gas (as per instructions) immediately. Otherwise, if the gas is left for a long time in the Buchholz relay, some constituents of the gas may dissolve in the oil modifying the composition of the gas originally collected in the Buchholz Chamber, leading to misconception about the happenings inside the transformer.
- (h) In several cases, it is seen that the significance of measurement of magnetizing current in power transformers is not appreciated. It is desirable that the measurements are made on both H.T. & L.T. sides on all the phases,

and recorded properly whenever there is an occasion for testing the transformer. A comparative study of these values over an extended period will provide a definite pointer to the condition of the core and the windings of the transformer.

(d)

Describe the planning for VAR compensation in the network?
(Grid Code – P26)

(5)

- (a) Over and above the demand estimation and planning to cater the active power, reactive power despatch is also important for overall efficient and trouble free Grid operation. A close relation exists between voltage instability and reactive power compensation. Hence the planning for reactive power compensation is also a system-planning problem and needs careful study. STU shall carry out planning studies for Reactive Power Compensation of STS including reactive power compensation requirement at the Generating Station's Switchyard. Normally, while planning the system, the degree of reactive power compensation is considered at load points by keeping an eye on target power factor assigned, the load power factor and the supply/ absorption of reactive power form the various elements in the system. It is considered a good practice of not drawing any reactive power from the remote ends but meeting all the requirements locally. Flattening the nominal voltage across the system shall be achieved by the optimal use of reactive power compensation in the network so as to improve the voltage profile across the system and is a measure of balance between the reactive power generated and absorbed in the system.
- (b) The operative power factor of the generators in the network shall be between 0.85 lagging and 0.95 leading for good reactive power supply capability for local loads and should not generally be used for remote despatching of reactive power.
- (c) The quantum of compensation required to be provided in the Grid shall be suitably distributed in the transmission system, sub stations and distribution system of network. The norms for percentages and quantum of MVAR to be provided by the Licensees / Generators for different period must be specified by STU through well-documented guidelines for use by all concerned.

5 (a)

Define Administrative approval & Technical sanction? (Tamilnadu Electricity Board Manual Vol – I – P306)
(4)

Administrative Approval : Except to the extent delegated in Appendix-I of this Manual, all works require the administrative approval of Board. The administrative approval is, in effect, an order to execute a certain specified work at a stated cost. It is to be noted that, for almost all works both the administrative approval and technical sanction are to be accorded.

	<p>Technical Sanction: For each individual work to be carried out after obtaining administrative approval a detailed estimate must be prepared for the technical sanction of authority competent in the Electricity Board. This sanction is known as the Technical sanction and must be obtained before the execution of the work is commenced. As its name indicates, it amounts to no more than a guarantee that the proposals are technically sound and that the estimates are accurately calculated and based on adequate data.</p>
<p>(b)</p>	<p>Write about measurement book and in which cases no entry need to be made in the measurement book ? (TN Electricity Board Manual Vol I P385) (4)</p> <p>The measurement book must be looked upon as a most important record as it is the basis of all accounts of quantities whether of work done by daily labour, by piece-work by contractor or supply of stores. Deviations in a lump-sum contract for civil works are also recorded in it. The descriptions of the work must be lucid so as to admit of easy identification and check. Since prompt settlement of claims is obviously in the interests of economy, measurements should be promptly taken and delay in recording measurements should be avoided.</p> <p>In the following cases where actual measurement or count is not involved, no entry need be made in the measurement book :</p> <ol style="list-style-type: none"> 1. Compensation for land, 2. Compensation for trees, 3. Property tax on buildings, 4. Rents on buildings hired for office accommodation or for keeping departmental stores, 5. Current consumption charges, 6. Wages of work establishment, and 7. Water charges
<p>(c)</p>	<p>What are the possible causes for failure of surge arrestors? (Code of Technical instructions / P216) (4)</p> <p>The life of an arrester is dependent on various factors such as temperature, applied voltage (temporary and operating AC voltage), surge duty, (Lightning and switching surges) and external contamination. Excessive discharges of surges or power follow current may puncture the non-linear resistors and this will in turn cause damage to spark gap assemblies in gapped arresters. As regards the gapless arresters, it will result in arrester failure. Moisture ingress and partial breakdown of the internal insulation are some of the other adverse factors. Corrosion or contamination of the spark gap electrode surfaces are important contribution factors for the failure of conventional gapped arresters. Puncture of valve and grading resistors may be caused by severe service duty.</p> <p>Other factors that lead to degradation failure of a gapped and gapless arresters in service are,</p> <ol style="list-style-type: none"> 1. Application of sustained power frequency voltage (50 Hz) in excess of arrester rating 2. Repeated discharges within a short duration. 3. Improper handling during transport, installation and in-service. 4. Contamination of external porcelain housings.

<p>(d)</p>	<p>Write about the various methods of grounding of transmission line towers. (Code of Technical instructions / P326) (4)</p> <p>The various methods of grounding of transmission line towers are discussed below:</p> <p>(a) Grounding rods are driven at the base of the tower to obtain a measured resistance of less than 15 ohms.</p> <p>(b) If this is not feasible, an electrode location is sought within 60.96 metres (200') of the tower. If a resistance of less than 25 ohms can be obtained within 60.96 metres (200') the ground rods are provided at that point and tied to the tower base by a single buried wire.</p> <p>(c) If a resistance of less than 25 ohms cannot be obtained within 60.96 metres (200') of the structure, crow-foot counterpoise with 4 wires is installed. The counterpoise conductors may be 6 SWG galvanized steel wire or wire ropes released from power stations. The four-wires are taken away from the tower mutually at right angles and are kept atleast 15.24 metres (50') apart. Each of the wires is terminated on a rod at the nearest point where a resistance of less than 150 ohms can be obtained.</p>
<p>(e)</p>	<p>What are the rights to reject the tender by the tender Accepting Authority after making negotiation with the tenderer and before passing the order for accepting the tender? (Tender Act 1998 – P17) (4)</p> <ol style="list-style-type: none"> 1. After negotiation with the tenderer and before passing the order accepting a tender, if the Tender Accepting Authority decides that the price quoted by such tenderer is higher by the percentage as may be prescribed over the schedule of rates or prevailing market price, he shall reject the tender. 2. The Tender Accepting Authority before passing the order accepting a tender, may also reject all the tenders for reasons such as changes in the scope of procurement, new technologies or substantial design changes lack of anticipated financial resources, court orders, accidents or calamities and other unforeseen circumstances.
<p>6 (a)</p>	<p>Describe the procedures to be followed at the tender opening? (Tender Rules 2000 – P37) (4)</p> <p>The following procedure shall be followed at the tender opening.</p> <ol style="list-style-type: none"> (a) All the envelopes received containing tenders shall be counted; (b) All the tenders received in time shall be opened; (c) Any tender received subsequently shall not be opened and shall be returned unopened to the tenderer; (d) On opening the tender, the members of the Tender Scrutiny Committee shall initial the main bid including the prices and any corrections;

	<p>(e) A record of the corrections noticed at the time of the bid opening shall be maintained;</p> <p>(f) The name of the tenderers and the quoted prices should be read out aloud.</p> <p>(g) The fact whether earnest money deposit has been submitted and other documents required produced may be indicated, but this shall be merely an examination of the documents and not an evaluation;</p> <p>(h) Minutes of the tender opening shall be recorded. The signatures of the tenderers present shall be obtained unless any of the tenderers or his representative refuses to sign the minutes.</p>
<p>(b)</p>	<p>Write about maintenance of rubber gloves and safety belts? (Safety Manual – P74-2(5), P77) (4)</p> <p>ரப்பர் கையுறைகள் :</p> <p>ரப்பர் கையுறைகளை அணியும்பொழுதும் கழற்றும் பொழுதும் அவற்றில் அதிகப்படியான இழுப்பு (strain) உண்டாகாமல் இருக்கவேண்டும். தேவையில்லாமல் அவற்றில் அதிக வெப்பமோ குளிரோ படும்படி வைத்திருத்தல் கூடாது. அவற்றை எப்பொழுதும் தூய்மையான நிலையில் ஒரு குளிர்ந்த இடத்தில் வைத்திருத்தல் வேண்டும்.</p> <p>சேமக்கச்சைகள் :</p> <ol style="list-style-type: none"> 1. ஒவ்வொரு நாளும் கச்சையை உபயோகிக்குமுன், அதில் ஒரு குற்றமும் இல்லை என்பதை உறுதிப்படுத்திக்கொள்ள வேண்டும். 2. ஒரு கச்சை தற்செயலாக வெட்டுப்படின, அதனை உடனே கழித்துவிடவேண்டும். 3. ஒரு தோற்கச்சையை அல்லது வாரைக் குத்தித் துளை செய்யக்கூடாது. அதிகப்படியான துளைகள் வேண்டியிருந்தால், ஒரு சரியான துளையிடும் கருவியைக் (punch) கொண்டு துளையிட வேண்டும். எந்த இரு துளைகளுக்கும் இடைவெளி ஓர் அங்குலத்துக்குக் குறைந்திருக்கக்கூடாது. 4. மழையில் வேலை செய்திருந்தால் வேலை முடிந்ததும், ஒரு தூய துணியைக் கொண்டு கச்சையைத் துடைத்து அறைக்குள் உலரவைக்க வேண்டும். 5. சேமக்கச்சைகளை, நீராவிச் சுருள்களிலிருந்து (steam coils) அல்லது வெப்ப வெளியேற்றிகளிலிருந்து (radiators) வரும் வெப்பம் படும்படி வைக்கக்கூடாது. ஊது சவாலைகள் (blow torches), உலைகள் அல்லது மற்ற வெப்பச் சாதனங்களின் வெப்ப எல்லைக்கு வெளியே சேமக்கச்சைகளை வைக்கவேண்டும். 6. கச்சைகளை மேலே உயரத்திலிருந்து தரையில் விழும்படி நழுவவிடவோ எறியவோ கூடாது.
<p>(c)</p>	<p>What are the reasons for covering the SS yard with a layer of crushed stone? (Code of Technical instructions / P325) (4)</p> <p>The sub-station yard should be covered with a layer of crushed stone of size 3 to 5 cm to a layer thickness of 8 cm to 10 cm. By this way the possible maximum value of shock voltage can be reduced by 50% to 90%. The stone layer helps to conserve moisture in the soil beneath and thus keeps down the soil resistivity. The stone layer also inhibits the growth of plants which might decrease the resistance beneath the feet and serves more or less as an insulated platform for the operating</p>

personnel who handle the switches. Further it prevents the spread of oil splashed. Sub-station operating staff must have good protective foot-wears and use gloves for manual operation of equipments in the sub-station yard. Growth of vegetation in sub-station yards should be removed then the there.

- (d) What are the possible causes for problems developing in batteries? (Code of Technical instructions / P 22) (4)

The possible causes for problems developing in batteries are:

- (a) Buckling : This is due to too much charging resulting in unequal expansion of positive plates.
- (b) Sulphating : This is due to too little charging. If the battery is not sufficiently worked, abnormal sulphation results.
- (c) Hydration : Hydration is the action of water on the Lead plates. If a battery is exhausted to a point where the electrolyte is practically water and charging is not given at once, or if the plates are not entirely immersed continuously in the electrolyte, hydration will set up as a white creamy substance spreading regularly over the plates and reaching into the pores of the active material. As soon as charging is given, acid liberated from the plates attacks the Lead Hydrate forming Lead sulphate in a condition difficult to recover even by very prolonged charging.
- (d) Stratification : In this case a layer of strong acid lies at the bottom of the cell for lack of circulation. Strong acid is liberated from the plates under the action of the charging current and, being heavier than the weak electrolyte, it falls by gravity to the bottom of the cell where eventually a layer of acid with specific gravity as high as 1.4 may gradually build up. Stratification causes the hydrometer readings to be misleading. It tends to very irregular working of the plates. It could be overcome by circulation either through stirring up with a paddle or blowing up with an air pump. It is not experience with a normally working battery.

- (e) An industrial service, having a connected load of 48.0 KW was inspected on 12.11.2017. It was found that no capacitor was installed. The consumption of the service is given below. Calculate the capacitor compensation to be levied. (supply code chapter 2. Miscellaneous charges Para (1)(b)) (4)

Month	Assessed units	Assessed amount in Rs.
12/2016	7210	51433
2/2017	8420	59500
4/2017	9540	66968
6/2017	8530	60234
8/2017	11240	78303
10/2017	7560	53766

Last 2 assessment total = 132069
10% of above = **Rs. 13,207/= Answer**

7 (a)	<p>What are the qualifications for appointment of Chairperson and Members of State Commission? (Electricity Act 2003/P53) (4)</p> <ol style="list-style-type: none"> 1. The Chairperson and the Members of the State Commission shall be persons of ability, integrity and standing who have adequate knowledge of, and have shown capacity in, dealing with problems relating to engineering, finance, commerce, economics, law or management. 2. Notwithstanding anything contained in sub-section (1), the State Government may appoint any person as the Chairperson from amongst persons who is, or has been, a Judge of a High Court. PROVIDED that no appointment under this sub-section shall be made except after consultation with the Chief Justice of the High Court. 3. The Chairperson or any other Member of the State Commission shall not hold any other office. 4. The Chairperson shall be the Chief Executive of the State Commission.
(b)	<p>Write about earnest money deposit and security deposit? (Tender Regulation 1991 – P16) (4)</p> <p>Earnest Money Deposit</p> <ol style="list-style-type: none"> 1. Every tender, other than Single Tender, shall be accompanied by Earnest Money Deposit which shall be in cash or in such other form as may be specified by the Board from time to time. 2. The requirements of Earnest Money Deposit must be worked out at 1% of the estimated face value of the contract rounded off to the nearest Rs.100/- subject to the condition that the maximum Earnest Money Deposit to be paid is limited to Rs.2 Lakhs. The amount of Earnest Money Deposit so fixed shall be mentioned in the Tender notice / specification along with the mode of payment. [(Per) B.P. (FB) No.5 (Accounts Branch) Dt.25-5-98] 3. The approved tenderer shall, in lieu of Earnest Money Deposit, submit proof of permanent Deposit. 4. The Competent Authority may waive the Earnest Money Deposit clause in respect of any specification under Limited Tender for good and sufficient reasons to be recorded. 5. Where a tenderer is exempted from payment of Earnest Money Deposit, he shall, in lieu of Earnest Money Deposit, submit proof of such exemption. 6. Small Scale Industries registered within the State of Tamilnadu are to produce their Registration Certificate showing the materials which they are permitted to manufacture and the period of validity on the Certificate as proof of eligibility for exemption from payment of Earnest Money Deposit / Security Deposit. The Registration should be valid for the entire period of currency of the contract. [(Per) B.P. (FB) No.25 (Accounts Branch) Dt.20-9-97] <p>Security Deposit</p> <ol style="list-style-type: none"> 1. "The successful tenderer will have to pay a security deposit of 10% of the value of the contract, inclusive of Earnest Money Deposit paid subject to a monetary ceiling of Rs.10 Lakhs (Rupees Ten Lakhs only). 1.Of this 2% of the value of the contract including amount remitted as Earnest Money Deposit has to be paid in Cash / DD and the balance 8% in the form of Bank

	<p>Guarantee". [(Per) B.P. (FB) No.5 (Accounts Branch) Dt.10-4-2000]</p> <p>2. In the case of Tenderers who are exempted from the payment of Security Deposit like Undertakings / Corporations of the Government of Tamilnadu, SSI registered in Tamilnadu an undertaking must be obtained before placing the order (including the undertaking already given for Earnest Money Deposit) agreeing to pay an amount not exceeding 10% (including the undertaking already given for Earnest Money Deposit) of the value of the contract in case of any breach or violation of the contract. [(Per) B.P. (FB) No.25 (Accounts Branch) Dt.20-9-97]</p> <p>3. In the case of Civil Works Contract, 2% of the value of the contract (including Earnest Money Deposit paid already) shall be paid in cash as Security Deposit. In the case of building works wherever the response to the Tender Call is poor, the competent authority may permit the tenderer to pay the Security Deposit in three instalments by recovery from the first three consecutive bills.</p> <p>Further, 5% of the value of the work done will be recovered from each bill as withheld amount.</p> <p>If the security deposit in cash is not paid within the time frame stipulated in the contract, penal interest at Board's borrowing rate will be levied for the delayed period. [(Per) B.P. (FB) No.34 (Accounts Branch) Dt.24-10-97]</p>
(c)	<p>Write about the operation guidelines for Distribution system? (Distribution Code – P11) (4)</p> <p>Operation Guidelines for Distribution system</p> <p>The procedures and practices to be followed by the Licensees and consumers whose electric lines and electrical plants are connected to the Licensee's distribution system for safe and efficient operation of their respective systems are;</p> <ol style="list-style-type: none"> 1. Demand Estimation : The Licensee shall provide to the SLDC / SSLDC, its projection of demand on a year ahead, month ahead and day ahead basis. The time frames for such submission, as set out in the TNEGC shall be adhered to by the Licensee. The SLDC or SSLDC shall be the agency to receive the details from the licensees or issue directions to the Licensees as the case may be in line with the requirements prescribed in this chapter on Operational Guidelines and as per the provisions of the relevant Code. On demand, the concerned consumers shall furnish these data to the Licensees. The Licensee shall estimate its hourly and daily demand on the basis of relevant load curves drawn on a day ahead basis, subject to modification depending upon information received from any specific consumer or caused by any untoward incident / contingency. 2. Schedule Shutdown Programs : The Licensee shall furnish the proposed (planned) outage (scheduled shutdown) programs to the STU / SLDC as specified in TNEGC. Planned outage programs shall furnish clearly the details of the electric lines / cables and the equipments of the distribution system that will be taken out of service, and other details of the planned

interruption namely the date, duration and quantum of load that may be limited / restricted at any interconnection during this planned interruption.

3. Contingency Planning : The contingencies in the distribution system are mainly due to :
 - (a) Total or partial blackout of intra transmission or inter transmission network . (Loss of generating sources)
 - (b) Failure of network components like breakers, lines and UG cables in the transmission system.
 - (c) Breakdown of components in the distribution system.
The procedure to be followed during such contingencies for the restoration of supply is detailed in the sections to follow
4. Intra / Inter Transmission System outage :In regard to the restoration of supply during the total black out at any point of interconnection, the Licensee shall abide by the black start procedures framed by the STU / SLDC. Likewise, the Licensee shall follow the guidelines provided by the STU during the outage of the apparatus or lines / cables in the above networks. The licensees may also follow an approved Demand Side Management, Load shedding, rolling blackouts and other measures.
5. Distribution System Outage: The interruption of the power supply to any part of the distribution system lasting more than an hour, due to the breakdown of any part of the distribution system/its components, may be termed as distribution system failure and the Licensee shall evolve a suitable supply restoration procedure for such distribution system failures under intimation to the Commission.

- (d) The six bimonthly current consumption charges of a LT commercial service are given below. The security deposit available for the service is Rs. 20,578/=. Calculate the additional security deposit to be collected.

(Supply code chapter (2) para 5.5)

(4)

Month	Assessed amount in Rs.
7/2016	17,545
9/2016	18,234
11/2016	20,378
1/2017	15,445
3/2017	21,386
5/2017	16,345

Average assessed amount = $109333/12$ = Rs.9,111/=

Required security deposit = 9111×3 = Rs 27,333/=

Additional security deposit to be collected = $27,333 - 20,578$ = Rs. 6,755/=

(e) Write about the rules to be followed while digging of pole pits ?
(Safety Manual – P68) (4)

கம்பக் குழிகளை மிகவும் முன்னதாகத் தோண்டுதல் :
தோண்டப்பட்ட குழிகளை உடனே மூடாமல் விடக்கூடாது.
ஆதலால், கம்பங்களை நிறுத்துவதற்கு அதிக முன்னதாகக் குழிகளைத்
தோண்டுதல் கூடாது.

கம்பக் குழிகளை முடிவைத்தல்
நகர அல்லது கிராம எல்லைக்குள் தோண்டப்பட்ட குழிகளில்
தற்செயலாய் ஒருவரும் விழாமல் இருக்க, அவற்றைப் பலகைகள் கொண்டு
மூடவேண்டும்.

வெடிமருந்து உபயோகித்தல்
விநியோக மின்பாதைகள் (distribution lines) அமைக்கத் தோண்டும்
குழிகளைக் கூடுமானவரை வெடிமருந்து உபயோகிக்காமலே தோண்ட வேண்டும்.
ஏனெனில், வெடி வைத்தல் அருகிலுள்ள கட்டடங்களுக்கும் நடமாட்டமுள்ள
சாலைகளுக்கும் அபாயத்தை உண்டாக்கும். வெடிவைத்தல்
இன்றியமையாததெனின், பின்வரும் முக்கிய முன்காப்புகளைச் செய்தல்
வேண்டும்.

1. மூங்கில்களாலும் பலகைகளாலும் குழிகளை மூட வேண்டும்.
2. சாலையில் அதிக நடமாட்டமில்லாதபோது வெடி வைக்கவேண்டும்.
3. சாலையிலுள்ள நடமாட்டத்தைத் தடுக்க இருபுறமும் ஆட்களை
வைக்கவேண்டும். தேவையான குறைந்த நேரத்துக்குத்தான் நடமாட்டத்தைத்
தடுக்கவேண்டும்.

8 (a) What are the principle parts of the On load tap changer and explain it. (Code of
Technical instructions / P 68) (10)

On-load Tap Changer

On load tap changer facilitates changing of secondary voltage without
interrupting the load current. The principle parts of the on-load tap changer are:

1. Diverter switch oil tank
2. Diverter switch
3. Transition resistors
4. Tap selector
5. Drive mechanism

1. Diverter switch oil tank

The diverter switch which performs the function of load transfer from
one tap to another is housed in its own oil tank. The oil in this tank is kept
separate from the transformer oil owing to the fact that due to arcing that
takes place in the diverter switch the diverter oil gets carbonised.

The diverter switch oil tank is made of either paper laminates or fibre
glass material. It has to withstand the full working voltage to earth. This oil
tank is connected to a small oil conservator to ensure that the diverter switch
oil tank is full of oil at all times. A protective surge relay is provided in
between the diverter switch oil tank and its conservator to prevent serious
damage to diverter switch in case of any fault inside the diverter. The
operating of relay isolates the transformer from circuit.

2. Diverter switch

This is the most important part of the tap changer. It has a stored energy unit, main contacts, transition contacts and transition resistors. By the high speed snap action of the stored unit, the load transfer takes place from one tap to another from the main contact to another main contact after passing through the transition contacts. The total duration of the switching operation from departure from one main contact to arrival at the other is about 0.04 second (i.e. 2 cycles). Since the change takes place by means of the stored energy unit there is remote possibility of the contact being in between the taps once the tap changer operation is initiated it is completed without break.

3. Transition Resistors

Transition resistors are of high grade nickel-chromium alloy wire wound on porcelain carriers. The resistors are all immersed in oil and therefore they are cooled rapidly when they carry the load current during the transition time.

The on-load tap changer fitted with resistors is an improved version to the tap changer fitted with reactors. The tap change action in case of resistor type can be very fast and the arc extinction is effective since the current through the switch is always in phase with the recovery voltage irrespective of the power factor of the transformer load.

4. Tap Selector

The function of the tap selector is to prepare the tap change by connecting the diverter switch to the required tap on the transformer. During this stage the contact system of the diverter switch stays in its original position until the tap selector has arrived at the new tap. The change of tap takes place only when the diverter switch operates.

The tap selector contacts which are connected to the transformer winding taps are arranged one above the other. Alternate connection of even numbered and odd numbered tap selector contacts to the diverter switch contacts takes place. With this arrangement the tap selector contacts for each phase are divided into two groups, odd numbered contacts 1,3,5,..... and even numbered contacts 2,4,6,8,..... During tap change the diverter switch only effects the no-break transfer of the current from the odd tap to even or vice versa as per the selection made earlier by the tap selector. The entire tap selector assembly is inside the oil of the main tank of the transformer.

5. Drive Mechanism

The on-load tap changer is operated by a motor drive unit mounted outside the transformer tank. Tap change operation can also be effected by means of a crank handle. When the change is done manually, power supply to the motor is automatically disconnected.

The motor drives a vertical shaft that goes upwards from the drive

mechanism box to a bevel gear unit fixed on the edge of the transformer cover. This bevel gear inturn is connected to the tap changer head by means of horizontal shaft. The stored energy unit which effects the tap change is at the tap changer head.

The tap change motor can be operated either from the local drive mechanism box or from the control room through the remote tap change control panel (RTCC Panel)

(b) What are the functions and duties of Central Electricity Authority? (Electricity Act 2003/P47) (10)

The Authority shall platform such functions and duties as the Central Government may prescribe or direct, and in particular to –

- (a) Advise the Central Government on the matters relating to the national electricity policy formulate short-term and perspective plans for development of the electricity system and co-ordinate the activities of the planning agencies for the optimal utilization of resources to subserve the interests of the national economy and to provide reliable and affordable electricity for all consumers;
- (b) Specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
- (c) Specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;
- (d) Specify the Grid Standards for operation and maintenance of transmission lines;
- (e) Specify the conditions for installation of meters for transmission and supply of electricity;
- (f) Promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
- (g) Promote measures for advancing the skill of persons engaged in the electricity industry;
- (h) Advise the Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority, the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;
- (i) Collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
- (j) Make public from time-to-time the information secured under this Act, and provide for the publication of reports and investigations;
- (k) Promote research in matters affecting the generation, transmission, distribution and trading of electricity;
- (l) Carry out, or cause to be carried out, any investigation for the purposes of generating or transmitting or distributing electricity;
- (m) Advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in co-ordination with any other Government, licensee or the generating company owning or having the control of another electricity system;

	<p>(n) Advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and discharge such other functions as may be provided under this Act.</p>
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