**Chapter 3**

**Information Gathering**

**3.1 Introduction**

Information gathering is an indispensable and substantial part of analyzing a system. To know, analyze or discuss about a system, firstly the information about the system should be found out. Information gathering requires a person who knows what information is to be collected, where these would be found and in which way the information is to be gathered. To collect information, the art of information gathering is to be mastered. This means that information gathering is not an easy or routine work. Proper preparation, experience and training provides fruitful information gathering.

Though information gathering does not require any standard rule, it is important to do it accurately, methodologically, under right conditions and without minimum interruption to the user personnel. Some important tools are used to gather information. By proper use of these tools, the information gathering becomes easy, methodological and required information can be collected from various sources.

Here we are going to analyze the system NESCO or Northern Electricity Supply Company. The required information to analyze the system using four tools have been collected.

**3.2 Different tools used in Information gathering**

All the information collected from the organization are presented in detail in this section using different tools.

**3.2.1 Forms, documents and statistical chart of NESCO**

First tool for gathering information is collecting information from the existing system, forms, documents or any statical explanation of the system. As the problems are more or less same for any system. We can get a clear idea about the ongoing processes of the organization from the forms and documents.

Several forms and documents are collected from which we can get some information about the working process of NESCO. These are the wiring inspection report in section 3.2.1.1, wiring certificate form in section 3.2.1.2, disconnection form in section 3.2.1.3, reconnection form in section 3.2.1.4, meter exchange form in section 3.2.1.5, officer’s evaluation form in section 3.2.1.6, application form in section 3.2.1.7 and load calculation document in section 3.2.1.8 respectively.

**3.2.1.1 Wiring Inspection Report**

Wiring Inspection Report is the form to take new connection in any residential area or any industries. It elaborately discusses about the connection and the wiring system.

Who is the applicant, how is the wiring condition, how many meters, how many phases, the address of the user, the transformer pole number all things are combined here in the report.

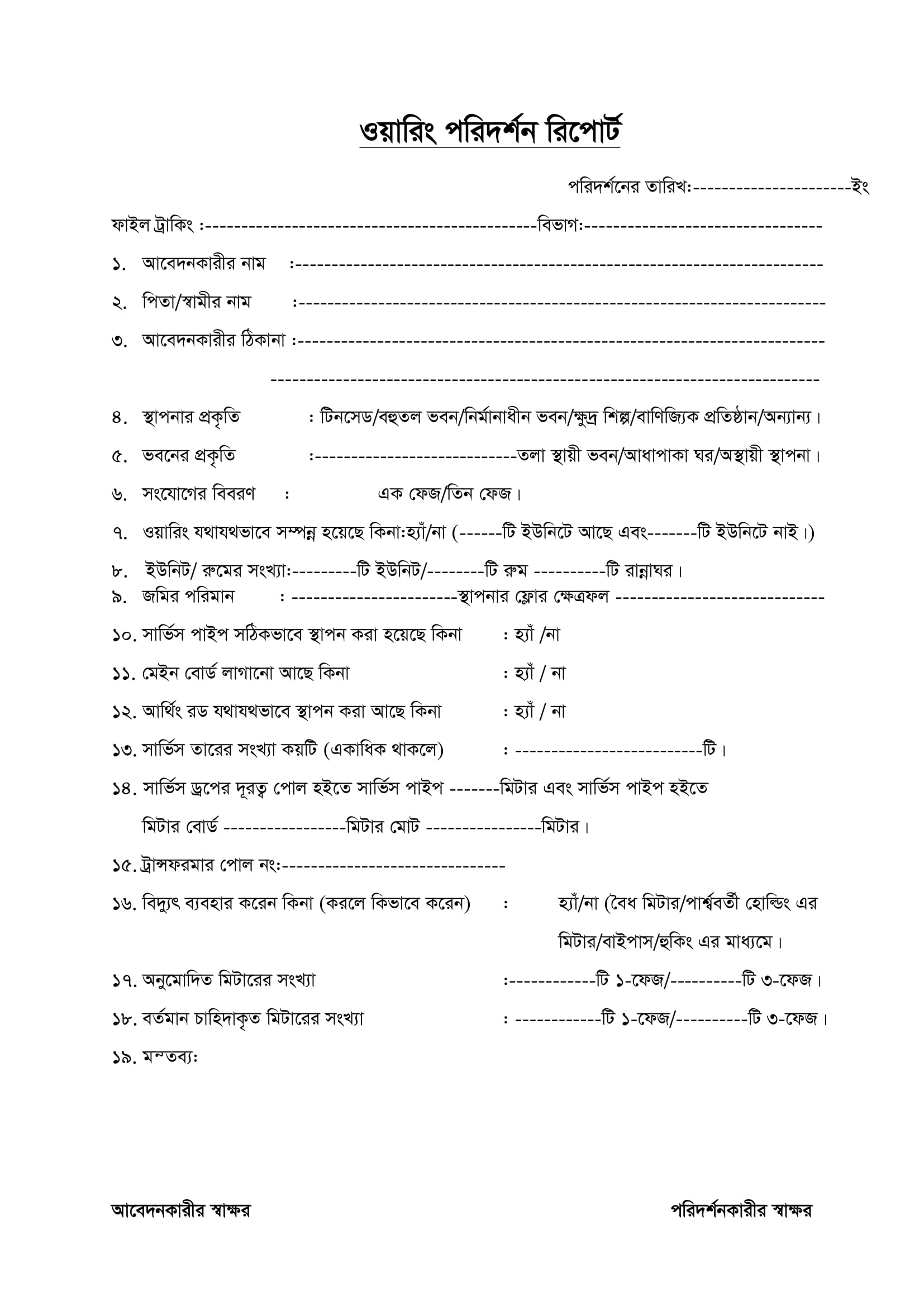
****The figure 3.2.1.1(a) shows the wiring inspection form in detail.

Figure 3.2.1.1 Wiring Inspection Report

**3.2.1.2 Wiring Certificate Form**

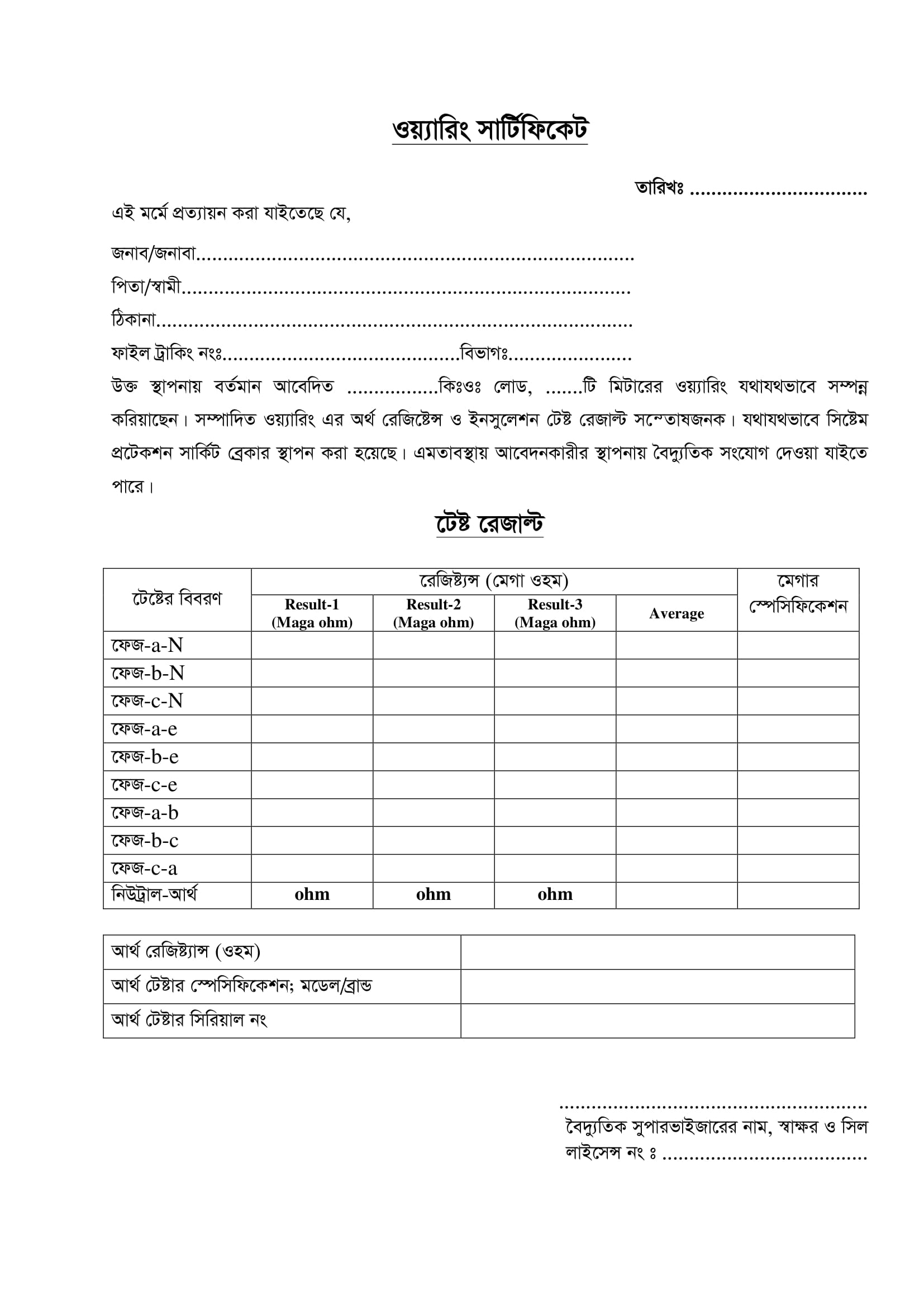
****Wiring certificate form contains the ownership of meter by the people and the connections and wiring system are briefly discussed in the form. The test result after the wiring test is also attached in the form. Figure 3.2.1.2 contains the wiring certificate.

Figure 3.2.1.2 Wiring Certificate Form

**3.2.1.3 Disconnection Form**

To disconnect any electricity connection or meter, a form is fill up by the user which contains the details of meter, customer number, the reason of disconnection etc. After applying is checked and approved by the authority of NESCO.

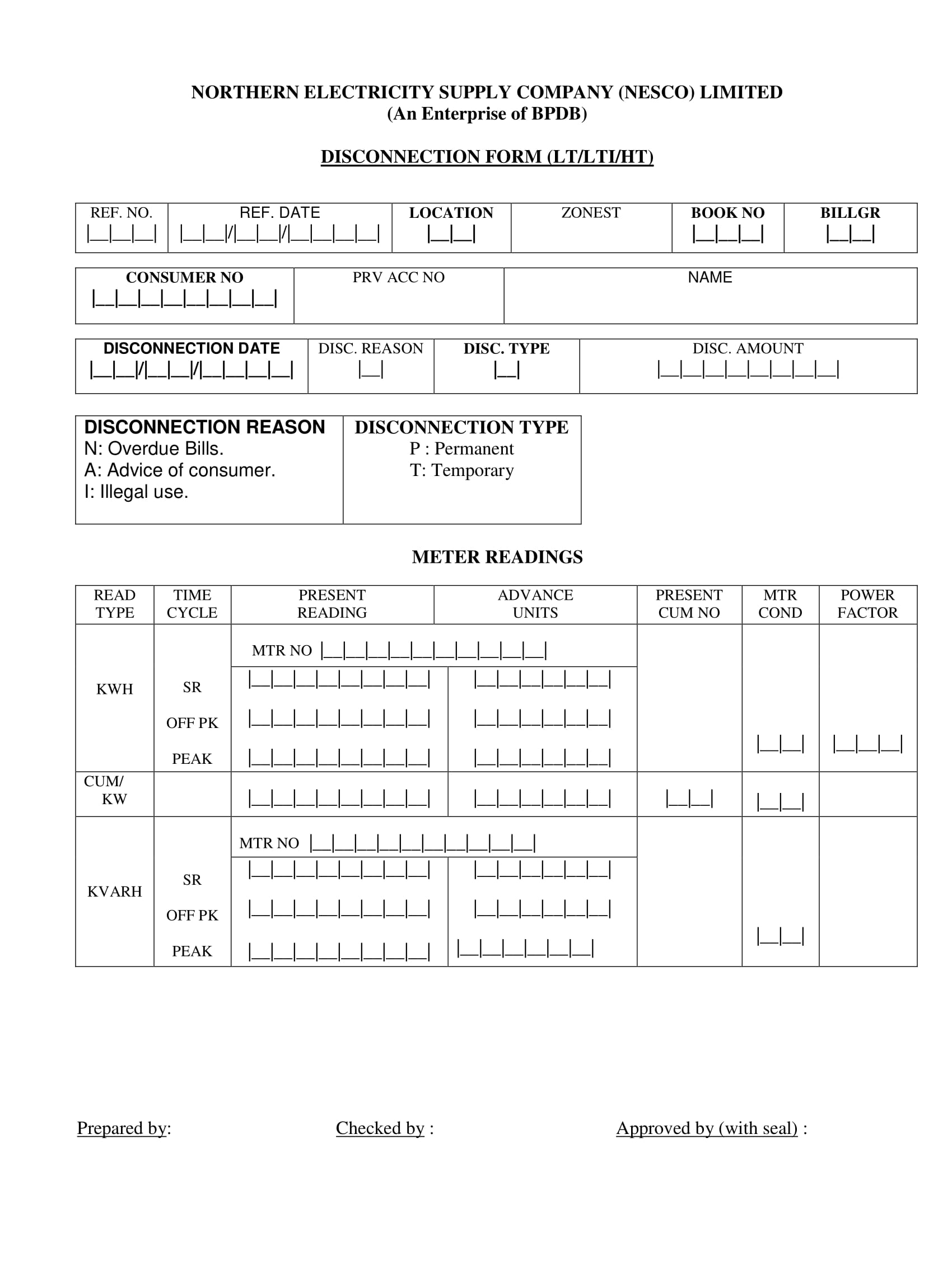
Figure 3.2.1.3 contains the disconnection form.

Figure 3.2.1.3 disconnection form

**3.2.1.4 Reconnection Form**

If connection is expired or cut down for any reason, then this reconnection form is used to again connect the meter. After applying is checked and approved by the authority of NESCO.

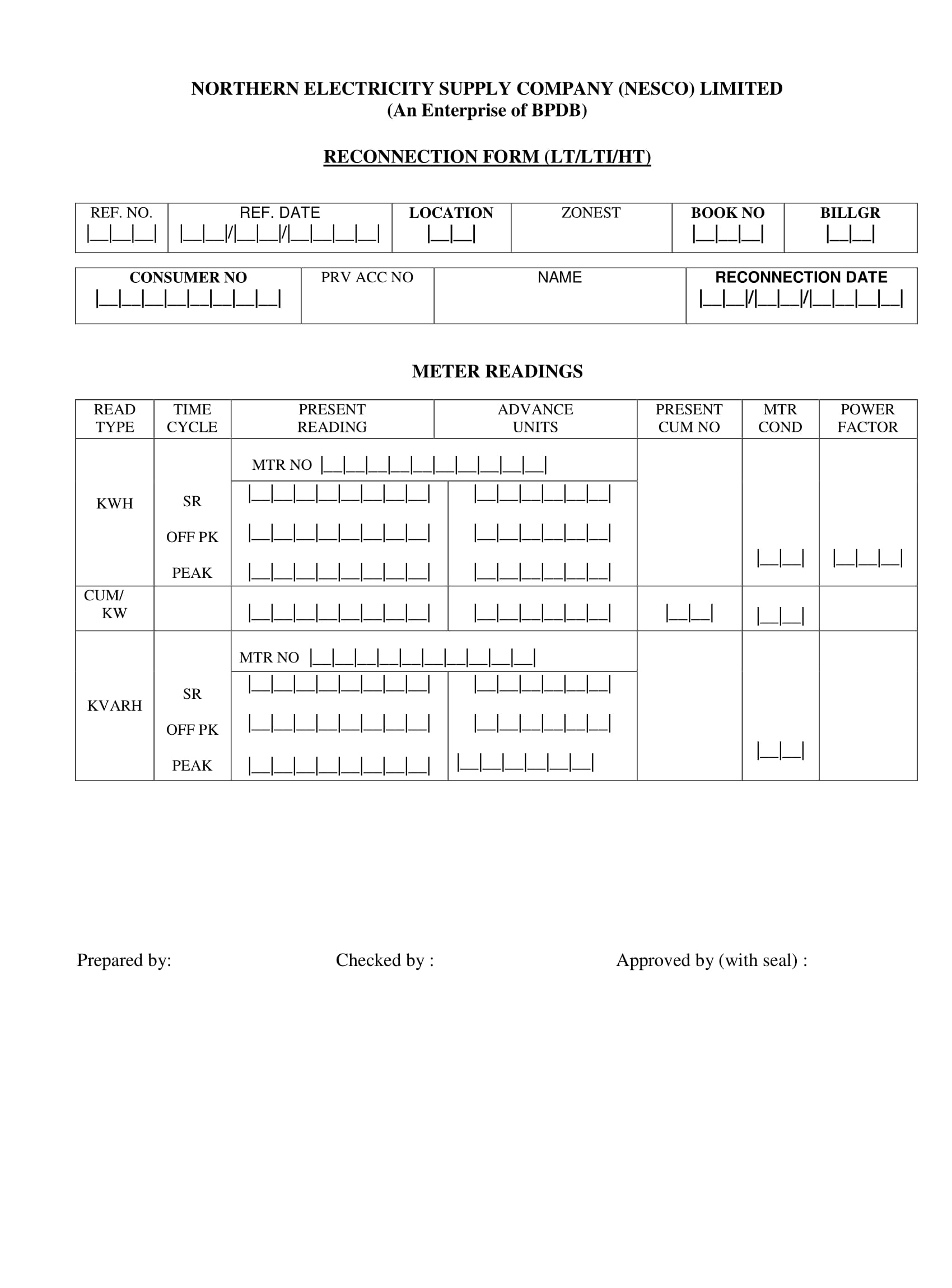
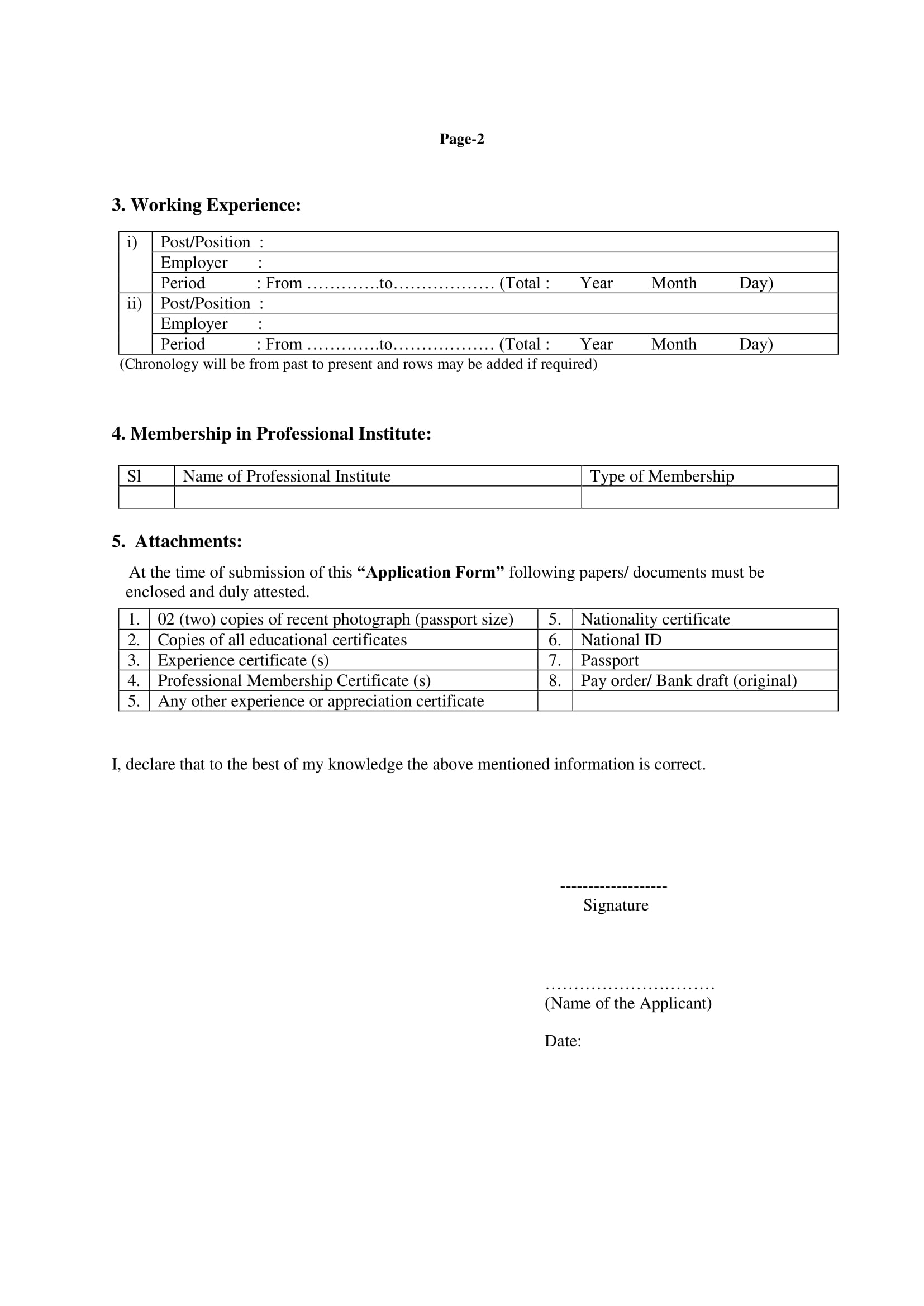
Figure 3.2.1.4 contains the reconnection form.

Figure 3.2.1.4 reconnection form

**3.2.1.5 Meter Exchange Form**

The faulty meters are needed to be exchanged with the new one. To exchange meters this form is filled up which contains the details of the old meter, new meter and the customer id or number who is willing to exchange etc.

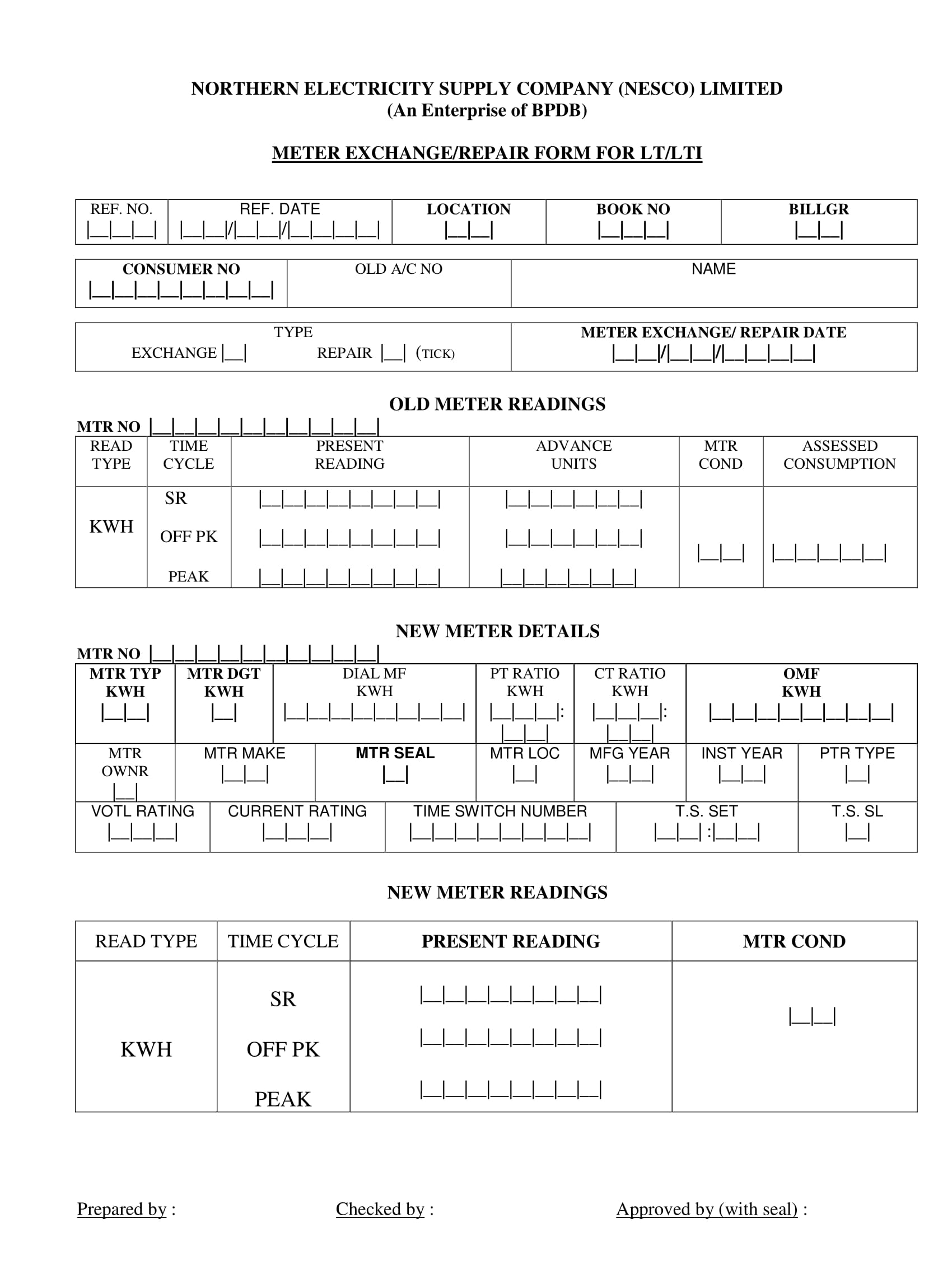
Figure 3.2.1.5 contains the meter exchange form.

Figure 3.2.1.5 meter-exchange form

**3.2.1.6 Officer’s Evaluation Form**

By the use of this form, the evaluation of the officials is done depending on their discipline, sincerity to job, personality, service and all other parameters.

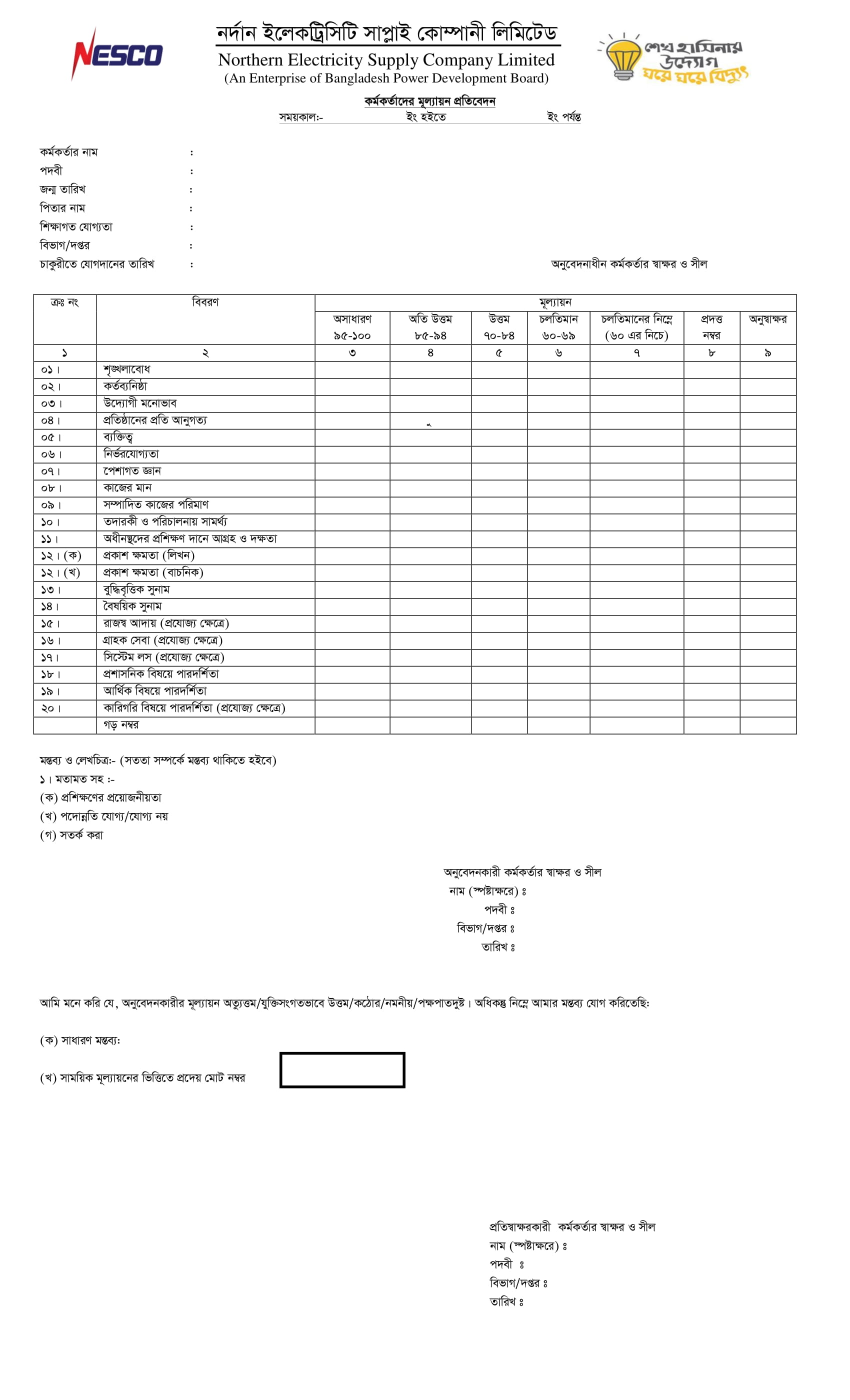
Figure 3.2.1.6 contains the officer’s evaluation form.

Figure 3.2.1.6 officer’s evaluation form

**3.2.1.7 Application Form**

To apply for any post in NESCO, this form is filled up by the applicants. This form contains the details of the applicants about his personal information, educational information and all background.

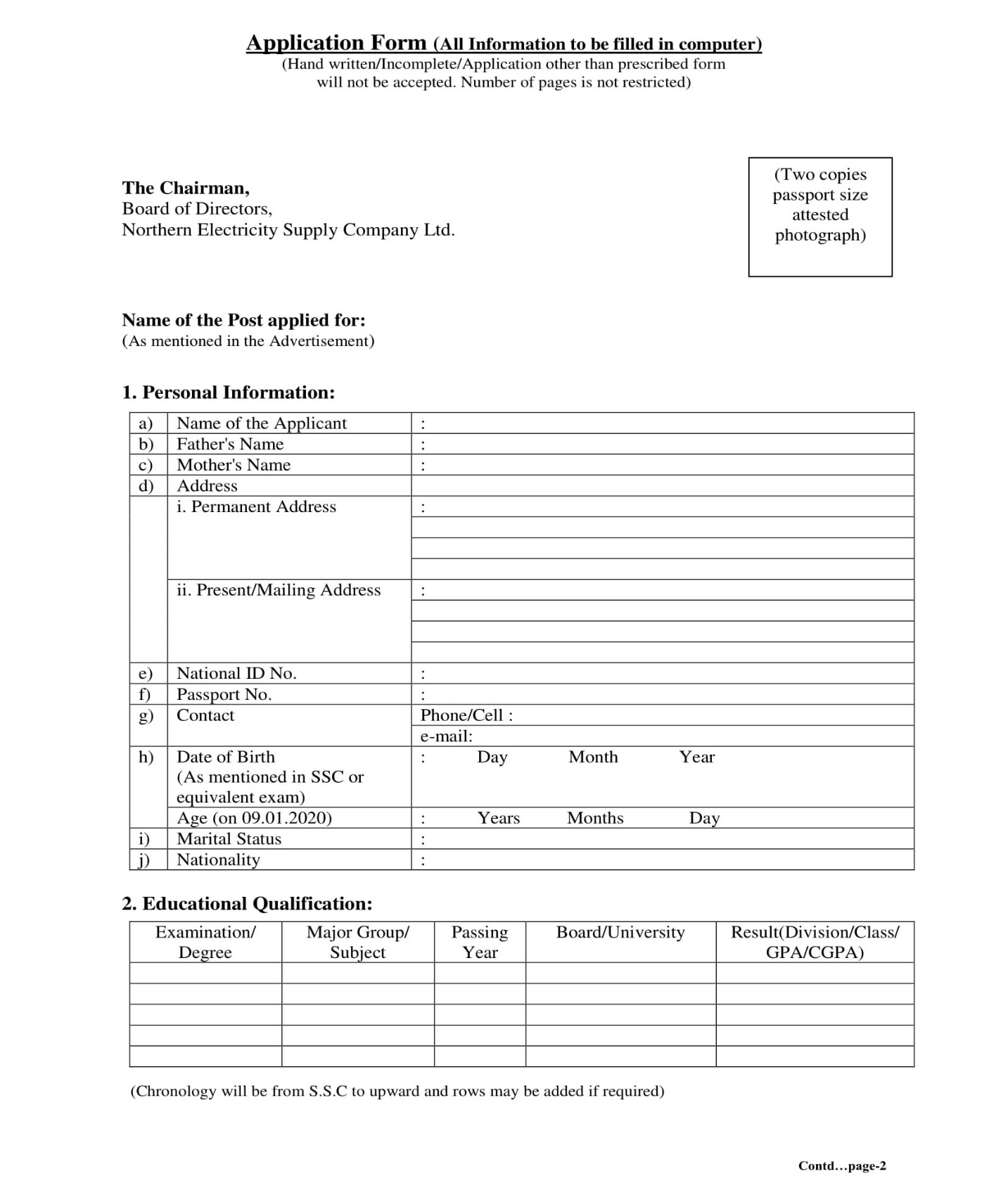
Figure 3.2.1.7(a) and 3.2.1.7(b) contain the application form.

Figure 3.2.1.7(a) application form

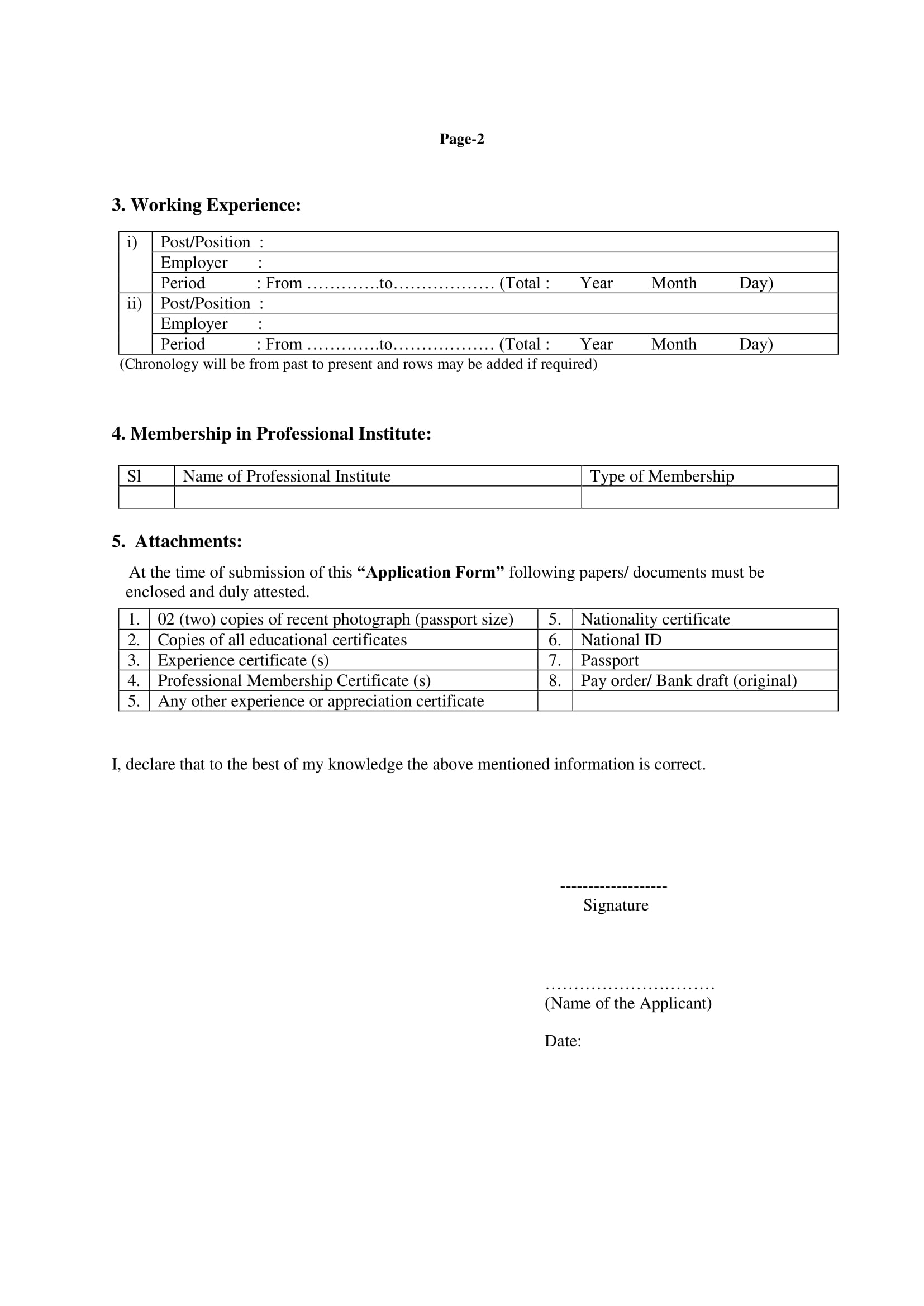
****

Figure 3.2.1.7(b) application form

**3.2.1.8 Load Calculation document**

This form or documents helps to calculate the load to which power is distributed. Actually, this form is filled up by the contractor.

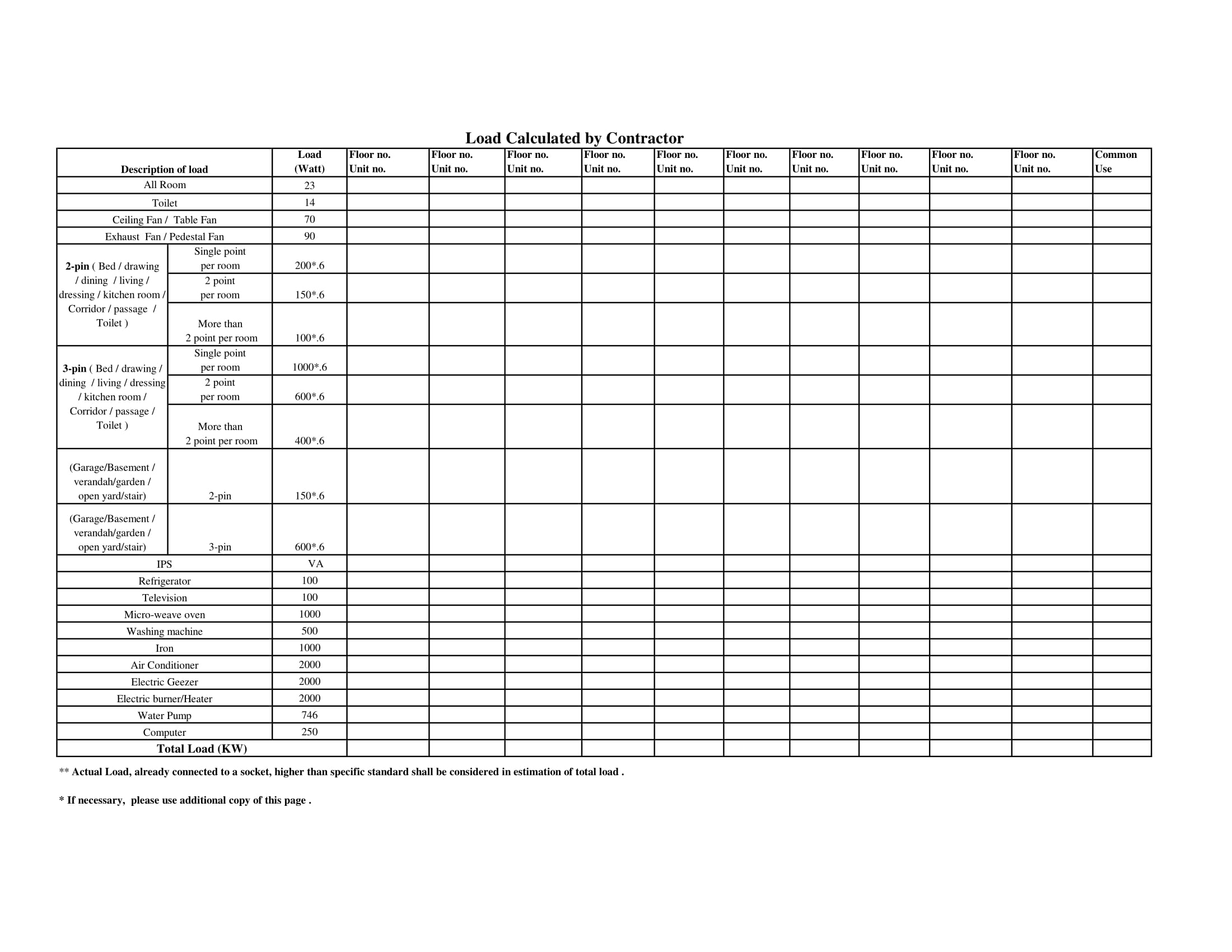
Figure 3.2.1.8 the load calculation by contractor.

Figure 3.2.1.7(a) application form

**3.2.2 Onsite observation on working process of NESCO**

Onsite observation is one of the main tools of information gathering. By this process the real system can be visualized more clearly and can be got attached with the system which opens the door to know more about the system. The observer should be experienced and intelligent enough to focus on the working procedure and gather information. For this, he or she should keep in mind the following questions.

* What kind of system we are observing.
* The people running the system and who are important people of the system.
* The history of the system and the evolution of the system to current stage.
* How the system responses to internal and external crisis.

Before observation, the observer should know about different types of observation. Among them four alternative observation methods are used usually.

* **Natural or Contrived**

In natural observation, the observation takes place in the employee’s place or in the system but in case of contrived observation, it is set up by the observer or in a place like laboratory.

* **Obtrusive or Unobtrusive**

In obtrusive observation, the respondent or the person being observed knows that he or she being observed. In unobtrusive observation, the respondent does not know about it.

* **Direct or Indirect**

In direct observation, the observer directly observes the subject or system but in case of indirect observation, an intermediate mechanical device like recorder or camera is used to observe.

* **Structured or Unstructured**

In structured observation, the observer actually records or gather information of a particular or specific action but in case of unstructured observation, the observer observes whatever are pertinent or visible to him at the time of observation.

We have observed the system several times and our observations were natural, obtrusive, direct and unstructured. Some of the observations are detailed below-

1. During our observation, we found that all the employees are busy with there work. We met with the deputy general manager. He was also busy and involved in an online meeting with the officials. He was very cordial to talk with us. he asked us about our need. Then we inform him about the report and sked different questions. He answered clearly and gossip with us. during that period also, the employees came to him for different directions and he directed them.
2. We also observed the office thoroughly and they showed us their personal server. It was highly secured and the doors were secured by finger print of the employees only. They showed us their whole server system including the power supply to the servers, cooling systems, the chambers, the large CPUs, large memory device etc. One employee was constantly working in the control room to observe all the time whether any fault is aroused or not.
3. We again observed the supply system and the large machineries of the system. The liable person was there to control the system. All the employees and officials were busy with their respective works. But they have a deficiency in manpower. As there was not required manpower to control the whole system, the appointed persons were so busy to handle all the works properly. ICT department also need manpower as it has started a few years ago but advancing with large progress.
4. All the officials and employees behaved very good with us. they were willingly giving different information about the system when they came to know about our visit. The deputy general manager was also very cordial and gossiped a lot with us. The respected engineer showed us different portions of their server with enthusiasm and described every little works.

**3.2.3 Face to face interview**

Interview is a face-to-face question answer session between the interviewer and the interviewee. The person being interviewed is interviewee and who is responsible to take interview is interviewer. Interview is the tool by which we can collect such information which cannot be collected by onsite observation or from literature. By this tool only the information is collected but also the quality and authenticity of the information is also verified.

We took interview of some people of Northern Electricity Supply Company to gather more information about the system. Among them the interview of deputy general manager and analyst is described here.

**To the Deputy General Manager**

At first, we met deputy general manager of ICT department of NESCO. He was a very busy but cordial person. He warmly welcomed us to know any kind of information and talked about the details.

1. **Interviewer:** In which region your organization supply electricity?

**Interviewee:** NESCO supplies electricity in northern region of Bangladesh specially in different districts of Rajshahi and Rangpur divisions.

1. **Interviewer:** Are you satisfied with the performance of NESCO?

**Interviewee:** Yes. It distributes electricity as per need and power generation different grids. The power it gets from the national power grid is properly distributed to the users.

1. **Interviewer:** Do you think your organization is corruption free?

**Interviewee:** Yes, of course. We try to maintain all things with proper documents.

1. **Interviewer:** What do you think about the recent load shedding?

**Interviewee:** This is very unwanted. But for the scarcity of natural gas as the production of power is less, so we have to maintain with that through load shedding.

1. **Interviewer:** How do NESCO handle this load shedding?

**Interviewee:** Actually, a schedule is provided that which region will go through load shedding in which portion of day. If any emergency occurs, then it is declared forehand and user made known by miking of notice.

1. **Interviewer:** Who takes the important decisions?

**Interviewee:** We form a board of higher officials and through meeting the decisions are taken.

1. **Interviewer:** Do the users get service properly? What do you think?

**Interviewee:** The users can express it better. But I think, yes, they do.

**To the Analyst**

1. **Interviewer:** Is this organization fully digitalized or not?

**Interviewee:** Almost. Most of our works are handled now through online system.

1. **Interviewer:** When has it started?

**Interviewee:** This organization started its job from October, 2016. At that time, it was not so digitalized and handled the billing system and others by some 3rd party organization. On March, 2018 ICT department was established to maintain all online function internally, preparing own software and not to depend on any 3rd party.

1. **Interviewer:** Which portion of the organization is digitalized?

**Interviewee:** Actually, if I say, it’s almost 99%. We have our own software, database and online services. On last month, we have collected 99.79% of our total bill through online.

1. **Interviewer:** Does NESCO have its own server?

**Interviewee:** Yes, of course. NESCO has a tier 3 data center which does not require a total shutdown during maintenance.

1. **Interviewer:** who are involved I maintaining the servers?

**Interviewee:** NESCO itself. The employees work here are involved.

1. **Interviewer:** What are the functions of prepaid meter?

**Interviewee:** The user can pay before using it. Then as per the use, the money is charged an meter shows the amount of billing.

1. **Interviewer:** why should we replace post-paid meter by prepaid one?

**Interviewee:** It provides more advantages. All information is in online. Again, in case of postpaid meter, the reader may take inaccurate reading which can make complexity in paying bills by customers but in prepaid system, its totally free of that inaccuracy.

1. **Interviewer:** Is the money/electricity ratio of prepaid meter efficient?

**Interviewee:** Yes. It is maintained properly. Some money is taken at VAT or for other cost which as also same for the postpaid meter also.

1. **Interviewer:** How many consumers are using prepaid meter?

**Interviewee:** Almost 5 lakhs consumers out of 17 lakhs are now under this prepaid meter system.

1. **Interviewer:** Which type of meter is more preferred by the consumer?

**Interviewee:** In the early stage, people hesitate to take prepaid meter for inherent apathy to change. But now they are being smart and the users are increasing.

1. **Interviewer:** Is there any possibility to manipulate any meter related information online data?

**Interviewee:** No. the users can only access personal information on online and data safety is used for all user information.

1. **Interviewer:** how data security is provided in NESCO?

**Interviewee:** Privacy policy TR3 solutions is used which offers new security capabilities.

1. **Interviewer:** What are the odds in online payment?

**Interviewee:** People are not smart enough to cope-up with this new system. But day by day the user is increasing for online payment. To increase interest, 1% recharge is offered to the user.

1. **Interviewer:** In case of server down or failure what are the counter measures are taken?

**Interviewee:** If the server is failed the customer service-related functions will be pros-pond for some times but the supply will not be hampered. And it is recovered as early as possible.

1. **Interviewer:** Is there any online system for new meter or electricity connection program?

**Interviewee:** Yes. New customer can do all things on online.

1. **Interviewer:** Is there any way to inform the customers about remaining balance in prepaid meter?

**Interviewee:** Yes. If the bill goes down below 100 tk, the user gets a message.

1. **Interviewer:** Is there any online help desk?

**Interviewee:** Yes, we have. We have a call center in the number 16603.

1. **Interviewer:** What is the main lacking of this organization?

**Interviewee:** It’s main lacking is manpower. We need more expert people to cooperate to run the organization.

1. **Interviewer:** Within how many years the process will be fully online based?

**Interviewee:** I hope within 1.5 years.

1. **Interviewer:** What is the mission of this organization and the future agenda?

**Interviewee:** we have several missions which includes the digitalization of all activities, improve the quality of customer service and to deliver the power without any improperness.

**3.2.4 Information collection through questionnaire**

Questionnaire is actually an opinion poll by which many people’s response can be recorded at a time. It is provided as a form containing some questions related to the system. It is an alternative to the interview. In some cases, interview cannot work properly for many people to get the answer of some common questions. Again, many people feel comfortable to face questionnaire than interview. We have also collected some information through questionnaire from the worker of NESCO.

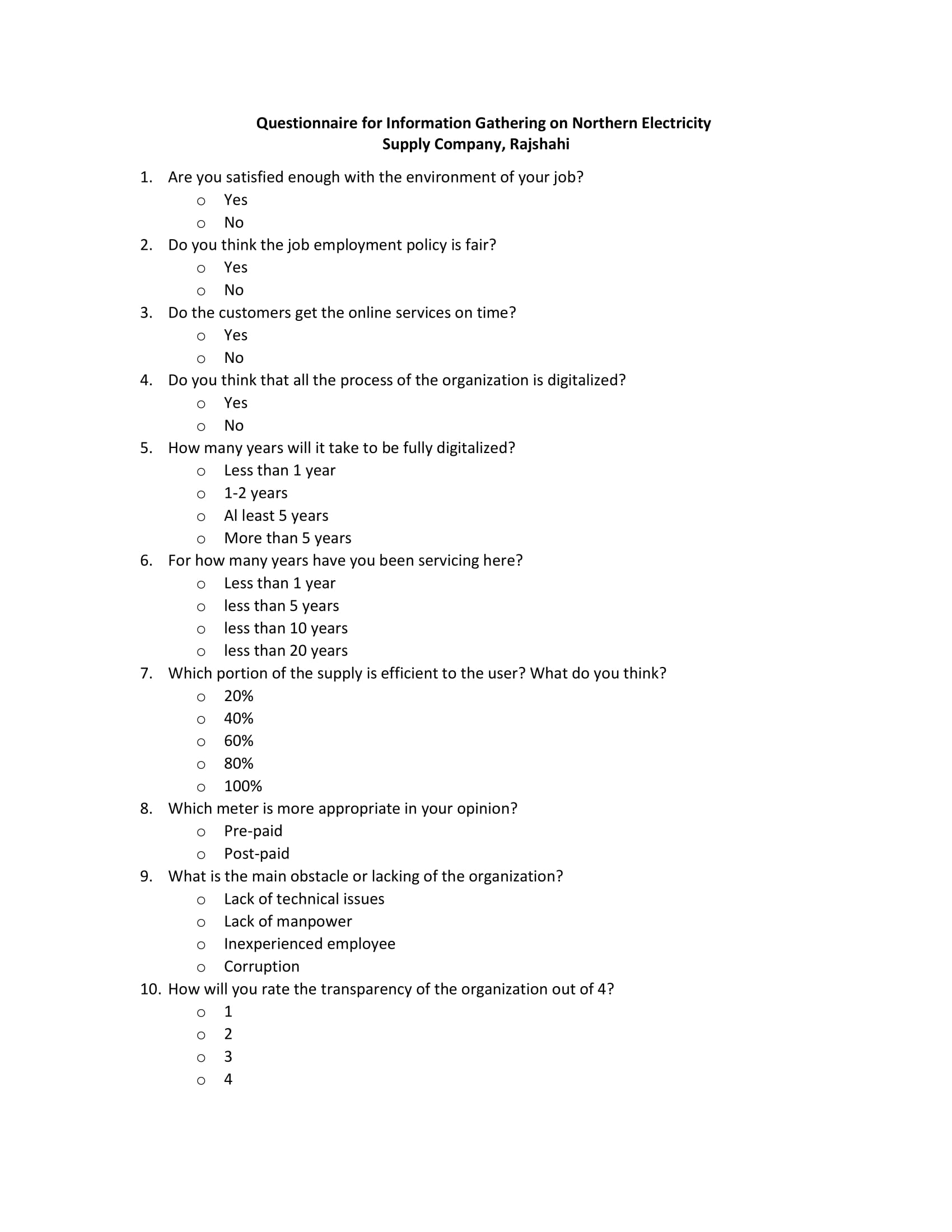


Figure 3.2.4 Questionnaires form

The questionnaire was distributed among 10 persons and their responses are recorded. The explanation of their responses is designed here.

**Table 3.1** Yes/No type questions

|  |  |  |
| --- | --- | --- |
| Question No. | YES | NO |
| 1 | 10 | 0 |
| 2 | 8 | 2 |
| 3 | 5 | 5 |
| 4 | 7 | 3 |

**Question No. 5:** Less than 1 year (40%), 1-2 years (60%).

**Question No. 6:** Less than 1 year (20%), less than 5 years (70%), less than 10 years (10%).

**Question No. 7:** 60% (5%), 80% (80%), 100% (15%).

**Question No. 8:** Pre-paid (60%), Post-paid (40%).

**Question No. 9:** Lack of technical issues (20%), lack of manpower (80%).

**Question No. 10:** 2 (10%), 3 (60%), 4 (30%).

**Chapter 5**

**Input/ Output and Forms Design**

**5.1 Introduction**

A form is a structured document with a fixed arrangement. It is a [document](https://en.wikipedia.org/wiki/Document) with spaces also named fields or placeholders in which to [write](https://en.wikipedia.org/wiki/Writing) or select, for a series of documents with similar contents. Forms are used to collect the required information in a logical, meaningful fashion for communication and pass to another entity. There are various types of forms. They are action form, memory form and report form. An action form is which tells the uses to do something. For example, application form, purchase orders etc. A memory form is the form to keep records. For example, inventory record, journal sheet etc. A report form guides the supervisor and administrator to do something. For example, balance sheet, operating statement etc.

Forms are the primary condition of data processing. If all necessary data are properly included in forms, future work with those data becomes easier. Forms must be well-defined so that the person for whom the forms were designed can easily and comfortably give required information. In recent times, digitized forms have become very popular.

**5.2 Form Design for Northern Electricity Supply Company (NESCO) Ltd.**

In the process of system analysis Northern Electricity Supply Company (NESCO) Ltd. several types of forms were required. As the main focus of the analysis was to work on user service in online, forms relating the user application for new supply, their feedback and complains were emphasized. Getting new supply process is a quite complex and lengthy process. From the start of user application to the end of providing supply, a lot of processes need to be performed. Moreover, after the supply there comes the issues like user data collection, security of data and some other process like collection of user feedback or complain, bill payment etc. For these purposes, a well and effective data management system must be established.

From the experience gained form the analysis, several forms seemed to give attention for better performance of the user application system, collection of feedback or complain processed by NESCO. As the analysis was highly focused on the user application system and their opinions, four forms for this purpose have been introduced here. One is for user application for getting supply, one is user identity checking, one is user complain and other is for user feedback. These forms were designed for keeping in mind about how the forms would interact with the central database. The forms contain one or more information such as details of user information is easily extractable from the database. These forms can be filled up online or any software can be introduced which will reduce the time and cost of user.

**5.2.1 User Application Form for Getting Supply**

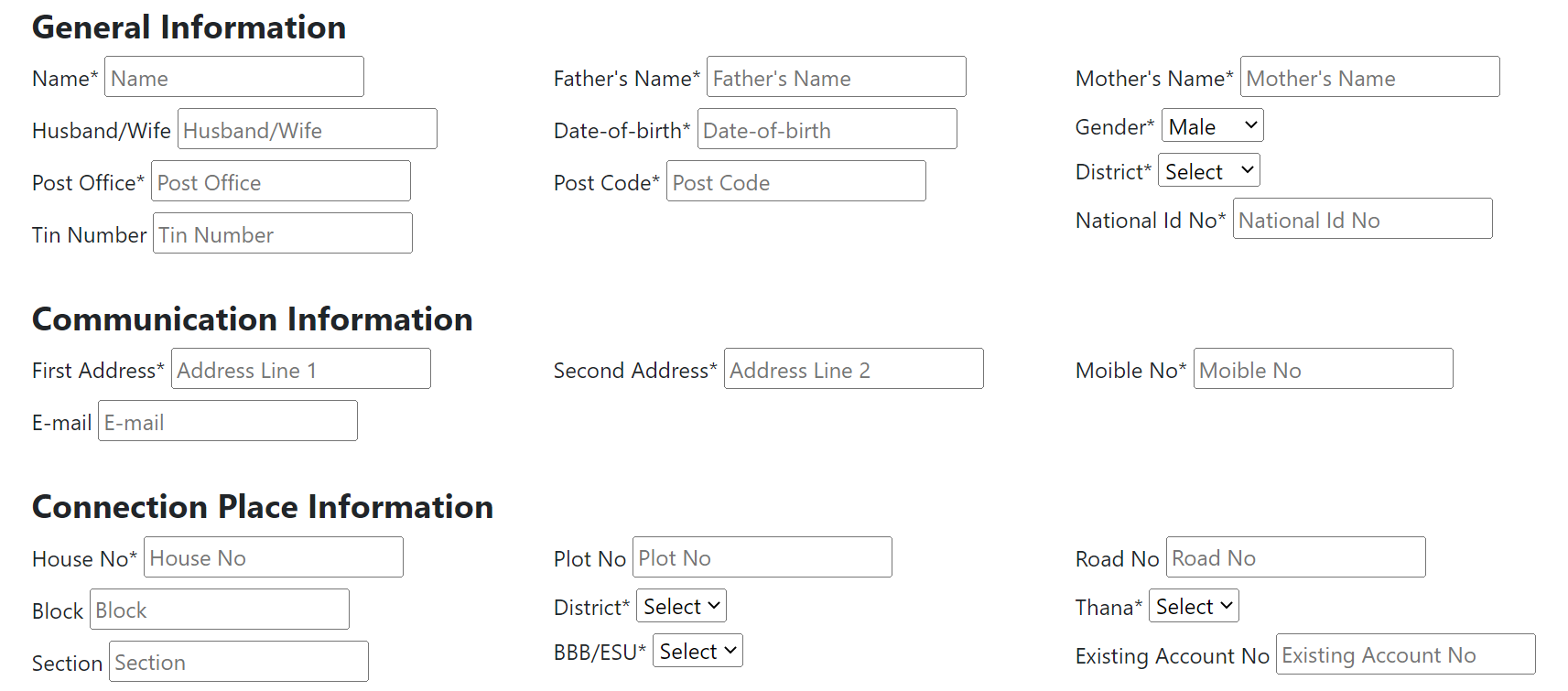
This form was designed for User application. The form contains information about users who got the supply. The fields of the forms are described below:

The form has 6 part. These parts are general information, communication information, connection place information, connection information, upload documents and number of connection. These parts are discussed below:

1. **General information:**
2. **Name:** Every user has name. Through this name new meter and supply is given. The name is stored in the central database.
3. **Father’s name:** Every user must have father’s name and this data is stored in the central database.
4. **Mother’s name:** Every user must have mother’s name and this data is stored in the central database.
5. **Husband/Wife:** If users have husband or wife, he or she fills this portion. But it is not mandatory. If users fill this portion, this data is stored in the central database otherwise not.
6. **Date of birth:** Every user has date of birth. Through this date of birth user age can be identified.
7. **Gender:** There are two types of gender. They are male or female. This information should be added to the form to make it more robust and specific.
8. **Post office:** User lives belong to a post office. This data identifies user’s post office.
9. **Post code:** User’s post office has post code. This data uniquely identifies the post office.
10. **District:** There are several types of district. User must select his or her own district.
11. **Tin number:** It contains the tax identification number.
12. **National id no:** It contains the national identity of user.
13. **Communication information:**
14. **First address:** It contains the user address where he or she lives.
15. **Second address:** It contains user another address. But it is not mandatory. If user provides, it stores in the central database otherwise not.
16. **Mobile no**: It contains user contact number through which authority can contact with him or her.
17. **E-mail:** It contains user e-mail address.
18. **Connection place information:**
19. **House no:** It contains user house no.
20. **Plot no:** It contains user plot no. But it is not mandatory.
21. **Road no:** It contains road no. where he or she lives.
22. **Block:** It contains the block no. of user.
23. **District:** There are several types of district. User must select one district where he or she lives.
24. **Thana:** There are several types of thana under a district. User must select one thana where he or she lives.
25. **Section:** It contains the section of user.
26. **BBB/ESU:** It contains the area.
27. **Existing account no:** It contains the user account no or bank account no.
28. **Connection information:**
29. **Type:** It contains several types of connection. They are temporary or permanent.
30. **Load:** It contains the load.
31. **Phase:** It contains different types of phase. They are single phase or three phase.
32. **Class:** It contains several types of class such as MT-4 Constriction, MT-4 General.
33. **Upload documents:**
34. **Applicant photo:** It contains user photo.
35. **Applicant signature:** It contains user signature.
36. **NID:** It contains user national id.
37. **Land Tax:** It contains user land tax documents.
38. **Number of connection:**
39. **Number of meter:** It contains quantity of meter which user wants.
40. **Submit:** When all data is properly recorded, this option will be used. Once this option is used, all inputs along with information of user would be stored in the database and the layout of the form will be refreshed for new entry.
41. **Reset:** When all data is not properly recorded, this option will be used to fill the form again. Once this option is used, all inputs will be removed.

**Northern Electricity Supply Company (NESCO) Ltd.**

**User Application Form for Getting Supply**



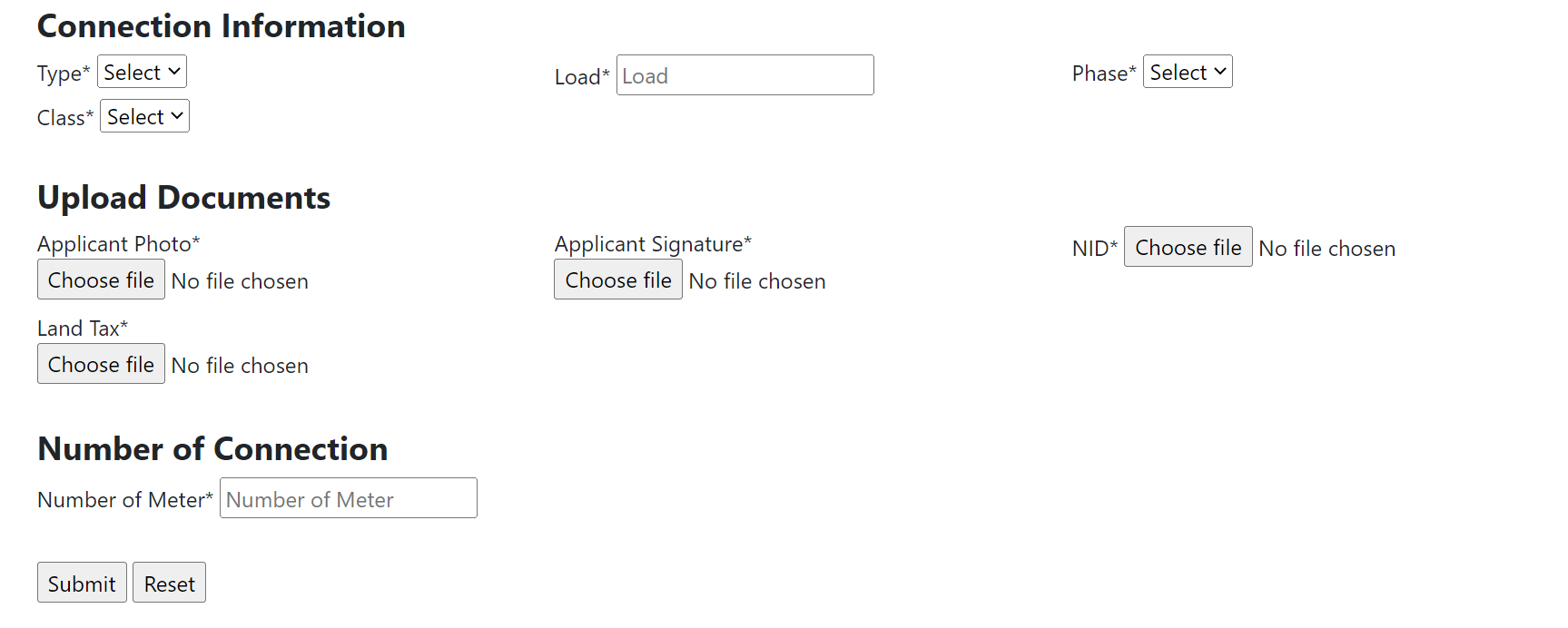


Figure 5.2.1 User application form for getting supply

**5.2.2 User Identity Checking Form**

The form is designed for logging in user account and to show details of current bills and other information. The fields description is given below:

1. **User id:** It contains user’s valid id. For logging in, user must provide their valid id.
2. **Area code:** It contains area code. User must provide it to login their account.
3. **Submit:** When all data is properly recorded, this option will be used. Once this option is used, user can see all information like current bill and others.
4. **Reset:** When all data is not properly recorded, this option will be used to fill the form again. Once this option is used, all inputs will be removed.

**Northern Electricity Supply Company (NESCO) Ltd.**

**User Identity Checking Form**

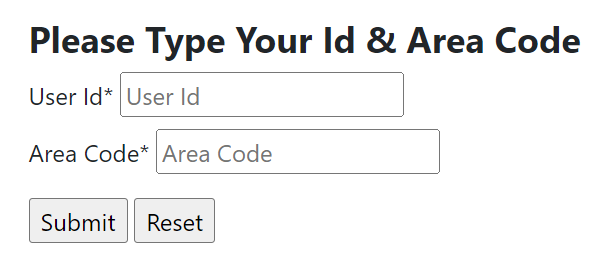


Figure 5.2.2 User identity checking form

**5.2.3 User Complain Form**

The form is designed for collecting user complain. The fields description is given below:

1. **User id:** It contains user id which is given by the institution.
2. **Name:** It contains user name which indicates who complains.
3. **E-mail:** It contains user e-mail.
4. **Mobile no:** It contains user mobile no through which authority can contact with him or her.
5. **Area:** It contains user’s living area.
6. **Address:** It contains user address.
7. **Message:** It contains the complains which is given by the user.
8. **Submit:** When all data is properly recorded, this option will be used. Once this option is used, all inputs would be stored in the database
9. **Reset:** When all data is not properly recorded, this option will be used to fill the form again. Once this option is used, all inputs will be removed.

**Northern Electricity Supply Company (NESCO) Ltd.**

**User Complain Form**

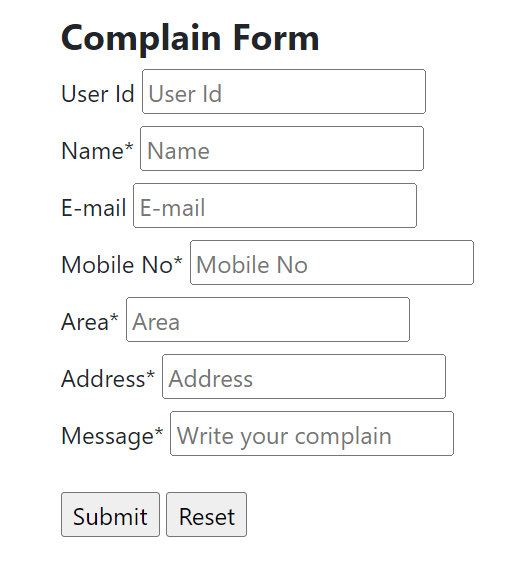
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Figure 5.2.3 User complain form

**5.2.4 User Feedback Form**

The form is designed for collecting user feedback or suggestion. The fields description is given below:

1. **User id:** It contains user id which is given by the institution.
2. **Name:** It contains user name which indicates who complains.
3. **E-mail:** It contains user e-mail.
4. **Mobile no 1:** It contains user mobile no through which authority can contact with him or her.
5. **Mobile no 2:** It contains user’s additional mobile no.
6. **Area:** It contains user’s living area.
7. **Address:** It contains user address.
8. **Message:** It contains the feedback or suggestion which is given by the user.
9. **Submit:** When all data is properly recorded, this option will be used. Once this option is used, all inputs would be stored in the database
10. **Reset:** When all data is not properly recorded, this option will be used to fill the form again. Once this option is used, all inputs will be removed.

**Northern Electricity Supply Company (NESCO) Ltd.**

**User Feedback Form**

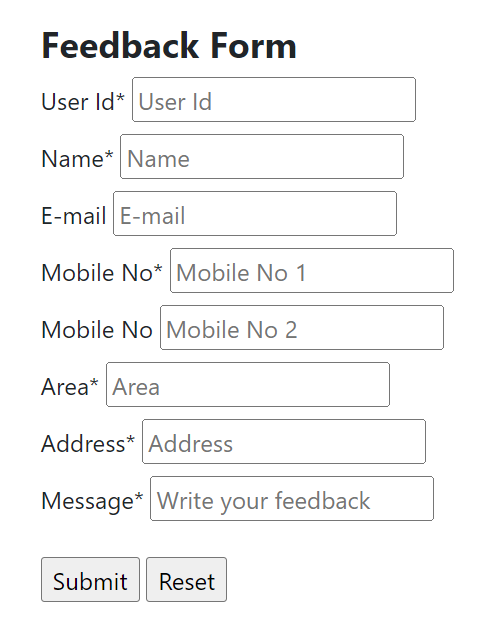
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Figure 5.2.4 User feedback form

**5.3 Conclusion**

The forms are essential medium for establishing an effective database system. An effective database system can ensure better performance for a system. As NESCO has to maintain a huge amount of data, the forms and database system must be effective and redundancy free. Every year the number of consumers is increasing and handling those amount of data is becoming quite complex process. Keeping those conditions under considerations, those proposed forms were designed.

But these forms need a robust and secured digital system with proper fail safe measurement. As the amount of data is increasing every year, these forms may be changed after a certain period of time. But as the forms are interacting with the central database, the modifications need to handle properly.

The forms are designed to process digitally. So, a digital system must be designed to implement those forms in use. The implementation can be done using a website or a software. The form will be interacting with the central database. But this process needs regular maintenance and qualified expert team. A technical support team can be appointed for this purpose.

**Chapter 6**

**Database Design**

**6.1 Introduction**

Digitalization of data requires databases. A database is a collection of interrelated data stored with minimum redundancy to serve many users quickly and efficiently. The general theme behind a database is to handle information as an integrated whole. The main objectives are to make information access easy, quick, inexpensive and flexible for the user. Northern Electricity Supply Company (NESCO) Ltd. requires database with several tables for user application information, user feedback and complain.

**6.2 Database for consumer**

For a consumer or user several information are required. We need to know personal information about the consumer, communication information, connection place information, connection information, no of connection etc. Another table is required for collecting consumer complain. Consumer’s some information and their complain are kept in the table. Another table is needed for customer feedback. This table contains the consumer’s feedback. Through feedback and complain the institution can solve problem. So, complain and feedback table is necessary.

Here, the database contains three tables for consumers. They are -

* CONSUMER INFORMATION
* COMPLAIN
* FEEDBACK

The table CONSUMER INFORMATION contains all personal information of the consumers. It contains name, father’s name, mother’s name, date of birth, gender, post office, post code, national id no, address, mobile no, email, house no, road no, thana, district, no of connection etc.

The table COMPLAIN contains some information. They are use id, name, email, mobile no, area, address, complain message.

The table FEEDBACK contains use id, name, email, mobile no, area, address, feedback message.

The table CONSUMER INFORMATION contains the personal information of each consumer. Data is accessed from this table. The relationship between the tables are given in the Entity relationship diagram (figure 6.1).

**6.2.1 Entity relationship diagram**

Entity relationship (ER) diagram of a database shows how tables are related to each other. We get a brief idea about the database from ER diagram. This diagram is given below:

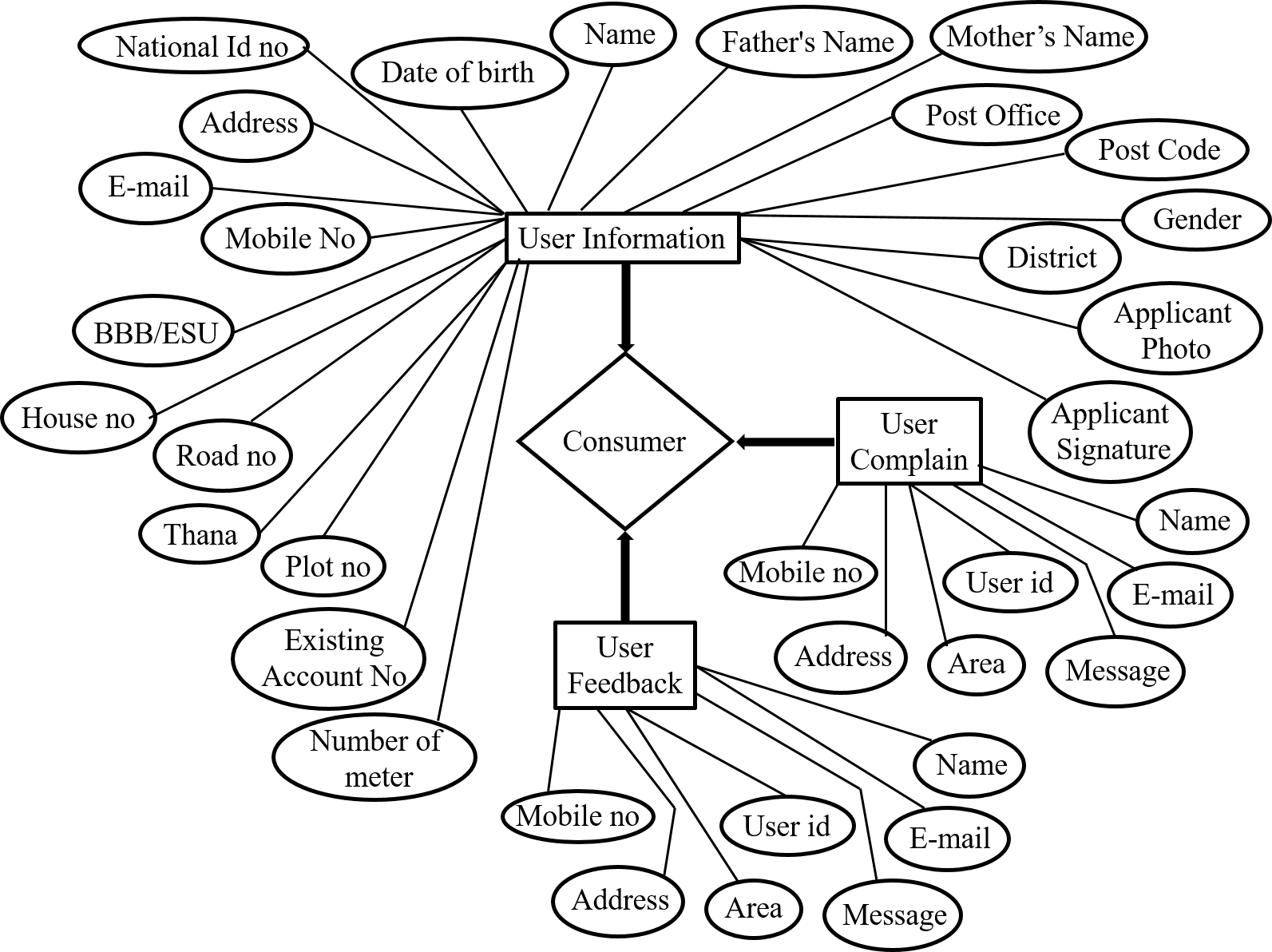
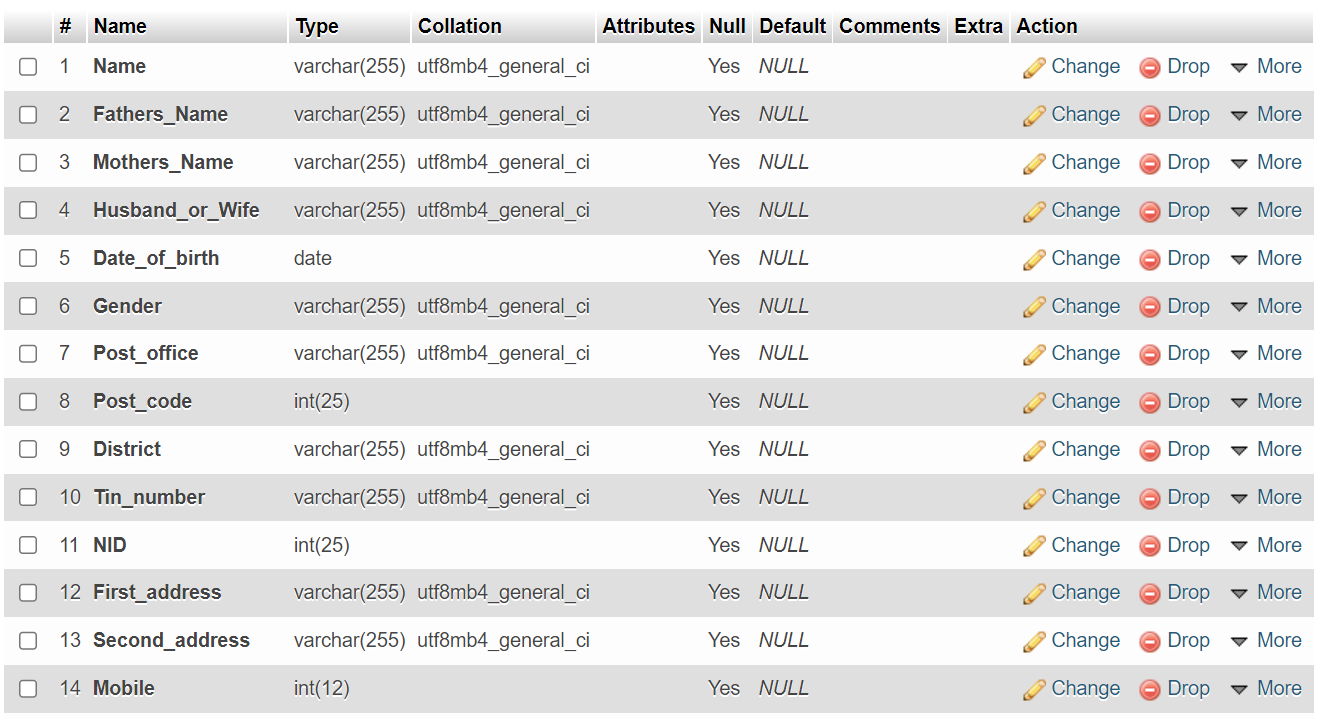
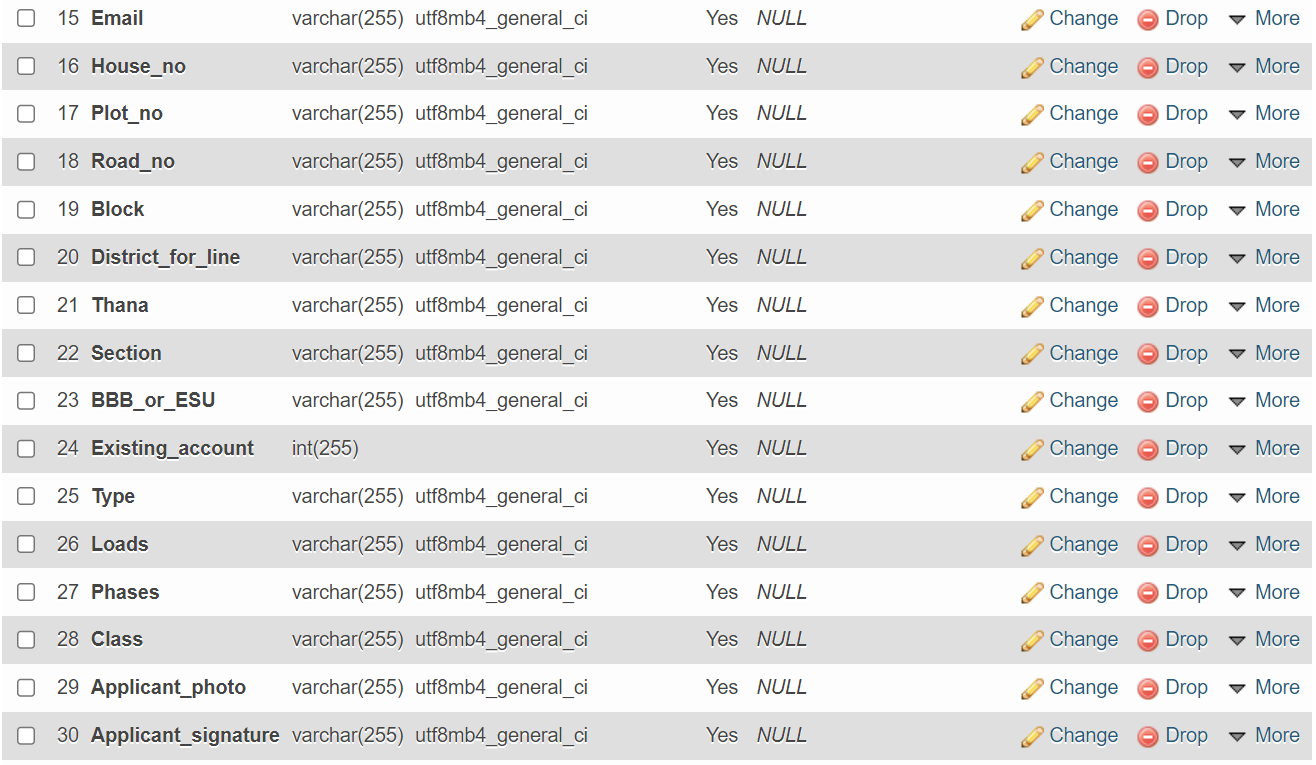


Figure 6.1 Entity Relationship diagram of consumer.

* + 1. **Structure of tables**

The structures of each table of the database are shown in Figure 6.2, 6.3, 6.4.





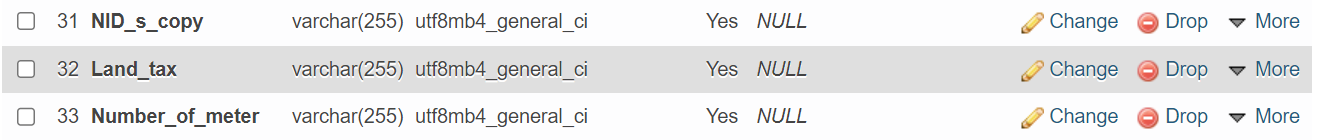


Figure 6.2 Structure of CONSUMER INFORMATION table.

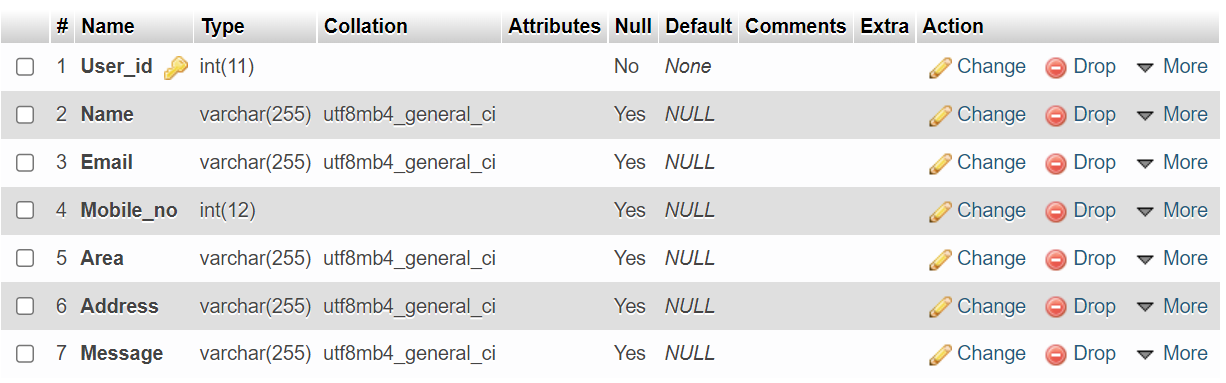


Figure 6.3 Structure of COMPLAIN table.

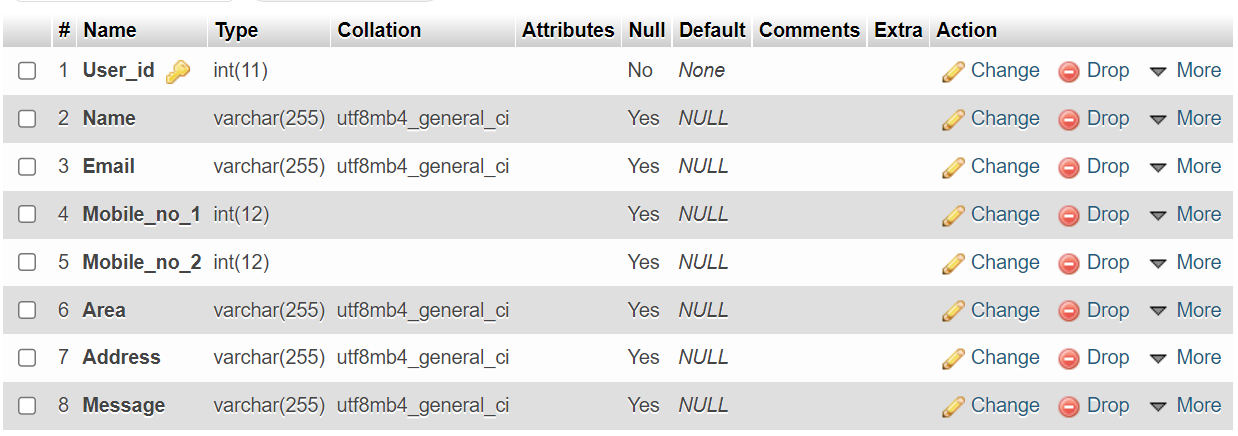


Figure 6.4 Structure of FEEDBACK table.

**6.3 Conclusion**

The three tables of the database remove the redundancy of data. It is not necessary to see every attribute for finding a specific information. Hence this type of relational database design makes the use of space, efficient. Also, the query time for searching an information is reduced as specific information can be searched at specific table.